ABET

Self-Study Report

for the

Bachelor of Sciences in Engineering – Mechanical Engineering

at

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

University of Nevada, Las Vegas
Las Vegas, Nevada
July 1, 2010

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Mechanical Engineering
Bachelor of Science Degree in Engineering (B.S.E)
University of Nevada, Las Vegas

BACKGROUND INFORMATION

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B. Program History

Engineering at UNLV has come a long way since 1957, when Herb Wells, a local mining engineer, began part-time instruction. In 1961, he offered 80 students courses that could lead to enrollment in the bachelor's program. Local growth led to the establishment of UNLV's School of Engineering in 1976, which was housed within the College of Sciences. The next two decades were a period of rapid expansion for the school. In 1984, the University of Nevada Board of Regents approved separate bachelor's and master's degrees in mechanical engineering, civil engineering, electrical engineering, and computer science. Two years later, Dr. William Wells became the first director of the School of Engineering, and by 1987, all eligible engineering programs had received accreditation through the National Accreditation Board of Engineering and Technology (ABET).

In 1988, the School of Engineering separated from the College of Sciences to form the Howard R. Hughes College of Engineering, named for one of the most innovative aviators and engineers of the 20th century and a central figure in the growth of Las Vegas. The next year saw the completion of the Thomas T. Beam Engineering Complex, where for the first time the college's programs were consolidated into a single, multidisciplinary space. The college has also added master's degrees in biomedical engineering, aerospace engineering, and materials and nuclear engineering; a construction management program. The college houses Air Force and Army ROTC units.

In 1991, doctoral programs were approved in all four academic departments of the College of Engineering. In 2005, the college introduced the first new academic programs in more than 25 years: the department of Aerospace Studies and the School of Informatics, which focuses on the applied side of computer science with an emphasis on entertainment and security.

Under the direction of the current Dean, Dr. Rama Venkat, the college has continued to advance, enrolling more than 1,600 undergraduates and about 250 graduate students. With 12 research centers and three laboratories, research expenditures have grown from $3 million a year in 2001 to more than $10 million a year.

To accommodate the growth in research and programs, the new Science and Engineering Building (SEB), adjacent to the Thomas T. Beam Engineering Complex, was completed in 2009. Designed for interdisciplinary teaching and research, this 200,000-square-foot structure houses state-of-the-art laboratory facilities and computing equipment.

In the years ahead, the college will continue to pursue its mission: to provide students with a solid foundation of practical and empirical knowledge to enable them to solve wide-ranging problems, to stay abreast of rapidly changing technology, and to recognize their responsibilities to society.

Started as the Department of Civil and Mechanical Engineering in 1984, the original goal of the program was to contribute to diversification of the southern Nevada economy. In 1989, the Department of Mechanical Engineering was separated from Civil and Mechanical Engineering, and the program was later accredited by the Accreditation Board for Engineering and Technology (ABET) in 1986, 1992, 1998, and 2004. In 1991, a doctoral program was initiated in the program to emphasize that excellence in teaching can evolve from strong faculty research activities as shown in its mission statement in the 2010-2012 Undergraduate Catalog:

> *"It is the mission of the Department of Mechanical Engineering to prepare students for the lifelong practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school.*
> *In addition, the department sustains an outstanding academic program, motivating the faculty to attain excellence in research by acquiring external funding and by incorporating students into their research programs."*

C. Options

The undergraduate program degree awarded is a Bachelor of Science Degree in Engineering. Students can choose their program emphasis through choice of approved electives, although it is not specified on the transcript or diploma.

D. Organizational Structure

Programs are administrated by department chairs/directors and are organized within colleges. The Dean of each College reports to Executive Vice President and Provost, Dr. Michael Bowers, who reports to President Neal Smatresk. The Provost is responsible for overseeing and aligning UNLV academic and budgetary policy, ensuring the quality of the faculty and student body, expanding the research enterprise and maintaining overall educational excellence. Figure 1 and 2 on the next two pages show the University organizational structure.

The College of Engineering is organized into eight different areas, including two schools, three departments, and four programs. Listed below is more information about the fields of study in the college.

Departments
- Civil & Environmental Engineering
- Electrical & Computer Engineering
- Mechanical Engineering

Schools
- School of Computer Science
- School of Informatics

Programs
- Aerospace Studies & ROTC
- Construction Management
- Entertainment Engineering and Design
- Pre-Engineering

Minors
- Aerospace Studies
- Computer Science
- Engineering Science
- Technology Commercialization

Figure 1 Organizational Structure of University

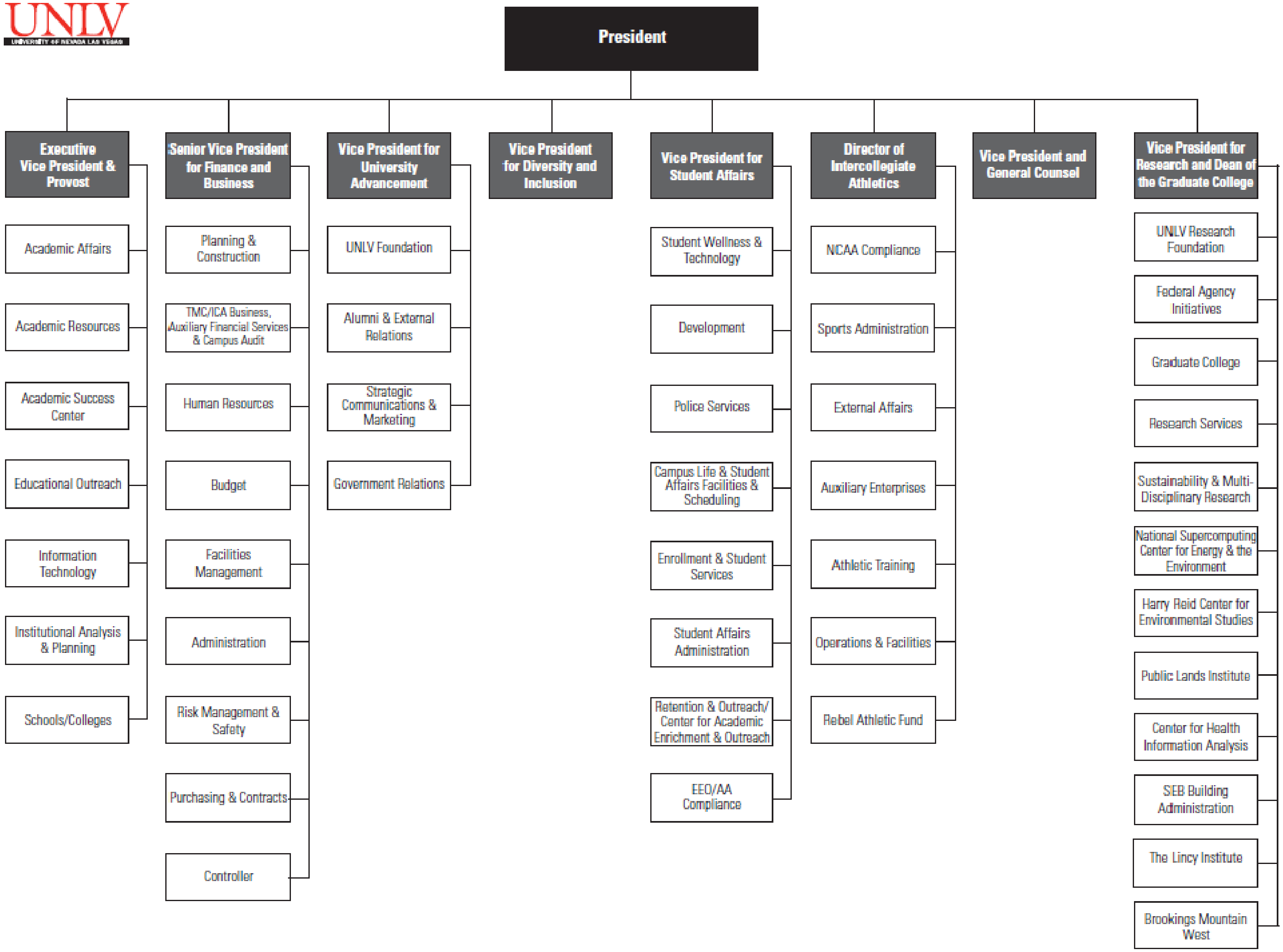
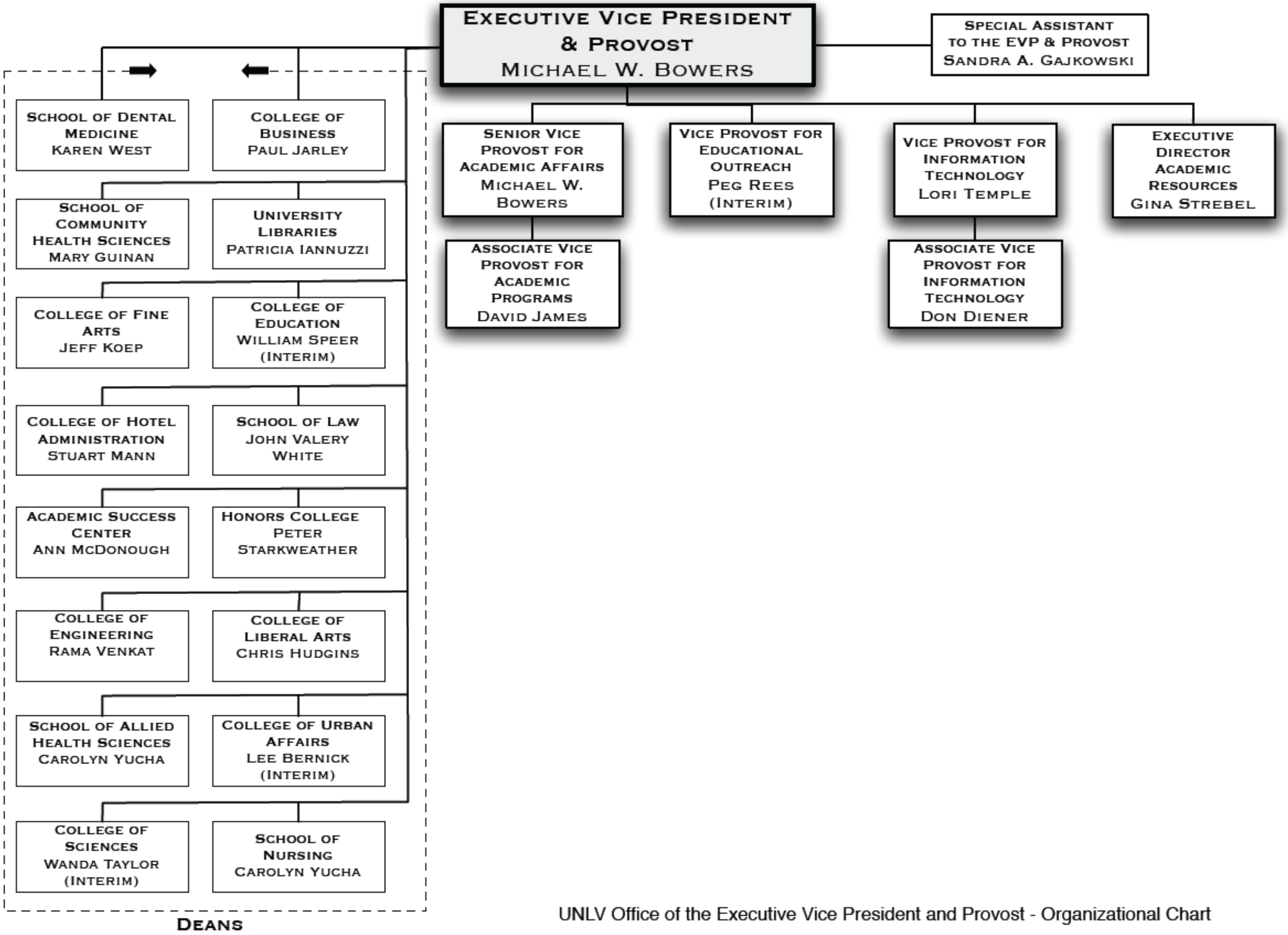


Figure 2 Organizational Structure of Office of Executive Vice President and Provost



UNLV Office of the Executive Vice President and Provost - Organizational Chart

The process of assessment and curriculum development involves constituents at the department, college, and university levels. The College of Engineering ABET Committee is chaired by the Associate Dean, Dr. William Culbreth. The College ABET committee meets regularly and provides college level efforts to guide each program on ABET requirements including space and resources allocation.

The Mechanical Engineering ABET Committee is headed by Department Chair, Dr. Woosoon Yim, and Dr. George Mauer who is also an undergraduate program coordinator as well as department representative to the college curriculum committee. This program-level committee takes the lead role in the detailed work of assessment, evaluation and program improvements. This committee reviews all assessment data from various tools and recommends changes to the curriculum to the ME faculty.

Any curriculum changes typically begin with the program faculty by vote, and are reviewed at the college and university levels to provide well-defined courses in terms of technical content and clarity for students.

E. Program Delivery Modes

The Mechanical Engineering program is a four-year on-campus program offered mostly during daytime. The program operates on Fall and Spring semesters (15 weeks of instruction and one week of final exams), and other general education courses and limited number of engineering courses are additionally offered during the summer. Presently, no undergraduate mechanical engineering courses are offered off-campus or through distance learning except ME 100 Introduction to Mechanical and Aerospace Engineering offered to local magnet high school students, which has been effective to attract local high school students to our engineering programs.

F. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions taken to Address them

F.1 Final statement from 2004 ABET Review

Table F-1 shows the summary of final statement from the 2004 ABET review of the Mechanical Engineering program.

Table F.1 Final Statement of 2004 ABET Review

	Final Statement of 2004 ABET Review
Introduction	*The Mechanical engineering program at the University of Nevada, Las Vegas seeks to prepare graduates for the life-long practice of mechanical engineering and related engineering disciplines, including preparation for an immediate entry position in industry or further study in graduate school. The program also aims to motivate faculty members to attain excellence in research by acquiring external funding and incorporating students into their research programs. The program has a total of 182 (76 FTE) undergraduate students and 13 active faculty members. A majority of the undergraduate students work part-time. The program graduates an average of 19 students per year. The faculty is well qualified and diverse, covering the major areas of the mechanical engineering field.*
Program Strengths	• *The students are enthusiastic about the program and believe that they are getting a good engineering education. The students are offered the opportunity to participate in research projects and in national and regional competitions, in which they perform competitively. Their success in winning first-place position in the Human Powered Vehicle (HPV) competition is impressive.* • *The faculty members are well qualified and appreciate the support that they get from administration in balancing their teaching and research interests. Faculty members appear to be enthusiastic about the program, and morale is good.* • *The leadership offered by the department chair is commended by both students and faculty, and is believed to be critical as the program continues to grow.*
Program Deficiency	***Criterion 6. Facilities*** *Criterion 6 requires that classrooms, laboratories, and associated equipment must be adequate to accomplish the program objectives and provide an atmosphere conductive to learning. The machine shop and laboratories do not offer an atmosphere conductive to learning due to inadequate safety precautions. In particular, safety instructions and signs are not clearly displayed in the equipment areas, emergency switches are not clearly identified, safety eyewear were either not available in the laboratories and shop or their location was not marked, and the ME 100L laboratory is in a room that is too small for the laboratory equipment and the 15-20 students in the class.* • *14-day response: The instruction provided information relative to several safety issues that were observed during to on-site visit and shared information on a recently completed, and successful Department of Environmental Health and Safety inspection (Aug. 12-16, 2004) at the College of Engineering. Additionally, the issue involving exhaust smoke was removed as it was demonstrated that the smoke in question does not involve toxic substance. The institution made the case that the safety issues noted were managed sufficiently by securing the areas in question with student-supervised access only.* • *The deficiency remains pending addition e that the noted al evidenc safety issues are eliminated or managed sufficiently.*

Program Weakness	***<u>Criterion 7. Institutional Support</u>*** *Criterion 7 requires that institutional support, financial resources, and constructive leadership must be adequate to assure the quality and continuity of the engineering program, the one technician available in the department is not sufficient to adequately support both the undergraduate and graduate shop and laboratories needs of the program. Aside from being overextended, this technician appears to lack expertise in CNC machine operation and measurement and data acquisition. This places extra burdens on faculty and limits the scope of laboratory experience for the students.*
Program Concerns	***<u>Criterion 2. Program Educational Objectives</u>*** *Criterion 2 requires the program to have in place detailed published educational objectives that are consistent with the mission of the institution. The program objectives are not fully consistent with the published program educational goals. In particular, one of the educational goals is to "provide graduates with solid academic preparation for professional position and/or graduate study"; however, the program objectives include preparing "graduate to have effective workplace skills" but do not include preparing graduates to succeed in graduate schools. The evaluation and improvement process appears to be in the early stages of development. There does not appear to be clear evidence that student inputs have been systematically used to refine or update educational goals and objectives.* ***<u>Criterion 3. Program Outcomes and Assessment</u>*** *Criterion 3 requires the program to have an assessment process that yields result that are applied to the further development and improvement of the program. The outcome assessment process could be strengthened by more meaningful questions in the alumni survey and by changing the performance rating system of survey and FE results to highlight the potential areas for improvement more clearly.* ***<u>Criterion 4. Professional Component</u>*** *Criterion 4 requires that the program include one year of college level mathematics and basic sciences. The program appears to include only 30 credit hours mathematics and basic sciences which is less that the expected minimum of 32 credit hours.* ***<u>Criterion 5. Faculty</u>*** *The current advising system, with faculty advisor assigned only in the junior and senior years limits the opportunity for students to get career advising during the critical first two years of their engineering education.*

F.2 Actions to Correct Previous Deficiencies, Weakness, and Concerns

As shown in Table F.1, there were several program deficiencies, weaknesses, and concerns in 2004 ABET visit.

First, with respect to Criterion 6, Facilities, (Criterion 7 in 09-10 ABET Criteria) all shop equipment has been inspected. Added safety instructions and signs have been placed in appropriate areas, as well as safety eyewear. The ME 100L laboratory has been moved to the bigger space where 20-30 students can comfortably sit and work on their projects. To remediate the space problem for ME 100L, Anthony Vaughn, the UNLV Director of Academic & Research Space, had allocated an 800 square foot laboratory for exclusive use by ME 100L for Spring 2005 in FDH 141. Currently, the ME 100L is located in the CBC C-234 with more than 1000 sq ft of space.

For Criterion 7, Institutional Support, (Criterion 8 in 09-10 ABET Criteria) we hired a full-time Model Designer / Machinist, Mr. Kevin Nelson, in 2005. In addition to supervising the department machine shop, this machinist position requires proficiency in operating CNC machines and the CAD-based rapid prototyping machine. Mr. Nelson works with faculty members and students in designing experiments and prototypes. His expertise resulted in the training of many students in basic machine tool operations and the basics of CNC machining. He contributed to the increasing quality of senior design projects.

In the same year, we also created a new professional position, the Laboratory Director who oversees all undergraduate and graduate laboratories. Primary responsibilities of the position cover maintenance and development of undergraduate, graduate, and research laboratories in consultation with the appropriate faculty persons. Mr. Jeff Markle, M.S. in Mechanical Engineering, has been in this position since its creation. He comes to us with extensive industrial experience. The duties of the laboratory director include:

- working with faculty members supervising undergraduate labs to upgrade and redesign experiments,
- preparing teaching assistants for conducting their duties,
- interacting with senior design students to help them build their prototypes,
- consult graduate students working on setting experiments,
- help faculty develop and operate research laboratories, and
- installing, maintaining, debugging, and performing periodical maintenance and calibration of department equipment, computers, and software.

For Criterion 2, Program Educational Objectives remained the same as before even though there was a concern of ignoring “preparation for graduate study” in the program objectives. It was our view that it is one of long-term objectives which will be determined by individual students after graduation, as to whether they will pursue the graduate study.

For Criterion 3, Program Outcomes and Assessment, a mapping between CRITERION 3(a)-(k) and our educational outcomes has been made, and individual educational outcomes are assessed using both internal and external assessment methods.

For Criterion 4, Professional Component, as a result of this concern, one three credit math elective course has been added as a graduation requirement. Students can make a choice from MATH 432 (Mathematics for Engineers and Scientists II), MATH 488 (Partial Differential Equations), STAT 463 (Applied Statistics for Engineers), or other 400 level mathematics courses after the approval of the student's academic advisor. After the change, the program has 33 credit hours of mathematics and basic sciences.

For Criterion 5, Faculty, a concern about mentoring only junior and senior students in the program was expressed. Starting in 2005, departments assigned mentors to all students including freshmen and sophomores. The students are required to see their faculty mentors before registering for their classes in each semester.

Several changes have taken place in the program as a direct result of the continuous evaluation of ME faculty of assessment data. While we went through substantial curricular changes in the last several years, we continue to monitor the quality of the program. We also maintain our efforts to upgrade the department labs. Some of our space problems have been solved with the completion of the new Science & Engineering Building (SEB).

Overall, the ME department feels that it meets or exceeds the expectations of our various constituents as measured by various assessment methods of the program outcomes. We are continuously striving to upgrade the quality of the curriculum and upgrade educational laboratories. To maintain the quality of our program, we need to address the following issues:

- Hire additional outstanding faculty
- Use current facilities and the new SEB building efficiently.
- Continue maintaining and upgrading our educational laboratories.
- Continue enhancing our assessment methods.
- Continue updating curriculum in response to technology changes and the demands of our stakeholders.

CRITERION 1. STUDENTS

A. Student Admissions

Admission to the University: Admission to the university requires graduation from an accredited high school with a minimum weighted grade point average of 3.00 on a 4.00 scale in the following required high school courses:

ENGLISH: Emphasis on composition; rhetoric; and American, English, and world literature: 4 units
MATHEMATICS: Algebra or higher-level mathematics, including algebra I and II, geometry, analytic geometry, trigonometry, pre-calculus, probability and statistics and other advanced mathematics: 3 units
NATURAL SCIENCE: (lab or simulation); Including biology, chemistry or physics with at least two years in a laboratory science: 3 units
SOCIAL SCIENCE STUDIES: Including world history, geography, U.S. history, economics, government, or law: 3 units

TOTAL: 13 units

Students who have earned the required high school courses but have not earned a minimum grade point average of 3.00 (on a 4.00 scale) may be admitted to the university if they have earned a combined score from the SAT critical reading and SAT math sections of at least 1040, or an ACT composite score of at least 22, or a Nevada Advanced High School Diploma.

Admission to the College of Engineering and ME Program: Admission policies to the College in the 2010-2012 Catalog are:

> *"**Admission Policies**: A student admitted to UNLV may immediately be admitted to the College of Engineering. Regular admission requires graduation from an accredited high school with a minimum grade point average (on a 4.00 scale) of 3.00. High school graduates are strongly advised to complete four years of English, four years of mathematics, and three years of science while in high school.*

Minimum GPA for admission into Department of Mechanical Engineering is 2.50. Student is considered a "Pre-Major" upon entry to the department until they have met a prescribed set of courses with a minimum earned grade of C or higher and an overall grade point average of 2.5 on a 4.0 scale. Upon completion of this criterion students are then granted "Advanced Standing" and are permitted to begin taking upper-level courses in their major.

B. Evaluating Student Performance

Academic Probation and Suspension: The College of Engineering generally follows the academic policies defined in the University Catalog and monitors the student progress through the College Advising Center. The key department policies for maintaining good academic standing are:

- Grade of C (2.00) or higher must be earned in each engineering course (ME, CEE, EE, EGG) for graduation.
- Grades of C (2.00) or higher are required in all immediate prerequisites of all engineering, construction management, and computer science courses and in ENG 101 and 102.
- An overall 2.3 GPA and 2.5 GPA in engineering courses is required for probation, transfer, and graduation.

The University policy for Academic Good Standing is to maintain a UNLV cumulative grade point average of 2.00 or above.

The College Advising Center verifies that all engineering students are meeting minimum progress defined in each department's policy. Engineering student schedules are reviewed during Spring and Fall semesters. Administrative probation letters are mailed out when students do not meet the minimum progress requirements. Failure to meet the terms of the administrative probation letter results in an administrative suspension letter.

Following the University Policy, the college will suspend the student for a minimum of one calendar year. College suspension does not suspend a student from the university; however, a suspended student will not be permitted to take any UNLV credit course until the student has secured re-admittance or acceptance by another college. Administrative suspension letters are mailed at the end of regular Spring and Fall semesters and effective immediately. Students who are enrolled for the following semester will be retracted after the appeal deadline outlined in the letter. Students on academic probation are required to meet the minimum progress requirements per the probation letter. University suspension also automatically suspends the student from the program and college in which he or she is enrolled. A certified letter mailed to the last address provided by the student to the Office of the Registrar & Admissions will discharge all university responsibility for notification. The college may readmit a student suspended by the college, upon application to the dean, in accordance with college and department rules. Petitions for relief from college and department rules must include approval of advisor, department chair, and dean. The decision of the college may be further appealed to the Faculty Senate Academic Standards Committee.

Academic Distinction: Undergraduate students are eligible for the dean's honors list if: (1) at least 12 credits have been completed during the semester with grades on the ABCDF scale, and (2) the semester grade point average is 3.50 or higher. Students who complete the requirements for University and/or Department Honors and departmental requirements for their major with a GPA in honors courses of at least 3.00 and a minimum of 60 credits at UNLV toward a baccalaureate degree with an overall UNLV GPA of at least 3.30 will graduate with university and/or Department Honors. In addition, students will graduate cum laude if their UNLV GPA is between 3.50 and 3.69 or magna cum laude if their UNLV GPA is 3.70 or higher. Summa cum laude is earned by students who complete Department Honors with a UNLV GPA of 3.70 or higher and receive a grade of A on their senior thesis/project (HON 499 H). The student graduating with the highest four-year UNLV grade point average is awarded the Nevada Centennial Medallion in a special ceremony.

C. Advising Students

The Engineering Advising Center was created in July 2001 to centralize the undergraduate academic advising services, as well as assessment, recruitment and retention initiatives, for the Howard R. Hughes College of Engineering. Students working towards the B.S.E. in Mechanical Engineering are evaluated, advised, and monitored through the Engineering Advising Center. The Director of Advising & Assessment directs the office. A centralized advising approach is used in order to better maintain a consistent application of University, College, and Departmental policies, and to provide year-round academic advising services to the College's undergraduate students. All student files are maintained in the Engineering Advising Center.

In addition to the Advising Director, the Engineering Advising Center is staffed by full-time professional advisors and classified staff members. The professional advisor and classified staffs oversee the advising of Pre-Major Mechanical Engineering students. The Advising Director and professional advisor are responsible for providing aggressive academic counseling for those students who are on academic probation.

Upon completion of pre-major coursework, Mechanical Engineering students obtain advanced standing status. All students are assigned a faculty member who acts as their mentor and meets with the student each semester until graduation. The Director and Faculty Advisor collaborate in tandem to provide academic and career advising to the Department's Pre-major and Advanced Standing students.

Each undergraduate student works closely with his/her advisor to schedule and execute their academic program. Students are required to meet with an advisor every semester, prior to registering for the upcoming semester, in order to have their "advising hold" removed. During advising appointments students sign a contract with their advisor and are reminded of the necessary prerequisites for courses that they plan to take the following semester. The Department Chair considers exceptions to Departmental policies on a case-by-case basis through a petition process.

Most student-related forms are processed in the Advising Center. Depending on the form and student's major, the director of the Advising Center has signature authority to sign for the advisor and the Department Chairs. The majority of the general education and interpretation of transfer questions are handled in the Advising Center based on the transfer credit policy together with the Department Chairs.

The Advising Center has past and present flowcharts and curriculum sheets for all engineering majors, major technical electives, and engineering-related pamphlets for student perusal. The Advising Center is able to answer most university, college, and department related questions or refer to the correct offices. The followings are the areas of administrative advising conducted by the Center:

- Academic probation/suspension
- Academic expectations
- Transfer credit evaluation
- Catalog changes/Choice of catalog
- Change of majors
- Course substitutions
- Double majors and minors
- General educational requirements
- Course scheduling
- Graduation applications
- Prospective students advising
- Student orientation and advising

C.1 Faculty Advising in the Mechanical Engineering Program

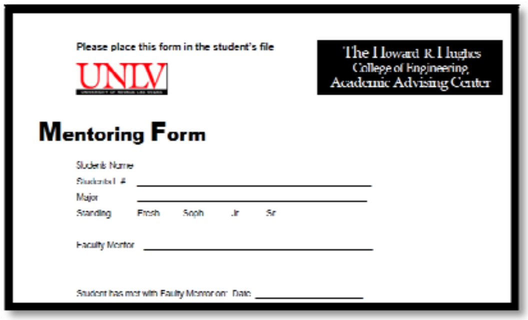
All Mechanical Engineering faculty helps assure that graduates have technical knowledge and experience that is appropriate to their interests and career goals for advising on the appropriate selection of technical electives and senior design project.

The Department Chair serves as the official faculty advisor for all students. The Department assigns a faculty mentor for all students including incoming freshmen. The student mentor list is updated each semester to add new, incoming, and transfer students and delete the students who graduated. Also, the mentor list is shared with the College Advising Center to ensure all students meet their faculty mentors before they register for courses in each semester.

Figure 1.1(a) shows the mentoring roles of faculty and the Advising Center, and Figure 1.1(b) shows the Mentoring Form used by the College Advising Center. The signed form is kept in the student folder in the Center.

Faculty Mentors	**College Advising Center**
• Academic Progress and Course Planning • Academic Goals • Career-related issues • Graduate School • ME Electives • FE Exam Prep • Reviews of academic progress/checklist Complete Mentoring Form and return to Advising Center and also faculty can access Advising Data System web site at: https://advising.apps.unlv.edu/engineering/auth/login.php	• Maintains student files • Orient student to the University /College • Assist registration • Facilitates transfer credit evaluation • Reviews pre- and co-requisites • Processes all student paperwork and forms • Processes graduation applications • Removes any advising holds • Meets with Probationary Students • Conducts all correspondence to students regarding curriculum, major and policy changes

Figure 1.1 (a) Roles of Faculty and Advising Center for Student Mentoring



Please place this form in the student's file

UNLV

The Howard R. Hughes
College of Engineering
Academic Advising Center

Mentoring Form

Student's Name
Student ID # ____________________
Major ____________________
Standing Fresh Soph Jr Sr

Faculty Mentor ____________________

Student has met with Faculty Mentor on: Date ______________

Figure 1.1 (b) Mentoring Sign-in Form

C.2 Career Service

Career counseling is provided by the staff listed above in collaboration with the department and the Office of Career Services. In cases where a staff member cannot answer a career question, the student is then referred to a faculty mentor in the department with expertise in the area in which the student is interested. The Office of Career Services provides career counseling to College of Engineering students both in their main office location and at a walk-up location in the Engineering Great Hall on alternate Wednesday mornings. The walk-up location has proven to be a popular way for the Engineering Career Services Representative to engage engineering students in the career planning process as early as their freshman year.

C.3 Disability Resources Center

The office provides services to students with permanent or temporary disabilities, including academic and disability management advising. See also: http://drc.unlv.edu/

C.4 Multicultural Engineering Program (MEP)

Since 1989, the Multicultural Engineering Program (MEP) has prepared minority groups in the rigorous disciplines of engineering, computer science, informatics, and construction management for graduation and employment. The MEP supports programs designed to recruit, retain, and graduate educationally disadvantaged students, and builds an academic support community and provides the necessary bridges for students' academic and professional success. The MEP offers classes for effective learning techniques, a study center, tutoring, group study workshop, professional development and industry networking opportunities, and scholarship opportunities.

The program was initially created due to the underrepresentation of American-Indians, African Americans, and Latino and Hispanic Americans in the engineering, computer science, informatics, and construction management professions. Currently, women are also considered an underrepresented group and are actively sought for employment internationally, nationally, and regionally within the engineering profession.

Although the program is open to all engineering students at UNLV, the mission is to increase the enrollment, retention, and graduation of engineers from the historically underrepresented groups. Applications to join are available in the MEP offices.

Tutoring Services and Study Groups: Tutoring for all levels of math, science, engineering, and computer science is available for MEP students. Special study groups comprised of MEP students taking the same classes are organized and conducted regularly to help students succeed in their course work. In addition, one-on-one tutoring is also available by appointment.

Motivation and Career Awareness: Providing several opportunities to explore career options, research college majors, get involved with professional industry organizations, establish peer and professional mentoring relationships, and participate in internships with community partners.

Financial Aid and Scholarships: Several scholarships are available throughout the year from public and private companies for students in engineering programs, and MEP students get the benefit of receiving scholarship information firsthand from various community partners. A scholarship application is required to be eligible for one or more of the MEP scholarships.

Student Organizations: There are a variety of student organizations affiliated with the UNLV MEP, including the American Indian Science and Engineering Society (AISES), the National Society of Black Engineers (NSBE), and the Society of Women Engineers (SWE). MEP students have the opportunity to join these organizations and meet other students who share their same academic and professional interests at a local and national level.

MEP Study Center: The MEP Study Center is available to all MEP students weekdays and evenings, and located in TBE A-207. The center is equipped with a computer lab, photocopier, writing center, and staff to assist students in fulfilling their academic goals.

D. Transfer Students and Transfer Courses

Admission policies are described in the College of Engineering section of the Catalog:

> *"**Transfer Policies:** Transfer students from other universities or from other UNLV colleges must have a minimum GPA of 2.50 for admission to the College of Engineering. Transfer students with a GPA of less than 2.50 can be admitted on probationary status and must schedule an interview with the Director of Advising prior to entering the college. The student may be required to agree to an academic performance contract."*

The evaluation of transfer credits in the College of Engineering is made jointly by the Office of Transitional Services, the Advising Director, and the Department Chair. The Office of Transitional Services and the Advising Director are responsible for reviewing transfer courses that are compatible with the general education core requirements. The University has an articulation agreement already established with neighboring institutions and "feeder schools," which eases the repetitive review of transfer courses from these institutions. Courses that are not previously articulated, and pertain to engineering, are evaluated by the respective department for possible transfer credit. The number of transfer students to the department has held steady over the last few years as Table 1.2 shows.

The following is the policy of transfer credits of the College of Engineering Advising Center:

- *General education and other classes such as math classes not taught by the College of Engineering that UNLV accepts for transfer credit can be applied toward our degree requirements.*
- *Transfer credit from an ABET accredited college for one and two hundred level classes taught by the College of Engineering can be applied toward the degree requirements only if the class is equivalent to our class. Equivalent means that the class content including imbedded laboratory experience and prerequisites for the class are the same as our class. One hundred and two hundred level engineering classes can be transferred from a non-ABET accredited college upon verification that the class is equivalent to our class, was taught by a qualified instructor, and that the university is accredited by an external accreditation agency.*
- *No three or four hundred level classes can be transferred to our programs from any other program, either ABET accredited or non-ABET accredited without the approval of the program Department Chair and the approval of an Associate Dean of the College of Engineering. Approval will only be granted if the content, learning objectives, and imbedded laboratory experience are equivalent to our class and the transfer class was taught by a qualified instructor. The burden of proof of equivalence for three and four hundred level classes lies with the student who must provide all required supporting documentation.*
- *One hundred and two hundred level College of Southern Nevada (CSN) classes and classes from other Nevada Universities can be transferred to our programs if the College of Engineering Department Chair has verified that the class is equivalent to our class and has approved the class instructor. Classes from Fort Valley State University can be transferred to our engineering programs because we have a transfer agreement with Fort Valley.*

E. Graduation Requirements

A student enrolled at a Nevada System of Higher Education (NSHE) institution may elect to graduate under the catalog of the year of enrollment in a baccalaureate-level program or the year of admission to the university and enrollment in the catalog of the year of the declaration of major or the year of graduation. Whichever catalog is used, it cannot be more than 10 years old at the time of graduation.

In the case of NSHE transfer students, any exceptions to this policy will be handled by the Transfer Center and the transfer agreement contract process. To be guaranteed the catalog of choice upon transfer, a student must have an approved transfer agreement on file with the university.

The university does not guarantee the awarding of a degree based on the unchanged requirements of a particular catalog. Periodic revisions of degree requirements are made because of advances in knowledge, changes in occupational qualifications, or the expectations of accrediting authorities. If such revisions have occurred, the college dean may require a reasonable adherence to the college and department requirements of a recent or current catalog. Institutional catalogs do not constitute contractual agreement or commitments. It is the responsibility of students to keep in touch with the major department in order to learn of such requirements and to plan ahead for their satisfaction.

Minimum Grade Point Average for Graduation: In order to graduate, an undergraduate student shall have a minimum cumulative grade point average of 2.00 for the total of all college-level credit attempted at the University of Nevada, Las Vegas (UNLV GPA). Department GPA requirements must also be met. Particular grade requirements are also required for individual courses within different majors in the college. For example, all engineering students must earn C's or above in all courses that are pre-major or courses and/or prerequisites to another course. The following are the Department Policies for graduation:

1. Grade of C (2.00) or higher must be earned in each engineering course (ME, CEE, EE, EGG) for graduation.
2. Grades of C (2.00) or higher are required in all immediate prerequisites of all engineering, construction management, and computer science courses and in ENG 101 and 102.
3. An overall 2.3 GPA and 2.5 GPA in engineering courses is required for probation, transfer, and graduation.
4. All mechanical engineering students must take the Fundamentals of Engineering Discipline Specific Mechanical Engineering Examination as a graduation requirement. Students who fail to pass the exam are required to take the Fundamentals of Engineering Discipline Specific Mechanical Engineering Examination a second time.

Application for Graduation: Each undergraduate student should file an application for graduation two semesters before the proposed date of graduation. Students must have expected senior standing (earned credits plus credits currently enrolled in, equal to 90 or more) at the time of application. Students will be given a date to return the application packet. As shown in Figure 1.2, when a student applies for graduation, the University Graduation Office reviews the application and checks that the General Education Core requirements have been met. The application is then forwarded to the Engineering Advising Center, or a faculty advisor, to undergo an audit of all courses taken for evaluation to determine the student's final course schedule. The application is then forwarded to the Department Chair for approval. Once the Department Chair has approved the graduation application, then the Director of Advising & Assessment is the final signature in the approval process.

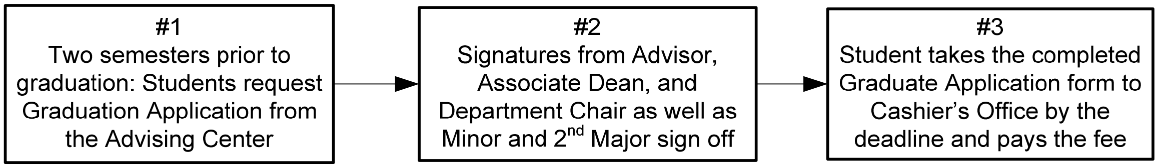


Figure 1.2 Graduate Application Process

F. Enrollment and Graduation Trends

Table 1-1 shows the admissions standards for mechanical engineering freshmen for past 5 years. Both ACT and SAT composite scores remain nominally the same or slightly increased. Percentile rank in high school has increased steadily as well as the number of new students enrolled even as the enrollment standard of the university increased twice in the last five years. Table 1-2 shows the number of transfer students enrolled in the past five years. As shown in Table 1.2, there has been a steady increase in transfer student in last five years.

Table 1.1 History of Admissions Standards for Freshmen Admissions for Past Five Years

Academic Year	**Composite ACT**		**Composite SAT (SAT-V/SAT-M)**		**Percentile Rank in High School**		**Number of New Students Enrolled**
	MIN.	AVG.	MIN.	AVG.	MIN.	AVG.	
2009-2010	13	23.4	280/420	523/581	29%	75%	61
2008-2009	17	24.1	380/300	574/566	25%	79%	69
2007-2008	17	23.1	370/410	500/552	29%	72%	58
2006-2007	15	22.3	390/400	530/590	21%	70%	45
2005-2006	18	23.5	410/330	560/523	21%	68%	64

Table 1.2 Transfer Students for Past Five Academic Years for ME and MEPRE Programs

Academic Year	**Semester**	**Number of Transfer Students Enrolled**	**Number of New Transfer Students**
2009-2010	Fall 2009	108	29
	Spring 2010	99	7
2008-2009	Fall 2008	94	26
	Spring 2009	87	7
2007-2008	Fall 2007	94	9
	Spring 2008	88	11
2006-2007	Fall 2006	79	18
	Spring 2007	81	8
2005-2006	Fall 2005	63	11
	Spring 2006	73	13

Table 1.3 and Figure 1.3 show the enrollment trends for the past five years. The number of full time and part-time undergraduate students has increased steadily at an average rate 15% per year as well as part-time students. Also, there has been a significant increase in the number of B.S. degrees conferred in past five years. The decrease observed in the number of graduate students is mainly due to the decrease in the research expenditures in last several years. However, the department maintains a healthy number of PhD students in the program (Figure 1.3), which is considered an important factor that determines the quality of the graduate program, and more Ph.D. degrees have been given in recently three years as shown in Figure 1.4. The undergraduate headcount increase in last five years can be explained by several factors including the population increase in southern Nevada, our continued effort to communicate

with local magnet high schools, and the recent expansion of our research programs. We expect both trends to continue within the foreseeable future.

Table 1.3 Enrollment Trends for Past Five Academic Years

	Year (2005-2006)	**Year (2006-2007)**	**Year (2007-2008)**	**Year (2008-2009)**	**Year (2009-2010)**
	F2005	F2006	F2007	F2008	F2009
Full-time Undergraduate Students Headcount	168	169	197	230	244
Part-time[1] Undergraduate Students Headcount	38	65	65	66	68
Student FTE[2] (Undergraduate)	105	104.8	109.4	129.5	113.4
Student FTE[3] (Graduate)	43.1	45.1	49.7	38.6	32.8
Degree Conferred (B.S./M.S./Ph.D.)	16 (B.S.) 33 (M.S.) 2 (Ph.D.)	20 (B.S.) 17 (M.S.) 1 (Ph.D.)	25 (B.S.) 22 (M.S.) 10 (Ph.D.)	35 (B.S.) 20 (M.S.) 6 (Ph.D.)	39(B.S.) 5(M.S.) 6(Ph.D.)

[1] Defined for undergraduate students taking less than 12 cr.
[2] Full-Time Equivalent for Undergraduate Students (15 cr.)
[3] Full-Time Equivalent for Graduate Students (M.S.=12 cr., PhD=9 cr.)

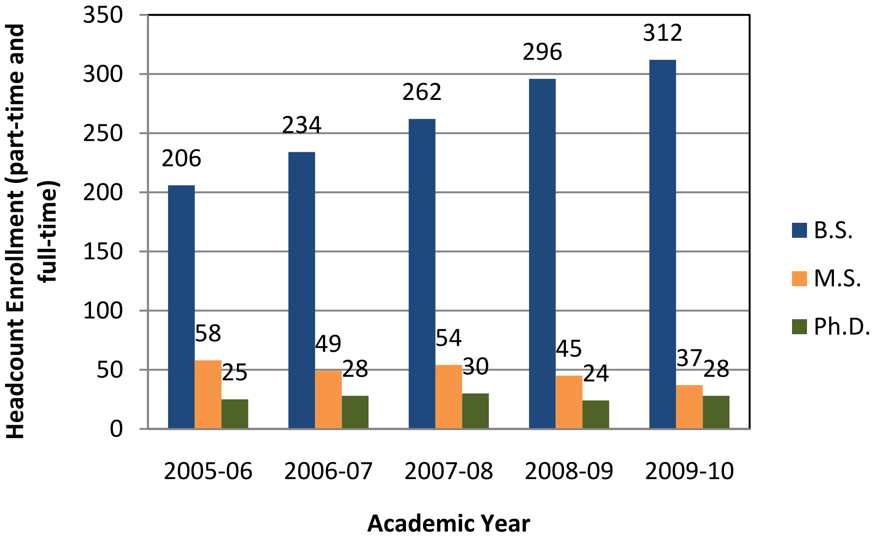


Figure 1.3 History of Graduate and Undergraduate Enrollment in the Department of Mechanical Engineering

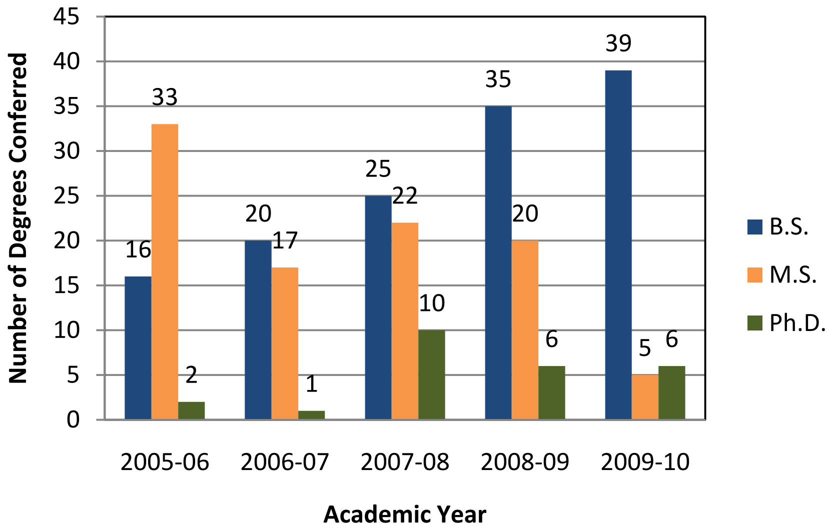


Figure 1.4 Number of Graduate and Undergraduate Degrees Conferred in the Department of Mechanical Engineering

Table 1.4 shows a three year trend of retention rate for ME program, which demonstrates continued improvement in the retention rate. Also, it shows a higher overall retention rate compared with the college and other programs (Table 1.6). Table 1.5 shows the retention rate for pre-ME program students, and Table 1.6 is the same data by department in the college.

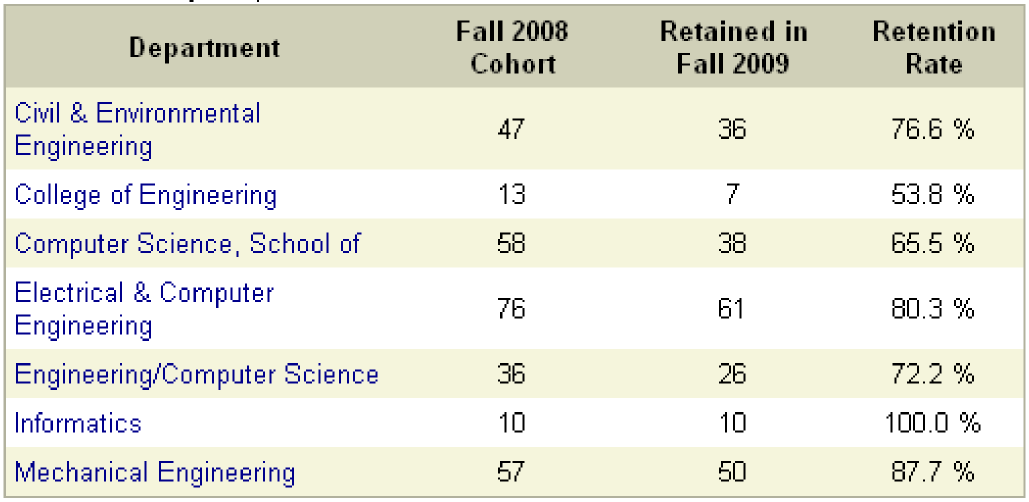
Table 1.4 Three Year Trend of Retention Rate for ME Program and College of Engineering

Cohort Term	Cohort		Retained to Next Fall		Retention Rate	
	College	Mech. Eng	College	Mech. Eng	College	Mech. Eng
Fall 2008	297	57	228	50	76.8%	87.7 %
Fall 2007	230	55	177	43	77.0%	78.2 %
Fall 2006	209	35	160	26	76.6%	74.3 %
Combined Cohort	736	147	565	119	76.8%	81.0 %

Table 1.5 Retention Rate for Pre-ME Program

Program	Fall 2008 Cohort	Retained in Fall 2009	Retention Rate
MEGPRE	57	50	87.7 %

Table 1.6 Retention Rate, Breakdown by Department



Department	Fall 2008 Cohort	Retained in Fall 2009	Retention Rate
Civil & Environmental Engineering	47	36	76.6 %
College of Engineering	13	7	53.8 %
Computer Science, School of	58	38	65.5 %
Electrical & Computer Engineering	76	61	80.3 %
Engineering/Computer Science	36	26	72.2 %
Informatics	10	10	100.0 %
Mechanical Engineering	57	50	87.7 %

Table 1.7 is a sample of 25 graduates and what they did after graduation. We can observe that there is large number of students who joined the graduate program, 10 students or 40%, which may reflect the recent recession of the U.S. economy as well as our continued encouragement of the students for the need of advanced degrees in engineering, which is one of our educational objectives. Out of 25 graduates, 8 students or 32% joined various types of industries.

Table 1.7 Program Graduates (For the most recent 25 graduates)

	Year Matriculated	Year Graduated	Prior Degree(s) if Master Student	Certification/ Licensure (If Applicable)	Initial or Current Employment/ Job Title/ Other Placement
1	Fall 2005	Spring 2009		N/A	Kloehn, Inc.
2	Fall 2004	Spring 2009			Unknown
3	Fall 2005	Spring 2009	B.S. in Mech. Eng.		Graduate Program
4	Spring 2006/Transfer	Spring 2009			Unknown
5	Fall 2006/Transfer	Spring 2009	B.S. in Mech. Eng.		Graduate Program
6	SUMMER 2005	Spring 2009			Unknown
7	Fall 2006/Transfer	Spring 2009	B.S. in Mech. Eng.		Graduate Program
8	Fall 2006/Transfer	Spring 2009	B.S. in Mech. Eng.		Graduate Program
9	Fall 2005	Spring 2009			NV Energy
10	Fall 2004	Spring 2009			Unknown
11	Fall 2004	Spring 2009			Unknown
12	Fall 2000	Spring 2009			NV Energy

13	Spring 2006/Transfer	Spring 2009			Bigelow
14	Spring 2006/Transfer	Spring 2009	B.S. in Mech. Eng.		Graduate Program
15	Fall 2005/Transfer	Spring 2009	B.S. in Mech. Eng.		Graduate Program
16	Fall 2004	Spring 2009	B.S. in Mech. Eng.		Graduate Program
17	Fall 2005	Spring 2009			Military
18	Fall 2004	Spring 2009	B.S. in Mech. Eng.		Graduate Program
19	Fall 2004/Transfer	Spring 2009	B.S. in Mech. Eng.		Allegiant Airlines
20	Fall 2004	Spring 2009			Unknown
21	Fall 2004	Spring 2009			Frito-Lay
22	Fall 2003	Spring 2009	B.S. in Mech. Eng.		Graduate Program
23	Spring 2005/Transfer	Fall 2008	B.S. in Mech. Eng.		Graduate Program
24	Fall 2004	Fall 2008	B.S. in Mech. Eng.		Jones & Elliott
25	Fall 2003	Fall 2008			Unknown

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

The missions of UNLV, College of Engineering, and the Mechanical Engineering Department are listed. A separate section relates the relation between these mission statements. The program educational goals and objectives are presented. Each of these objectives has a specific set of measurable outcomes. These outcomes are related to the (a) through (k) ABET outcomes. Program constituents are listed. The means of communications with these constituents are explained. This chapter also describes in detail the process used to establish and review the program educational goals and objectives. A brief overview of the curriculum and how it is configured to achieve the program educational objectives is included. These elements form a process of continuous program monitoring and improvement. A separate section documents the current status of achieving the program educational objectives.

ABET Definition:

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Assessment under this criterion is one or more processes that identify, collect, and prepare data to evaluate the achievement of program educational objectives.

Evaluation under this criterion is one or more processes for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which program educational objectives are being achieved, and results in decisions and actions to improve the program.

***Frequently Used Terms and Definition in this Report*:**

Program Educational Objectives: Statements that describe what students should know and be able to do by graduation time and during the first several years following graduation.

Program Outcomes: Measurable outcomes associated with each objective that describes what students are expected to know by the time of graduation and assessed on a regular basis.

ME: Department of Mechanical Engineering, University of Nevada, Las Vegas

ME Advisory Board (MEAB): The Department of Mechanical Engineering Advisory Board representing local and regional interests in the process of assessment and upgrading of our graduates and undergraduate programs.

ME Curriculum Committee (MECC): The Department consists of three faculty representatives that monitor the curriculum and supervises implementation of assessment methods.

A. Mission Statement

A.1 Mission of University of Nevada, Las Vegas

The University of Nevada, Las Vegas, is a research institution committed to rigorous educational programs and the highest standards of a liberal education. We produce accomplished graduates who are well prepared to enter the work force or to continue their education in graduate and professional programs. Our faculty, students, and staff enthusiastically confront the challenges of economic and cultural diversification, urban growth, social justice, and sustainability. Our commitment to our dynamic region and State centrally influences our research and educational programs, which improves our local communities. Our commitment to the national and international communities ensures that our research and educational programs engage both traditional and innovative areas of study and global concerns. UNLV's distinctive identity and values permeate a unique institution that brings the best of the world to our region and, in turn, produces knowledge to improve the region and world around us.

UNLV is committed to and driven by these shared values that will guide our decision making:

- High expectations for student learning and success;
- Discovery through research, scholarship, and creative activity;
- Nurturing equity, diversity, and inclusiveness that promotes respect, support, and empowerment;
- Social, environmental, and economic sustainability;
- Strong, reciprocal, and interdependent relationships between UNLV and the region around us;
- An entrepreneurial, innovative, and unconventional spirit.

Source: http://www.unlv.edu/about/mission.html

A.2 Mission of the Howard R. Hughes College of Engineering

The mission of the Howard R. Hughes College of Engineering is to educate the future leaders, innovators, and entrepreneurs while discovering, integrating, and applying new engineering and computer science knowledge in service to society.

The overarching goals of the College of Engineering are to:

- Enable students to achieve excellence in engineering, informatics, computer science, and construction management.
- Promote the discovery, integration, dissemination and employment of new engineering, informatics, computer science, and construction management knowledge in service to society;
- Enable economic growth while increasing the quality of life and maintaining the ecosystem. Our core strategy for undergraduate learning in engineering, computer science, informatics and construction management embraces four distinct objectives:
    - Graduates will be technically competent in core areas within their discipline and related mathematics and sciences.
    - Graduates will be able to work within a team and communicate effectively through oral, graphical, and written modalities.
    - Graduates will be able to synthesize diverse information to develop creative design solutions.
    - Graduates will be able to function effectively in an evolving profession.

We provide students a high-quality, rigorous, and innovative educational experience that enables them to address the needs and concerns of society by considering not only the technical aspects of the problems but also the social, environmental, economic, and political consequences of their decisions. All programs in the college provide the student with a high-quality education by incorporating subject matter from science, mathematics, social sciences, and humanities in addition to the major discipline. Development of communication skills, including written, oral, and graphical, are emphasized. Thus, we provide a rich and fertile environment in which the student acquires knowledge and skills, learns to make informed decisions, expresses creativity, and develops an appreciation for learning as a lifelong process.

We support the development of innovative teaching and learning strategies, appropriate use of technology in classrooms and laboratories, and the fostering of an atmosphere in which an ethnically and socially diverse student body and faculty can flourish.

Design is a fundamental part of the college curricula. Entering students are introduced to concepts of design, which are integrated throughout their programs, culminating in a senior-year, team-oriented, multidisciplinary capstone design project.

Upon graduation, our students are well prepared to pursue a professional career, enter educational paths such as law and medicine or pursue graduate education in engineering, informatics, computer science, or construction management.
Source: UNLV 2010-2012 Undergraduate Catalog

A.3 Mission of the Department of Mechanical Engineering

It is the mission of the Department of Mechanical Engineering to prepare students for the lifelong practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school.

In addition, the department sustains an outstanding academic program, motivating the faculty to attain excellence in research by acquiring external funding and by incorporating students into their research programs.
Source: UNLV 2010-2012 Undergraduate Catalog

A.4 Relation Between Department, College, and University Missions

Once the current university mission was defined and adopted in 2008, the College of Engineering started developing its mission statement. Each department in turn started developing a mission statement that matches those of the college and university.

The mission of the department directly supports and is consistent with those of the college and university. The mission statement of the university states, "*The University of Nevada, Las Vegas, is a research institution committed to rigorous educational programs and the highest standards of a liberal education. We produce accomplished graduates who are well prepared to enter the work force or to continue their education in graduate and professional programs*". The department mission agrees with that of the university as it states, "*Prepare students for the life-long practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school.*"

The mission of the College, "*to educate the future leaders, innovators and entrepreneurs, while discovering, integrating and applying new engineering and computer science knowledge in service to society*," matches that of the university. The mission of the department is oriented toward supporting the mission "*to prepare students for the lifelong practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school*".

One of the institutional goals of the university is to pursue "*a research institution committed to rigorous educational programs and the highest standards of a liberal education*". Our department mission is "*motivating the faculty to attain excellence in research by acquiring external funding and by incorporating students into their research programs*."

B. Program Educational Objectives

The Program Educational Objectives, rather near-term accomplishments by graduates, are:

1. Provide mechanical engineering graduates with technical capabilities.
2. Prepare mechanical engineering graduates to have effective work-place skills.
3. Instill a sense of responsibility as a professional member of society.

To achieve the objectives of the program, outcomes that are associated with each objective are assessed on a regular basis. The followings are the Program Outcomes in 2010-2012 Catalog:

1. **Provide mechanical engineering graduates with technical capabilities. The objective outcomes are:**
    a. Fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field.
    b. Ability to design and conduct experiments, analyze data, and utilize statistical methods.
    c. Ability to solve open-ended design problems.
    d. Ability to use modern computational techniques to solve engineering problems.
    e. Ability to mathematically model and analyze engineering systems.
2. **Prepare the mechanical engineering graduates to have effective workplace skills. The objective outcomes are:**
    a. Oral and written presentation of technical information.
    b. Introductory knowledge of economics.
    c. Working on a multi-disciplinary team with peers.
    d. Motivation to pursue lifelong learning.
3. **Instilling a sense of responsibility as a professional member of society. The objective outcomes are:**
    a. Commitment to professional and ethical behavior in the workplace.
    b. Awareness of world affairs and cultures.
    c. Recognition of the impact of engineering on local and global societies.
    d. Seeking professional licensure.

Source: UNLV 2010-2012 Undergraduate Catalog

C. Consistency of the Program Educational Objectives with the Mission of the Institution

Each of three objectives in Section B is related to a set of specific measurable outcomes. Periodic evaluation of these outcomes, among other methods, as described in Criterion 2 and Criterion 3, ensures that the ME students are sufficiently monitored to achieve these objectives. Table 2.1 summarizes the relation between university, college and department missions and the program educational objectives of the Mechanical Engineering program.

Table 2.1 Highlights of the Relation between UNLV, College, Department Missions and Program Objectives

UNLV Mission	The University of Nevada, Las Vegas, is a research institution committed to rigorous educational programs and the highest standards of a liberal education. We produce accomplished graduates who are well prepared to enter the work force or to continue their education in graduate and professional programs
College Mission	The mission of the Howard R. Hughes College of Engineering is to educate the future leaders, innovators and entrepreneurs, while discovering, integrating and applying new engineering and computer science knowledge in service to society
Department Mission	• To prepare students for the lifelong practice of mechanical engineering and related engineering disciplines. This includes preparation for immediate entry into positions in industry or for further study in graduate school. • To sustain an outstanding academic program, motivating the faculty to attain excellence in research by acquiring external funding and by incorporating students into their research programs.
Program Educational Objectives	• Provide mechanical engineering graduates with technical capabilities. • Prepare mechanical engineering graduates to have effective work-place skills. • Instill a sense of responsibility as a professional member of society.

D. Program Constituencies

The Department of Mechanical Engineering offers the Bachelor of Science in Engineering, and the constituencies of the program include:

- ME prospective students
- ME current students
- ME faculty
- ME alumni
- ME Advisory Board (MEAB)
- Employers and supervisors of ME alumni

Since the University of Nevada, Las Vegas is a public university; our constituencies in a broader sense are the citizens of the State of Nevada. The department attempts to serve the goal of economic diversification of the state by graduating qualified professionals in the area of mechanical engineering. Each of these constituencies has a distinct involvement in the ME program. The primary constituents are our current and future students for whom the program exists and goes through continuous improvement. From the inception of the ME program there has been a continuous effort to formalize the involvement of constituents in the assessment process directly and indirectly, and implement changes to the curriculum if necessary. Additional information on how we maintain contact with and engage our constituents is provided below.

D.1 ME Prospective Students

The ME department maintains contact with prospective students using several means including:

- Teaching ME 100 (Introduction to Mechanical and Aerospace Engineering) via distance learning to two high school in Las Vegas (Rancho-Aerospace Program).
- Sending Teaching Assistants to interact with students who take ME 100L (Introduction to Mechanical and Aerospace Engineering Lab) in their high schools (see Figure D.1).
- Arranging for our students to supervise high school students in the FIRST Competition.
- Campus visits by individual applicants and their parents.
- Visits to high school.
- UNLV SAGE (Summer Advanced Gifted Education) program (http://edoutreach.unlv.edu/sage/). Mr. Jeff Markle, Lab Director, has taught the summer course for local high school students for the past three years.

Figure D.1 Final Competition of ME100L with Local Magnet High Schools, Fall 2008

D.2 ME Current Students

Input from our current students is solicited using several methods that are briefly listed here:

- *ME Student Advisory Board:* As a part of our commitment to involve students, the department formed a student advisory board to help us understand the needs of our students. The board gives input in curricular and assessment issues. For example, extensive discussions with the ME student advisory board helped us understand the shortcomings of the educational labs.
    - The board members helped draft a lab survey that is distributed to students near the end of each semester.
    - The board also helps review the incoming semester schedule to ensure that it meets the needs of the students.
- Surveys: Student completes several surveys including lab surveys, end of semester surveys, and graduating senior exit interviews. These surveys are described in detail in the *Criterion 3* chapter.
- Departmental Open House.

In addition to these methods, the ME chair and faculty maintain an open-door policy to sustain communications with the students.

D.3 ME Alumni

We have five hundred alumni to date, and they are strongly committed to the advancement of the program. Several of the board members are alumni of the program. Typically, they are very committed to improving the program. We had 25% response to our alumni survey in 2005 and 2008. Our annual newsletter, “ME News” published every year is one way of communications with our alumni. The newsletter is supplemented by our continually updated web site. The alumni survey contributed to our regular upgrades of the curriculum.

D.4 ME Faculty

All ME faculty members are involved in teaching our curriculum on a daily basis. The department is relatively small (12 full time faculty), which allows everyone to participate in the decision making process. Faculty is also involved in program assessment and development through the ME Curriculum Committee and participation in departmental meetings in addition to their assessment of their courses and other teaching activities. Accreditation-related discussion occupies roughly half of each department meeting. Departmental meeting agendas are listed in Appendix E-12. Each faculty member is required to prepare an end-of-semester report for his or her course taught when the COA (Course Objective Assessment) result falls below the satisfactory level.

D.5 ME Advisory Board (MEAB)

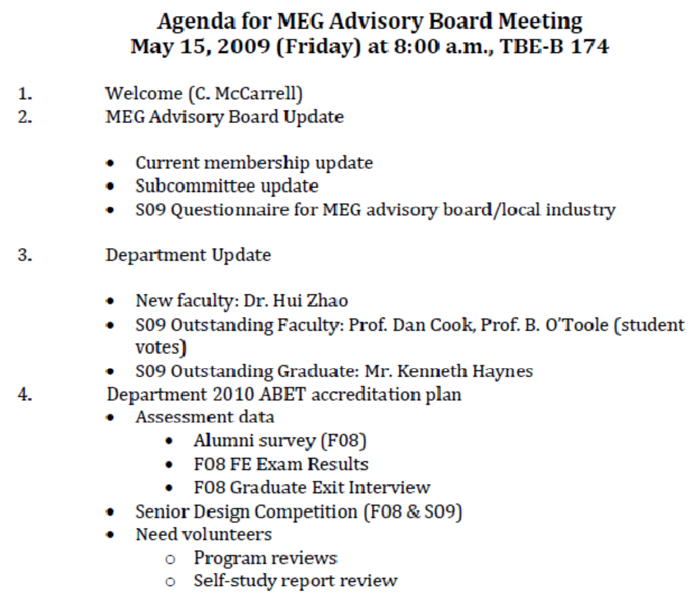
Since 1996, the Department of Mechanical Engineering has an advisory board to represent local and regional interests in the process of assessment and upgrading of our graduate and undergraduate programs. The board has more than fifteen members as shown in Appendix E-13, and created a MEAB Charter in 2010.

The chair of the board is also a member of the College Advisory Board, and the board meets at least once per semester. These meetings allow Board members to interact with ME faculty and staff. Table 2.2 shows a sample agenda of the general meeting held in May 2009 and dates of meetings in last 5 years. All meeting agenda and slides are available from the department website in http://me.unlv.edu/info/meg_advisory.html. As shown in Table 2.2, the board has been actively involved in the areas including:

- Identification of needs for new programs
- Review of ME curriculum/courses (Appendix E.3)
- Updating external survey forms.
- Identification of possible research opportunities
- Student internship programs
- Fund raising

Table 2.2 Dept Advisory Board's sample meeting agenda and the date of meetings in last 5 years

Meeting agenda for May 2009 meeting	Date of meetings (last 5 years)


Agenda for MEG Advisory Board Meeting
May 15, 2009 (Friday) at 8:00 a.m., TBE-B 174
1. Welcome (C. McCarrell)
2. MEG Advisory Board Update
• Current membership update
• Subcommittee update
• S09 Questionnaire for MEG advisory board/local industry
3. Department Update
• New faculty: Dr. Hui Zhao
• S09 Outstanding Faculty: Prof. Dan Cook, Prof. B. O'Toole (student votes)
• S09 Outstanding Graduate: Mr. Kenneth Haynes
4. Department 2010 ABET accreditation plan
• Assessment data
  • Alumni survey (F08)
  • F08 FE Exam Results
  • F08 Graduate Exit Interview
• Senior Design Competition (F08 & S09)
• Need volunteers
  ○ Program reviews
  ○ Self-study report review
	Jan 30, 2004
	April 27, 2004
	Mar. 11, 2005
	Sept. 23, 2005
	Dec. 2, 2005
	April 27, 2006
	Oct. 6, 2006
	Dec. 8, 2006
	March 2, 2007
	Nov. 9, 2007
	April 18, 2008
	Nov. 14, 2008
	May 15, 2009
	Oct. 9, 2009
	Jan 29, 2010
	April 16, 2010

D.6 Employers

Direct input from corporations comes mainly through the ME Advisory Board. In addition, we regularly invite industry leaders in the community for visits to strengthen their awareness of the program and its capabilities. Recently, we started encouraging local companies to use the department web site (http://me.unlv.edu/current/career_opp.html) to advertise for full-time, part-time, and internship opportunities. We invite local engineers to judge the Senior Design Competition. They grade projects on many factors including innovation, commercial potential, technical merit, clarity of the project, presentation (oral), and presentation (poster). Table 2.3 summarizes the means of interaction with each constituent group.

Table 2.3 Primary Constituents of the Program

Constituents	Means of Interaction
Prospective Students	• Teaching courses in high schools via distance learning • Teaching courses in high schools using teaching assistants • Arranging for our students to supervise high school students in the FIRST Competition. • Campus visits by individual applicants and their parents • Departmental Open House • Visits to high schools
Current Students	• Course and Instructor Evaluations (Every Semester) • Exit Interviews (Every Semester) • ME Student Advisory Board (At least once per semester) • Mechanical Engineering Department Open House (Every Year)
ME Alumni	• Alumni Surveys (Every Three Years) • Department Newsletter (Every Year)
ME Faculty	• ME Curriculum Committee (MECC) • ME Advisory Board (MEAB) Meetings • Department Meetings. Agendas are listed in Appendix E-12 • End-of-semester report for each course taught
ME Advisory Board	• ME Board Meetings • College Board Meeting • Curriculum/Course Review
Employers	• ME Advisory Board (MEAB) Meetings • ME Advisory Board / Local Industry Surveys (Annual) • Judging Senior Design Competition (every semester) • ME Advisory Committee / Local Engineers Curriculum Reports (Tri-Annual)

E. Process for Establishing Program Educational Objectives

Since 2004, the department has spent considerable time in assessment and continuous improvement. Preparing for the next round of accreditation. Preparing the department section of the university catalog is used to regularly scrutinize the program in general and our mission, goals, objectives, and outcomes specifically. Review of the 2004-2006, 2006-2008, 2008-2010, and 2010-2012 catalogs will show the significant effort spent on reviewing and clarifying these items since the last accreditation.

The review process includes considerable input from the program constituents. The objective of the preparation is to define program objectives and outcomes, as well as the assessment methods for these outcomes. This process went through several cycles of fine tuning. For example, questionnaires go through review by various constituents each time before they are implemented.

The major vehicle of this process is the ME Curriculum Committee (MECC). The responsibilities of the committee include assessing, communicating, and implementing curricular modifications needed to keep our program responsive to technology changes and the needs of our constituents. Discussion of possible changes starts with the committee, which in turn communicates them to the rest of the department faculty. Since 2002, our assessment program was strengthened through the implementation of the exit interviews of graduating seniors. Since then the process of fine tuning each of these methods has continued.

Details of the ME program assessment are summarized in Table 2.4. Our goal is to find a practical scheme that allows us to continuously assess the effect of curricular changes and to improve our program. A detailed discussion of these assessment methods are presented in the Criterion 3.

Table 2.4 Assessment method summary

Internal Assessments	External Assessments
• Course and Instructor Evaluations (Every Semester): o Lab Survey (mid-semester) o Instructor Evaluation o Evaluation of (a)-(k) ABET Educational Outcomes o Evaluation of Course Objectives o Exit Interviews (Every Semester) o Assessment by Faculty (Every Semester)	• FE Exam Results (Every Semester) • Judging Senior Design Competition (Every Semester) • ME Advisory Board / Local Industry Surveys (Annual) • ME Advisory Board / Local Engineers Reports (Tri-Annual) • Alumni Surveys (Tri-Annual) • ABET Accreditation (Every Six Years)

F. Achievement of Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the Mechanical Engineering Program is preparing its graduates to achieve. The process of evaluating the extent to which these objectives are attained is in place, and the result of the process is used to develop and improve the program outcomes so that graduates are better prepared to attain the objectives. Two surveys were performed to evaluate the extent to which these objectives were attained as well as the outcomes of the program. Details of the assessment process of educational objectives are shown in Figure 2.1.

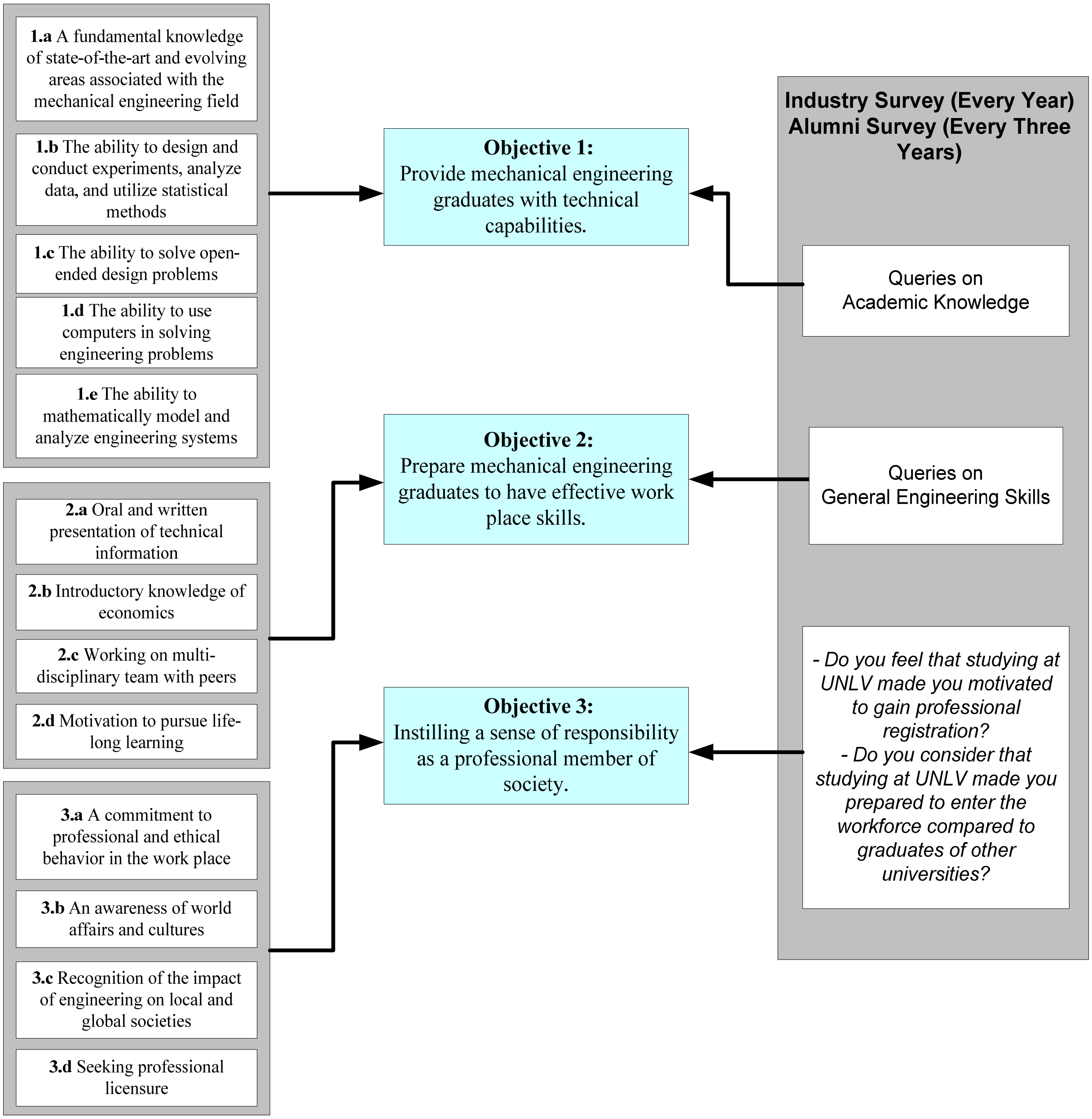


Figure 2.1 Assessment Process of Educational Objectives

The first survey was sent to the local program alumni and the second to industry leaders including the ME Advisory Board members. Usually the board members forwarded the survey to any industrial contact persons who employ UNLV graduates. The alumni surveys are conducted every three years (Fall 2005, Fall 2008) and the actual survey forms and summary results are included in Appendix E.2. Both online survey using SurveyMonkey and regular mail are used. The number of alumni who responded for 2005 and 2008 surveys were 58 and 49, respectively.

The second survey is an industrial employer survey that has been done annually[1]. Sample survey results from 2005 to 2009 are included in Appendix E.1. In this survey, small number of employers responded, but the number of responses sharply increased after the web-based survey was implemented in Spring 2009 as shown Table 2.5.

Table 2.5 Number of Alumni and Industrial Survey Reponses

	Year	**Number of Responses**
Industry Survey	2005	9
	2006	6
	2007	8
	2008	5
	2009	14
	Year	**Number of Responses**
Alumni Survey	2005	52
	2008	49

Table 2.6 shows a summary of both survey question groups and their usage in evaluating the ME Educational Objectives.

Table 2.6 A Structure of Questions asked in Alumni and Industrial Surveys

	Types of Questions Asked			**Evaluated Educational Objective**
Part 1	General Information about respondents	Alumni Survey	Graduation year; Job information; Employer information: Current activities; Job location;	N/A[2]
		Industry Survey	Industry information	
Part 2	Preparation	Professional Registration & Competitiveness		Objective 3
Part 3	General Performance	Academic Knowledge Level		Objective 1
		General Engineering Skills		Objective 2
Part 4	ME Educational Outcome			Objective 1, 2, and 3

For both surveys, a minimum average score necessary is set at *3.0* or '*neutral'* on a scale of (5=Strongly Agree and 1=Strongly Disagree) by faculty and MEAB members. When the score is below 3.0, corrective actions are necessary. The results of the surveys are presented and analyzed next.

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[1] It is planned to do the Industry Survey every two years from 2010.

[2] Useful to determine the validity of data to be used for evaluating the educational objectives

Most recent survey results (Alumni Survey: 2008, Industry Survey: 2009) are attached in the Appendix E.1 and E.2, respectively, and all survey data for the past five years are available in the department website at http://me.unlv.edu/GeneralInfo/ABETData.html.

F.1 Alumni Survey

The survey was sent to ME alumni. Response rate was about twenty percent as shown in Table 2.5. To facilitate easy understanding of the survey results, questions are grouped in to four parts as shown in Table 2.6.

Part 1: General Information about respondents: A clear majority of alumni who responded in the 2008 survey graduated in the last ten years as shown in Figure 2.2. This makes their responses more relevant to assessing the program educational objectives.

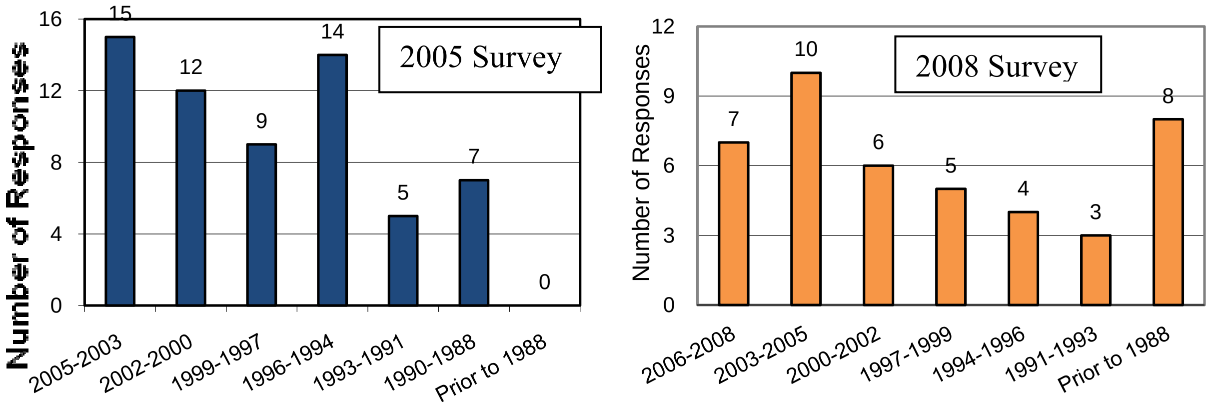

Figure 2.2 Results of 2005 and 2008 Alumni Survey question*: When did you graduate?*

Figures 2.3 through 2.5 shows the results of other selected questions of the survey which can show that a strong majority of respondents are involved in various engineering fields. Figure 2.3 indicates that some of the ME alumni who responded to the survey are pursuing graduate studies, which shows an achievement of the program outcome, "*2.d. Motivation to pursue life-long learning*." The answer also reflects on the third educational objective "*Prepare mechanical engineering graduates to have effective work place skills.*"

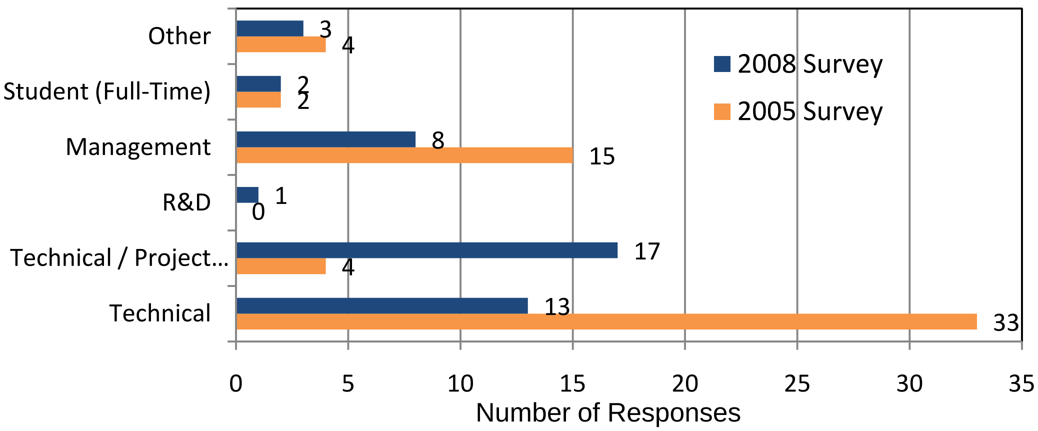

Figure 2.3 2005 and 2008 Alumni Survey question*: What type of position do you currently hold?*

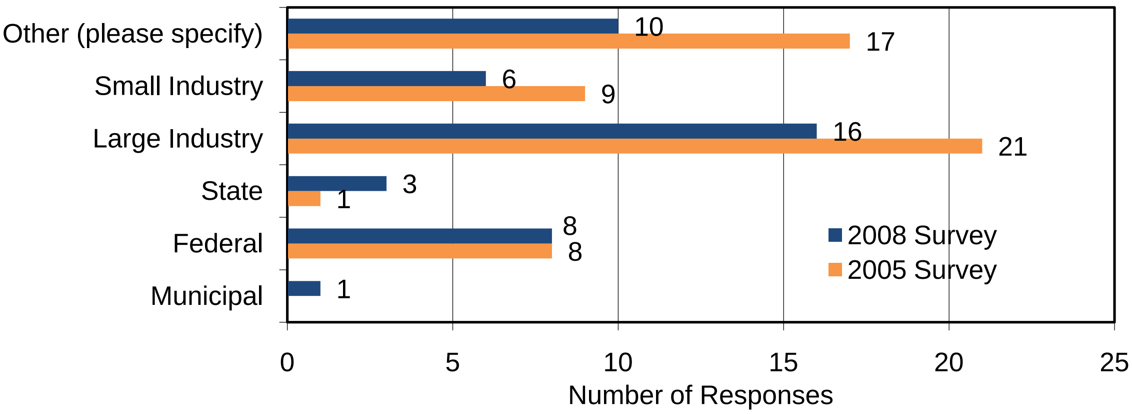

Figure 2.4 Results of 2008 Alumni Survey question*: Can you tell us something about your organization?*

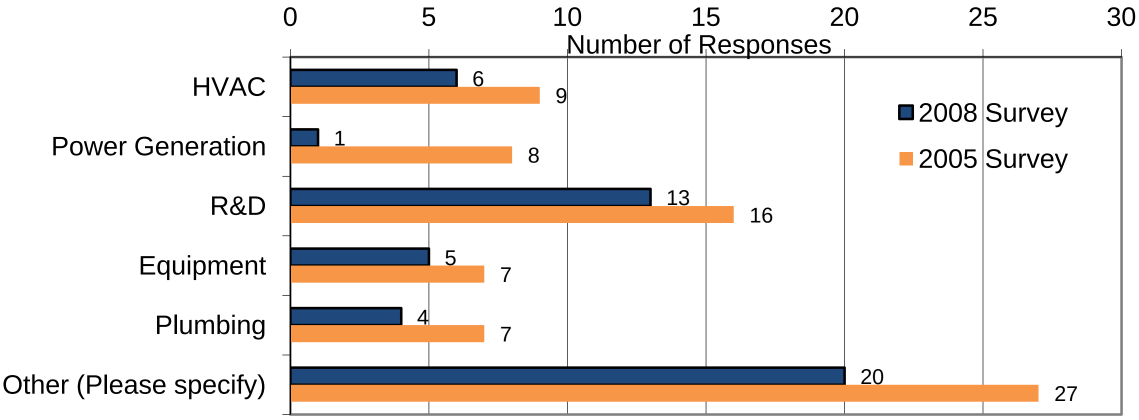

Figure 2.5 Results of 2008 Alumni Survey question: *Can you tell us something about your activities?*

Part 2: Preparation: Figure 2.6 and 2.7 show the responses to the questions indicating the success of our program outcome "3.d Seeking Professional Licensure" under the educational objective "Instilling a sense of responsibility as a professional member of society". These responses were evaluated in the same scale as others using (1)-(5) scale. In Figure 2.6, a scale of 5 is for *very motivated* and 1 for *not motivated at all.* In Figure 2.7, a scale of 5 is for *much more prepared*, and 1 for *much less prepared*. Averaged responses in (1)-(5) scale are 3.3 and 3.2 in the 2008 survey respectively, and 3.5 and 3.3 in the 2005 survey, which indicate that the program achieved educational objective 3 "Instilling a sense of responsibility as a professional member of society".

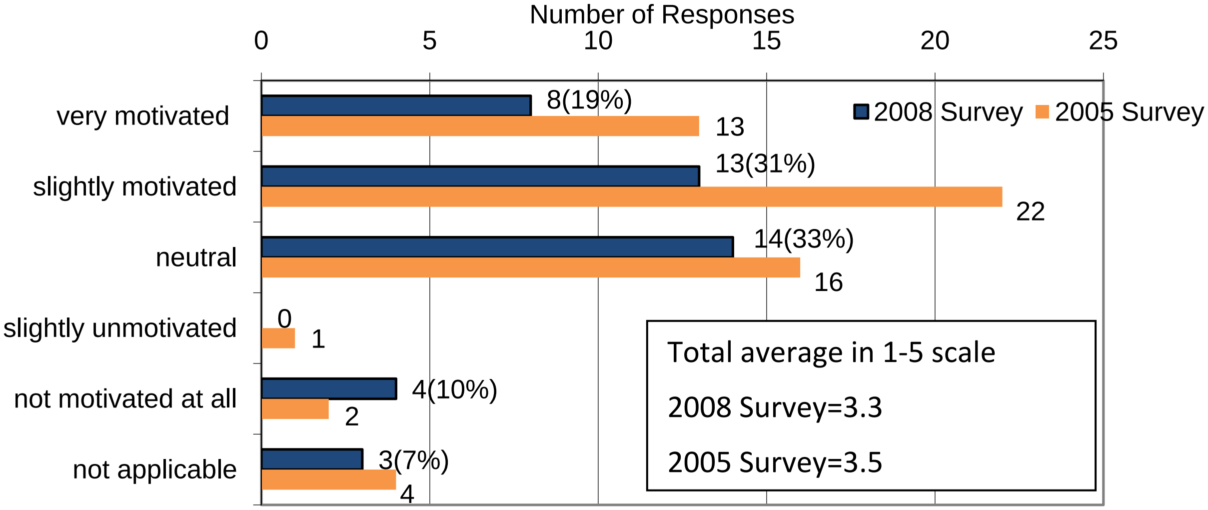

Figure 2.6 Results of 2008 Alumni Survey question: *Do you feel that studying at UNLV made you motivated to gain professional registration?*

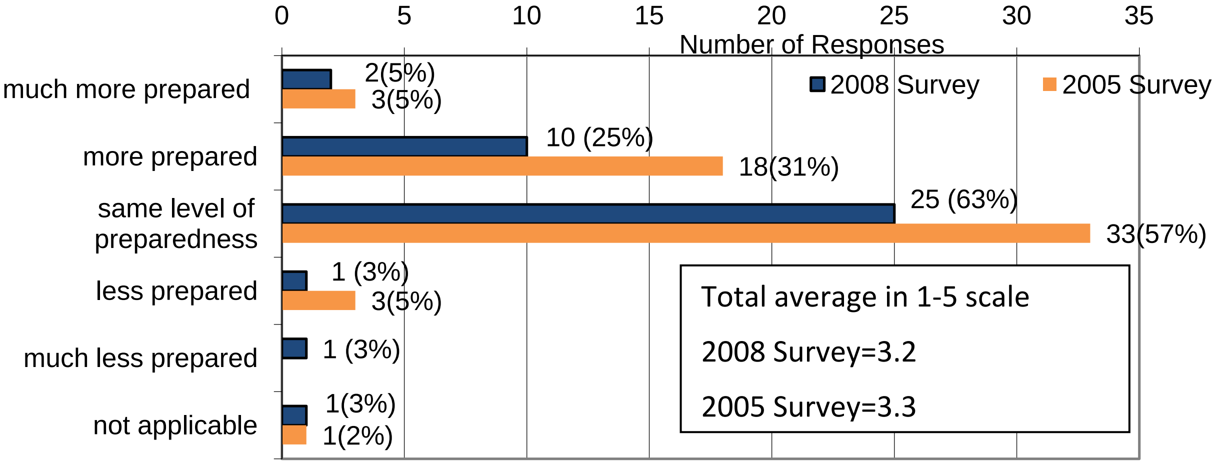

Figure 2.7 Results of 2008 Alumni Survey question: *Do you consider that studying at UNLV made you prepared to enter the workforce compared to graduates of other universities?*

Part 3: General Performance: Figure 2.8 and Figure 2.9 show the results for the questions that attempt to query our alumni about their perceived *academic knowledge levels* and *general engineering skills* in order to assess the program's success in meeting the Educational Objective 1 and 2. The same scale of (1)-(5) (5= Strongly Agree and 1= Strongly Disagree) is used for each area and averaged for the surveys conducted in 2005 and 2008. The survey result for the Academic Knowledge Level (Figure 2.8) is used to assess the Educational Objective 1, "*Provide mechanical engineering graduates with technical capabilities*", and the General Engineering Skills (Figure 2.9) is used for the Educational Objective 2, "*Prepare mechanical engineering graduates to have effective work place skills*".

As shown in Figure 2.8 and 2.9, the responses for all questions are very close for 2005 and 2008 surveys, and difference is statistically insignificant. Typically, any rating above 3.0 is treated as acceptable. In addition to the questions in the survey, a space was given for alumni to express their suggestions for program improvements. The results of this written section of the survey motivated us to review the status of the program. Several changes were made in response to these comments including upgrading labs, increasing CAD courses, so that students can choose from different CAD options in 3-D design (SolidWorks and ProEngineering). A table summarizing their comments and our responses is included in Appendix E.2.

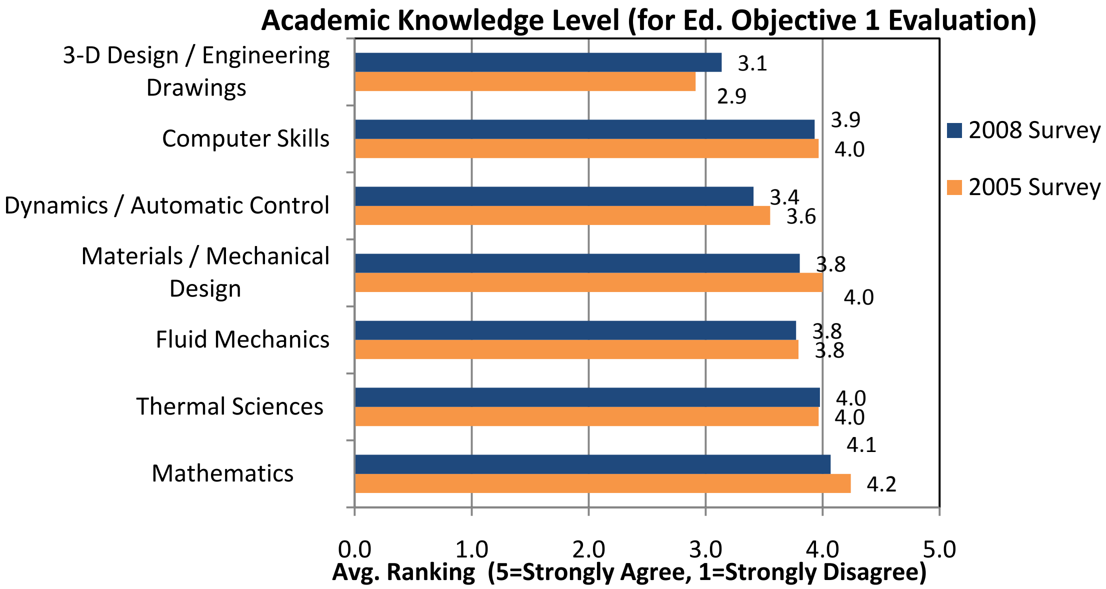

Figure 2.8 Results of 2005 and 2008 Alumni Survey question: *Your studies in UNLV helped you gain proficiency* (Average of 2008 survey=**3.7**, Average of 2005 survey=**3.8**)

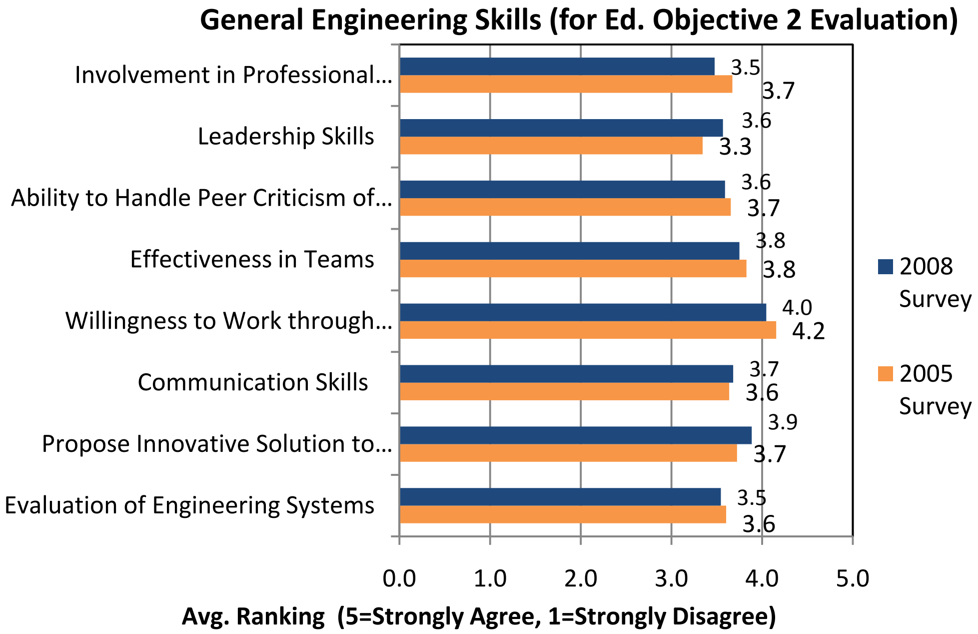

Figure 2.9 Results of 2005 and 2008 Alumni Survey question: *Your studies in UNLV helped you gain proficiency* (Average of 2008 survey=**3.7**, Average of 2005 survey=**3.7**)

Part 4: ME Educational Outcomes: The Educational Outcome assessment was done in the Alumni Survey to assess the Educational Objectives. It is reasonable to use the outcome assessment results since our educational objectives are also directly related to all educational outcomes. Table 2.7 shows the summary of Alumni Survey results in 2005 and 2008 for the Educational Outcomes. It should be noted that the rating of each objective is obtained by adding the response counts for all associated program outcomes for each objective, and they are rated on the scale of (5=Strongly Agree and 1=Strongly Disagree) using the total response counts shown in the last column of Table 2.7. The ratings for individual outcomes can be found in both CRITERION 3 and Appendix E.2.

As shown in Table 2.7, our educational objectives were met reasonably well considering that average ratings for three objectives are higher than 'neutral(=3.0)', and may not need any corrective actions. For detailed discussion about the assessment results for the educational objectives is presented in the end of this chapter.

Table 2.7 Alumni Survey Results for Educational Objectives by Averaging Ranks of Associated Educational Outcomes

2008 Alumni Survey Results for Educational Outcomes (* 5 (strongly agree) and 1 (strongly Disagree)**)**

	Your studies in UNLV helped you develop the following capabilities:	*strongly agree (5)*	*agree(4)*	*neutral (3)*	*disagree(2)*	*Strongly Disagree (1)*	*Not applicable*	*Rating Average **	*Response Count*
Objective 1	1.a A fundamental knowledge ..	64	112	27	4	5	1	4.0	213
	1.b The ability to design and ….								
	1.c The ability to solve open-ended ..								
	1.d The ability to use computers ..								
	1.e The ability to mathematically ..								
Objective 2	2.a Oral and written presentation..	38	75	49	10	1	1	3.8	174
	2.b knowledge of economics ..								
	2.c Working on multi-disciplinary..								
	2.d Motivation to pursue life-long..								
Objective 3	3.a A commitment ..	22	67	63	13	4	3	3.5	172
	3.b An awareness of world affairs ..								
	3.c Recognition of the impact ..								
	3.d Seeking professional licensure								

2005 Alumni Survey Results for Educational Outcomes (* 5 (strongly agree) and 1 (strongly Disagree)**)**

	Your studies in UNLV helped you develop the following capabilities:	*strongly agree (5)*	*agree(4)*	*neutral (3)*	*disagree(2)*	*Strongly Disagree (1)*	*Not applicable*	*Rating Average **	*Response Count*
Objective 1	1.a A fundamental knowledge ..	70	167	44	7	0	2	4.0	290
	1.b The ability to design and ….								
	1.c The ability to solve open-ended ..								
	1.d The ability to use computers ..								
	1.e The ability to mathematically ..								
Objective 2	2.a Oral and written presentation..	57	107	51	11	3	2	3.9	231
	2.b knowledge of economics ..								
	2.c Working on multi-disciplinary..								
	2.d Motivation to pursue life-long..								
Objective 3	3.a A commitment ..	41	88	68	19	6	7	3.5	229
	3.b An awareness of world affairs ..								
	3.c Recognition of the impact ..								
	3.d Seeking professional licensure								

Summary of Alumni Survey: Table 2.8 summarizes our assessment results for the educational objectives. The last column of Table 2.8 shows both direct and indirect assessment results for three educational objectives, and it can be concluded that our educational objectives were met reasonably well considering that average ratings for three objectives are higher than 'neutral(=3.0)', and may not need major corrective actions.

A relative low rating of the Objective 3, *Instilling a sense of responsibility as a professional member of society,* can be partly explained by the year of graduation of those alumni who participated in the survey. As shown in Figure 2.2, a majority of alumni who participated in the 2008 survey graduated in 2003 to 2005, which indicates that they finished the program under the catalog year of 1998-2000. Since then, there have been continuous efforts, including the program change that requires passing the FE exam, to motivate students to consider the FE exam seriously, and to encourage them to take Professional Engineer (PE) exam after graduation. We expect that next set of alumni survey will show improvement in achieving objective 3.

Table 2.8 Summary of Assessment Results for Educational Objectives (Alumni Survey)

Program Educational Objective	Surveyed items in ME Alumni Survey	Avg. of 2005 and 2008 Survey*	Total Avg. *
Objective 1: *Provide mechanical engineering graduates with technical capabilities.*	Educational Outcomes associated with the Program Objective 1(See Table 2.7)	4.0	3.9
	Performance in academic knowledge levels (Alumni Question #7 Part 1) (See Figure 2.8) *(Mathematics, Thermal Sciences, Fluid Mechanics, Materials / Mechanical design, Dynamics / Automatic Control, Use of Engineering Software to Solve Problems, 3-D design / Engineering Drawing)*	3.8	
Objective 2: *Prepare mechanical engineering graduates to have effective work place skills.*	Educational Outcomes associated with the Program Objective 1(See Table 2.7)	3.9	3.8
	Performance in general engineering skills (Alumni Question #7 Part 2) (See Figure 2.9) *(Propose Innovative Solution to Engineering Problems, Willingness to Work through Challenging Problems, Ability to Handle Peer Criticism of their Projects or Designs, Leadership Skills, Involvement in Professional Organizations)*	3.7	
Objective 3: *Instilling a sense of responsibility as a professional member of society.*	Program Outcomes associated with the Objective 3 (See Table 2.7)	3.5	3.3
	Other related questions: *- Do you feel that studying at UNLV made you motivated to gain professional registration? (See* **Figure 2.7***)*	3.3	
	- Do you consider that studying at UNLV made you prepared to enter the workforce compared to graduates of other universities? (See **Figure 2.6***)*	3.2	

* (5=Strongly Agree and 1=Strongly Disagree)

F.2 ME Advisory Board/Industry Survey

An Industry Survey (Appendix E.1) is sent to practicing engineers and employers within Southern Nevada every Spring semester. The survey is also sent to members of the department Advisory board. The survey is reviewed by the advisory board and faculty every year[3] to ensure that the program meets the industry needs. The survey attempts to assess the quality of our alumni as engineers in workplace. It is also used to understand how the respondents assess the ability of our graduates in meeting the program educational outcomes as shown in Criterion 3. Response rate is about 20%. To facilitate easy understanding of the survey results, all questions are grouped in four parts as shown in Table 2.6.

Part 1: General Information about respondents: As shown in Figure 2.10, in the Spring 2009 survey, a majority of responders work for public utility and engineering consulting firms. Also, some respondents work for large industries and government organizations.

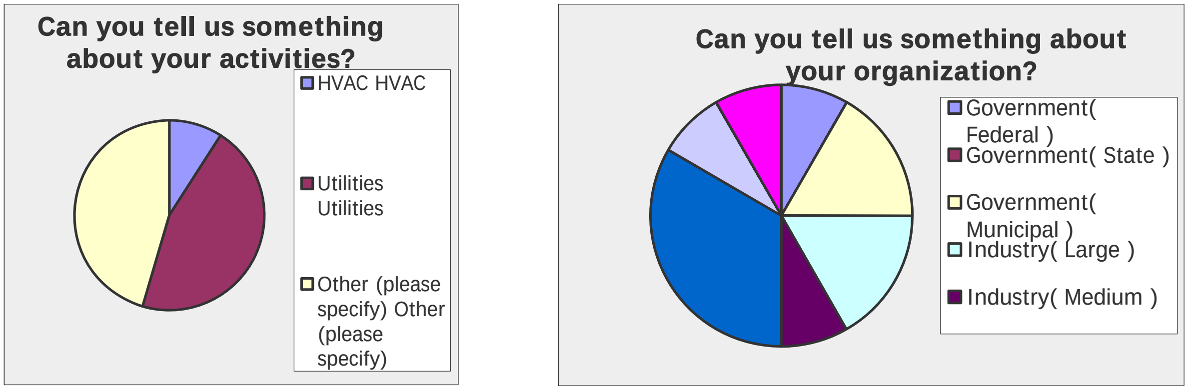

Figure 2.10 Profiles of 2009 Industry Survey Responders

Part 2: Preparation: Figure 2.11 and 2.12 show the responses to the questions indicating the success of our program outcome “3.d Seeking Professional Licensure” under the educational objective “Instilling a sense of responsibility as a professional member of society”. The following two questions were also asked to compare our graduates to the ones from other universities and our graduates’ motivation for professional registration.

- *Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities?*
- *Do you feel that UNLV graduates are motivated to gain professional registration?*

These responses were evaluated in the same scale as others using (1)-(5) scale with 5 for *much more prepared* (Figure2.11) or *very motivated* (Figure 2.12), and 1 for *much less prepared* (Figure 2.11) or *not motivated at all* (Figure 2.12).

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[3] From Spring 2009 the department plans to do the Industry Survey every two years.

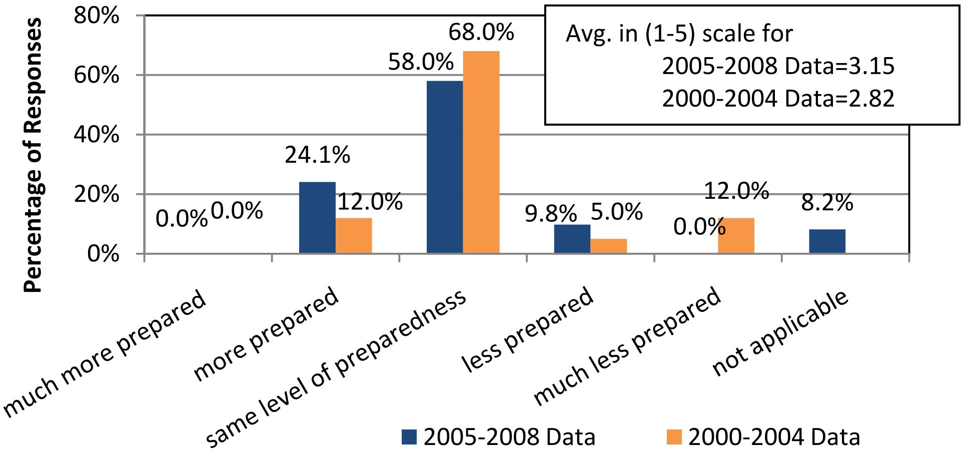

Figure 2.11 2000-2009 Cumulative Industry Survey Results: ***Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities?***

In Figures 2.11 and 2.12, both 2000-2004 and 2005-2008 data are shown for comparison. In both set of data a little more than eighty percent of respondents indicated that our graduates are prepared or more prepared to enter workforce when compared to graduates of other universities. Also, it is observed that there is a slight improvement in rating in the 2005-2008 survey compared with the one in 2000-2004. For the survey for motivation of professional registration, we can see the obvious improvement in the data collected during 2005-2008 compared with the one in 2000-2004. About 66 percent of respondents indicated in 2005-2008 survey that our students are attempting to pursue professional registration compared to 45% in 2000-2004. The results are somewhat ambivalent as local firms that are involved in HVAC and construction encourage their engineers to seek professional registration while other firms can be neutral toward this issue.

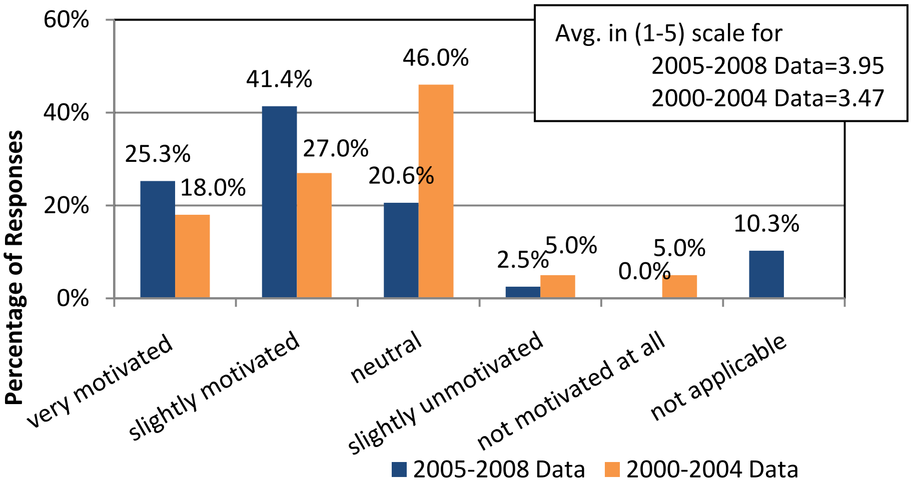

Figure 2.12 2000-2009 Cumulative Industry Survey Results: ***Do you feel that UNLV graduates are motivated to gain professional registration?***

<u>Part 3: General Performance</u>: Table 2.9 shows the cumulative results (2005-2009) related with general performance in academic knowledge and engineering skills of our graduates in their work places. As we did in the Alumni Survey, a*cademic knowledge levels* and *general engineering skills* are assessed to evaluate the Educational Objective 1 and 2, respectively, using the same scale of (1)-(5). As shown in Table 2.9, the cumulative averages of both *Academic knowledge level* and *General engineering skills* are 3.4 and 3.6, respectively, which shows that the educational objectives 1 and 2 were met reasonably well considering that the threshold value used for the assessment is "neutral (=3.0)".

Table 2.9 Cumulative 2005-2009 Questionnaire Results for ME Department Advising Board / Local Industry for General Performance

Academic Knowledge Level	S05	S06	S07	S08	S09	5 yr Avg
Mathematics	3.9	4.4	3.6	4.5	3.6	4.0
Thermal Sciences	3.4	3.0	2.5	4.3	2.5	3.1
Fluid Mechanics	3.9	3.0	2.5	4.0	3.1	3.3
Materials / Mechanical Design	3.3	4.2	3.3	4.0	3.1	3.6
Dynamics / Automatic Control	3.3	2.2	2.5	4.3	2.1	2.9
Use of Engineering Software to Solve Problems	3.2	4.4	3.4	4.5	3.8	3.9
3-D Design / Engineering Drawings	2.8	3.4	3.3	4.0	2.7	3.2
Ranking (5=Strongly Agree and 1=Strongly Disagree)					**Total**	**3.4**

General Engineering Skill	S05	S06	S07	S08	S09	5 yr Avg
Evaluation of Engineering Systems	3.6	3.8	N/A[4]	N/A	N/A	3.7
Understanding of Financial / Economic Implications of Engineering Designs and Decisions	3.0	3.8	N/A	N/A	N/A	3.4
Propose Innovative Solution to Engineering Problems	3.7	3.6	3.3	4	3.3	3.6
Oral Communications	3.4	4.4	N/A	N/A	N/A	3.9
Written communications	3.4	4.2	N/A	N/A	N/A	3.8
Willingness to Work through Challenging Problems	3.8	4.4	3.5	4.3	3.5	3.9
Effectiveness in Teams	3.8	4.4	N/A	N/A	N/A	4.1
Ability to Handle Peer Criticism of Their Projects or Designs	3.6	4.0	3.1	3.8	3.3	3.5
Leadership Skills	3.3	3.8	3.0	4.3	3.2	3.5
Involvement in Professional Organizations	3.4	3.0	2.8	3.0	2.9	3.0
Ranking (5=Strongly Agree and 1=Strongly Disagree)					**Total**	**3.6**

<u>Part 4: ME Educational Outcomes</u>: The Educational Outcome assessment was done in the Industry Survey to assess the Educational Objectives. It is reasonable to use the outcome assessment results since our educational objectives are also directly related to all educational outcomes. Table 2.10 shows the cumulative assessment results (2005-2009) of the educational

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[4] The number of questions were reduced from Spring 2007

objectives using associated educational outcomes. While the number of respondents is limited, the data clearly shows that a majority of responses did not identify any serious weakness in the academic preparation of our students. The areas where respondents showed some concerns, i.e. average score below 3.0, are discussed in detail in the Criterion 3.

Table 2.10 Cumulative 2005-2009 Questionnaire Results for ME Department Advising Board / Local Industry for Program Educational Objectives using Educational Outcomes

	S05	S06	S07	S08	S09	5 yr Avg.
Objective 1: Provide mechanical engineering graduates with technical capabilities.	3.9	4.2	3.4	4	3.2	**3.7**
A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	4.2	4.2	3.3	3.6	3.1	
The ability to design and conduct experiments, analyze data, and utilize statistical methods	3.6	4.7	3.1	4.2	3.2	
The ability to solve open-ended design problems	4.2	4.0	3.4	4.2	3.1	
The ability to use computers in solving engineering problems	4.0	4.2	3.9	4.6	3.5	
The ability to mathematically model and analyze engineering systems	3.6	4.2	3.5	3.4	3.1	
Objective 2: Prepare mechanical engineering graduates to have effective work place skills.	3.7	4.3	3.3	3.6	3.1	**3.6**
Oral and written presentation of technical information	3.4	4.5	3.5	3.0	2.8	
Introductory knowledge of economics	3.4	3.5	3.0	3.6	3.0	
Working on multi-disciplinary team with peers	3.9	4.5	3.3	3.8	2.9	
Motivation to pursue life-long learning	3.9	4.7	3.4	4.0	3.5	
Objective 3: Instilling a sense of responsibility as a professional member of society.	4	3.6	3.3	3.2	3	**3.3**
A commitment to professional and ethical behavior in the work place	4.6	5.0	3.9	4.4	3.0	
An awareness of world affairs and cultures	3.2	3.2	2.9	3.4	3.3	
Recognition of the impact of engineering on local and global societies	3.3	3.0	3.0	3.6	2.9	
Seeking professional licensure	3.7	3.3	3.4	3.2	3.0	

Ranking (5=Strongly Agree and 1=Strongly Disagree)

Summary of Industry Survey: Table 2.11 summarizes our assessment results of the Educational Objectives by ME Industry Survey. The last column of Table 2.11 shows both direct and indirect assessment results for three educational objectives, and it can be concluded that our educational objectives were met reasonably well considering that average ratings for three objectives are higher than ‘neutral(=3.0)’, and may not need major corrective actions. It should be noted that unlike the Alumni Survey, the rating of the Objective 3, *Instilling a sense of responsibility as a professional member of society,* is on par with the other two objectives.

Table 2.11 Summary of Assessment Results for Education Objectives (ME Advisory Board/Industry Survey)

Program Educational Objective	Surveyed items in ME Industry Survey	5-yr average ranking*	Total Avg.
Objective 1: *Provide mechanical engineering graduates with technical capabilities.*	Educational outcomes associated with the Program Objective 1 (**Table 2.10**)	**3.7**	**3.6**
	Performance in academic knowledge levels (**Table 2.9**) *(Mathematics, Thermal Sciences, Fluid Mechanics, Materials / Mechanical design, Dynamics / Automatic Control, Use of Engineering Software to Solve Problems, 3-D design / Eng. Drawing)*	**3.4**	
Objective 2: *Prepare mechanical engineering graduates to have effective work place skills.*	Educational outcomes associated with the Program Objective 1 (**Table 2.10**)	**3.6**	**3.6**
	Performance in general engineering skills (**Table 2.9**) *(Propose Innovative Solution to Engineering Problems, Willingness to Work through Challenging Problems, Ability to Handle Peer Criticism of their Projects or Designs, Leadership Skills, Involvement in Professional Organizations)*	**3.6**	
Objective 3: *Instilling a sense of responsibility as a professional member of society.*	Program outcomes associated with the Objective 3 (**Table 2.10**)	**3.3**	**3.5**
	Other related questions: *- Do you feel that UNLV graduates are motivated to gain professional registration?* **(See Figure 2.12)**	**3.95**	
	Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities? **(See Figure 2.11)**	**3.15**	

* (5=Strongly Agree and 1=Strongly Disagree)

G. Summary of Assessing Educational Objectives

As shown in Table 2.8 and 2.11, the average ratings for both Alumni Survey and Industrial Survey are similar and are both between ‘Neutral’ and ‘Agree’. The lowest scored item on both surveys is “Objective 3: *Instilling a sense of responsibility as a professional member of society*.” As mentioned before, there have been continuous efforts, including the program change that requires passing the FE exam for all students, to motivate them to consider the FE exam seriously, and to encourage them to take Professional Engineer (PE) exam after graduation, which we believe, will bear fruits shortly. Also, we have been focusing on active participation of students in the professional student organization such as ASME, SAE, and ASHRAE through annual student competition events, such as a Baja SAE Competition organized by students with a faculty mentor.

Overall, the Alumni and Industry survey responses indicate that we are preparing our graduates well for their careers. The ME Advisory Board is currently discussing the update of the survey questionnaire to include more direct assessment of the objectives rather than indirectly from the educational outcome assessment. We expect that a new survey questionnaire will be available in late 2010.

In conclusion, based on the alumni and industry surveys we have achieved the Program Educational Objectives. These results were shared with department constituents and recommendations with corrective actions are discussed in CRITERION 4.

CRITERION 3. PROGRAM OUTCOMES

ABET definition:

> *Program outcomes are narrower statements that describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program.*
> *Assessment under this criterion is one or more processes that identify, collect, and prepare data to evaluate the achievement of program outcomes.*
> *Evaluation under this criterion is one or more processes for interpreting the data and evidence accumulated through assessment practices. Evaluation determines the extent to which program outcomes are being achieved, and results in decisions and actions to improve the program.*

The followings are engineering program outcomes defined in 2010-2011 Criteria for Accrediting Engineering Programs:

(a) *an ability to apply knowledge of mathematics, science, and engineering*
(b) *an ability to design and conduct experiments, as well as to analyze and interpret data*
(c) *an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability*
(d) *an ability to function on multidisciplinary teams*
(e) *an ability to identify, formulate, and solve engineering problems*
(f) *an understanding of professional and ethical responsibility*
(g) *an ability to communicate effectively*
(h) *the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context*
(i) *a recognition of the need for, and an ability to engage in life-long learning*
(j) *a knowledge of contemporary issues*
(k) *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.*

A. Process for Establishing and Revising Program Outcomes

The existing program outcomes were approved by faculty member before our 2004 ABET visit. The program outcomes were originally developed by faculty members and debated during the faculty meetings as well as the ME Advisory Board meeting. Our faculty also mapped the program outcomes to the ABET Criterion (a) through (k) and grouped them to achieve each program Educational Objective discussed in CRITERION 2. The process of establishing and revising the Program Outcomes are similar to the processes elaborated upon for the Educational Objectives in **CRITERION 2.E**. *Process for Establishing Program Educational Objectives*, which consists of both internal and external review processes involving significant inputs from the program constituents.

B. Program Outcomes

According to Criterion 3, the program outcomes are statements that describe what students are expected to know and expected to do by the time of graduation. These statements or skills must foster attainment of the program educational objectives, Criterion 2. In the 2010-2012 Catalog, the program outcomes are listed together with associated program educational objectives since the skills earned from the stated outcomes must foster attainment of the program educational objectives, Criterion 2. Our program outcomes are as follows:

1.a. Fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field.
1.b. Ability to design and conduct experiments, analyze data, and utilize statistical methods.
1.c. Ability to solve open-ended design problems.
1.d. Ability to use modern computational techniques to solve engineering problems.
1.e. Ability to mathematically model and analyze engineering systems.

2.a. Oral and written presentation of technical information.
2.b. Introductory knowledge of economics.
2.c. Working on a multi-disciplinary team with peers.
2.d. Motivation to pursue lifelong learning.

3.a. Commitment to professional and ethical behavior in the workplace.
3.b. Awareness of world affairs and cultures.
3.c. Recognition of the impact of engineering on local and global societies.
3.d. Seeking professional licensure.

The above outcomes are closely related to the ABET educational outcomes (a through k) as can be seen in the Table 3.1. As shown in Table 3.1, each ABET Educational Outcome is related to at least one UNLV Program Outcome defined for the Mechanical Engineering program.

Table 3.1 Relation of ME Program Outcomes to ABET Program Outcomes

Criterion 3 (a) through (k) **UNLV ME Program Outcomes**	**a)** an ability to apply knowledge of mathematics, science, and engineering	**b)** an ability to design and conduct experiments, as well as to analyze and interpret data	**c)** an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	**d)** an ability to function on multidisciplinary teams	**e)** an ability to identify, formulate, and solve engineering problems	**f)** an understanding of professional and ethical responsibility	**g)** an ability to communicate effectively	**h)** the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	**i)** a recognition of the need for, and an ability to engage in life-long learning	**j)** a knowledge of contemporary issues	**k)** an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
1.a. Fundamental knowledge of state-of-the-art and evolving areas associated ….	×										
1.b. Ability to design and conduct experiments, analyze data, and utilize statistical methods.		×									
1.c. Ability to solve open-ended design problems.			×								
1.d. Ability to use modern computational techniques to solve engineering problems.											×
1.e. Ability to mathematically model and analyze…			×		×						
2.a. Oral and written presentation of ….							×				
2.b. Introductory knowledge of economics.								×			
2.c. Working on a multi-disciplinary team with peers.				×			×				
2.d. Motivation to pursue lifelong learning.									×		
3.a. Commitment to professional and ethical behavior in the workplace.						×					
3.b. Awareness of world affairs and cultures.								×		×	
3.c. Recognition of the impact of engineering on local and global societies.								×		×	
3.d. Seeking professional licensure.						×					

C. Relationship of Program Outcomes to Program Educational Objective

Table 3.2 illustrates how the specific program outcomes mentioned in the previous section are related to the program educational objectives. This relation shows that the demonstration of skills associated with these program outcomes by our students prepared them well to achieve the program educational objectives later in their career.

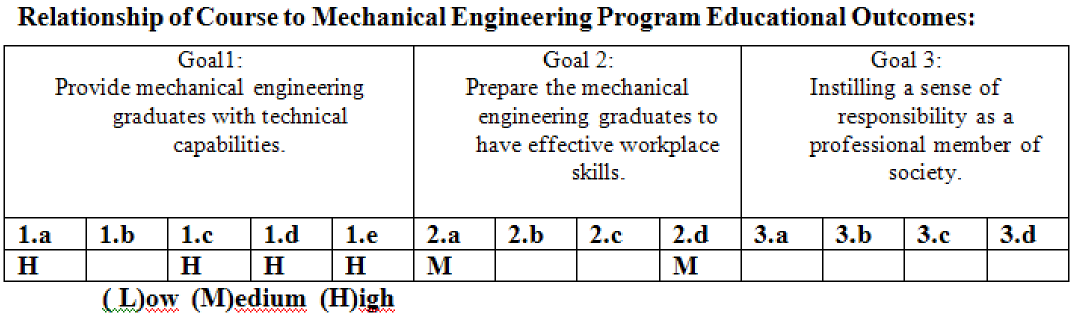
Table 3.2 Relationship of Program Outcomes to Program Educational Objectives

UNLV ME Program Objectives and Associated Outcomes		Program Outcomes
Objective 1:	Provide mechanical engineering graduates with technical capabilities.	**1.a.** Fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field.
		1.b. Ability to design and conduct experiments, analyze data, and utilize statistical methods.
		1.c. Ability to solve open-ended design problems.
		1.d. Ability to use modern computational techniques to solve engineering problems.
		1.e. Ability to mathematically model and analyze engineering systems.
Objective 2:	Prepare mechanical engineering graduates to have effective work place skills.	**2.a.** Oral and written presentation of technical information.
		2.b. Introductory knowledge of economics.
		2.c. Working on a multi-disciplinary team with peers.
		2.d. Motivation to pursue lifelong learning.
Objective 3:	Instilling a sense of responsibility as a professional member of society.	**3.a.** Commitment to professional and ethical behavior in the workplace.
		3.b. Awareness of world affairs and cultures.
		3.c. Recognition of the impact of engineering on local and global societies.
		3.d. Seeking professional licensure.

D. Relationship of Courses in the Curriculum to the Program Outcomes

In our program, the course objectives and their outcomes are developed and listed in the Course Syllabi, attached in Appendix A. In this course description, the course objectives/learning outcomes are mapped to the program Educational Outcomes as shown in the example in Table 3.2.1.

Table 3.2.1 Sample mapping of course contents to program outcomes



Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**	**H**	**H**	**M**			**M**				

(L)ow (M)edium (H)igh

These are also correlated to the Criterion 3 (a) through (k) as shown previously in Table 3.1. Each course coordinator compared their course outcomes to the skills developed for each program outcome and assigned a value of (H)igh, (M)edium, or (L)ow for a level of achievement of particular outcomes. A course assigned a value of High for a particular outcome means that the course contributes strongly to the development of this particular skill in the student. Table 3.3 shows the summary of this mapping for each program outcome. As shown in this table, the students have multiple opportunities throughout their career as students to achieve the skills associated with each program outcome.

Table 3.3 Summary of the relationship between the Program Educational Outcomes and ME Courses (H=highly Related, M=Moderately Related, L=Slightly Related)

Program Outcome / **Courses**	**1.a.** Fundamental knowledge of state-of-the …	**1.b.** Ability to design and conduct experiments, …	**1.c.** Ability to solve open-ended design ….	**1.d.** Ability to use modern computational ...	**1.e.** Ability to mathematically …	**2.a.** Oral and written presentation ...	**2.b.** Introductory knowledge of economics….	**2.c.** Working on a multi-disciplinary ...	**2.d.** Motivation to pursue lifelong ...	**3.a.** Commitment to professional …	**3.b.** Awareness of world affairs and …	**3.c.** Recognition of the impact …	**3.d.** Seeking professional licensure…
ME 100*	H	M	H	H	H	H		H	M	H		M	
ME 100L*	H	H	H	H	H	H		H	M	M			
ME 120*	L	M	L	H	M	H			M	L			
ME 130		H											
ME 220*	L	M	L	H	M	H			M	L			
ME 230	M			L	L								
ME 240*	L	M	L	H	M	H			M	L			
ME 242*	H	M		H	H	L			M	M			
ME 301*	H		L						M			M	
ME 302*	H	L	M		H	L		H	L				L
ME 302L*	H	H	L		L	L		H	L				L
ME 311*	M		L		L	L			M			M	
ME 314*	H	L	L	L	H								
ME 315*	H	H	L	H	H	H			M	H		L	
ME 319*	H		L	H	H	M		L					
ME 319L*	H		L	H	H	M		L					
ME 320*	H		H	H	H	M			M				
ME 330*	H		L	H	H	L			M				
ME 337*	M	H		H	L	L		L					
ME 337L*	M	H		H	L	L		L					
ME 380*	H		M	H	H	L			M			L	H
ME 380L*	H	H	L			H		M	M				

ME 400	H		M	H	H	H			M			L	H
ME 402*	H			H	M								
ME 415	H		H	M	H	H	M	H	M	M		M	L
ME 416	H		M	M	H				M				
ME 418	M		H		M	L	L		M	L		M	M
ME 419	H		H		M	L			M	L		M	M
ME 421*	H	H	H	H	H	H			L	M			
ME 421L*	H	H		H	H	H		H	M	M			
ME 425	H		L	H	H	M		L					
ME 426	H	M	L	L	M	M	L	L	M	M	L	M	L
ME 427	H	M	L	L	M	M	L	L	M	M	L	M	L
ME 429	M		H	H	H	M		L	L				
ME 434	H	H	M	M	H				M			L	
ME 440*	H	M	H	M	H	H	L	H	M	L			L
ME 443	J		M	H	H	M			M				
ME 446	H	L	M	L	H	L	L	H	M	L			L
ME 453*	H		L	H	H				M			L	
ME 455	H	M	L	M	H	L	L	L	H	H	M	M	L
ME 456	H		M	H	L	M	L		M		L	L	
ME 460	H	H	H	M	M	H	M	H	M	L	L	M	M
ME 462	H	H	H	M	M	H	H	H	M	L	L	L	L
ME 470	H	H	L	L	M	H		H	L	L			L
ME 495	H		H	H	H	H	L	L	M			M	
ME 497*	H	H	H	H	H	H	M	M	H	M	M	M	L
ME 498*	H	H	H	H	H	H	M	M	H	M	M	M	L

*Required Courses

In addition to disciplinary courses, University General Education (GE) courses provide a significant contribution to students' development of skills within Criterion 3 (a) through (k). The GE program is designed to help students develop a broad intellectual background, gain familiarity with a variety of fields of knowledge, and acquire practical skills necessary for analyzing the culture and the world. Upon completion of the GE core curriculum, students will be able to think critically and independently and so possess a foundation for life-long learning, professional, and personal development. The General Education requirements are divided into the following areas with the outcomes noted,

1. English Composition: Students will demonstrate effective written communication.
2. World Literature: Students will interpret and compare world literatures.
3. Constitutions: Students will interpret the U.S. and Nevada Constitutions in broad contexts.
4. Mathematics: Students will demonstrate quantitative reasoning skill.
5. Multicultural: Students will analyze contemporary cultures within the United States.

6. International: Students will demonstrate proficiency in a foreign language or explain how international cultures, societies, or political economics relate to complex, modern world systems.
7. Distribution Requirement: For all engineering students, Life and Physical Science and Analytical Thinking are excluded from the Distribution Requirement. Eighteen credit hours must be taken from Humanities and Fine Arts and Social Sciences.

Table 3.4 Summary of the Relationship between Criterion 3 (a)-(k) Educational Outcomes and UNLV General Education Core

UNLV General Education Core **Criterion 3 (a)through (k)**	English Composition	World Literature	Constitutions	Mathematics [1]	Life and Physical Sciences and Analytical Thinking [1]	Multicultural & International [2]	Humanities and Fine Arts	Social Sciences
a) an ability to apply knowledge of mathematics, science, and engineering				×	×			
b) an ability to design and conduct experiments, as well as to analyze and interpret data								
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability								
d) an ability to function on multidisciplinary teams								×
e) an ability to identify, formulate, and solve engineering problems								
f) an understanding of professional and ethical responsibility							×	
g) an ability to communicate effectively	×	×				×		×
h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context						×		×
i) a recognition of the need for, and an ability to engage in life-long learning						×	×	×
j) a knowledge of contemporary issues						×		
k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.								

[1] These are distribution area for all engineering student

[2] Every student must complete a three-credit multicultural course and a three-credit international course. Courses satisfying other requirements may simultaneously satisfy the multicultural and international requirements except one course cannot satisfy both the multicultural and the international requirements.

E. Documentation

The Criterion 3 (a) through (k) is assessed based on the assessment methods described in Section F. All assessment material for last 5 years can be found in the separate binders or in the department web site http://me.unlv.edu/GeneralInfo/ABETData.html. This assessment material as well as course syllabi and student sample work for each course can be used to evaluate our Program Outcomes. All student work is scanned and available in electronic forms to the ABET visit team through the department web site http://me.unlv.edu/GeneralInfo/SampleStudentWork.html. Course syllabi for all required courses and technical electives are in Appendix A. Course binders are available for all required and elective courses taught during three semesters (Spring 2009, Fall 2009, Spring 2010). Each course syllabi includes how the course is related with the Program Outcomes, and the results are summarized in Table 3.3. In addition, materials from Math/Science are also available for review. These materials include ABET style syllabi and how those courses are related to the program outcomes.

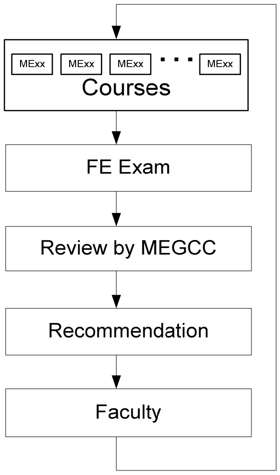
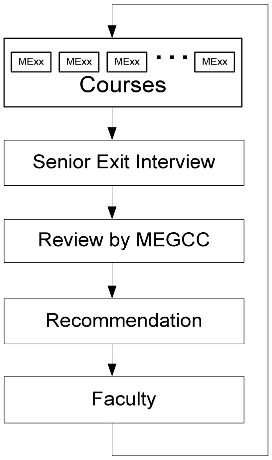
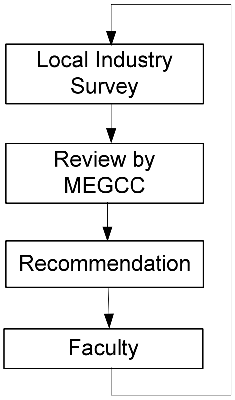
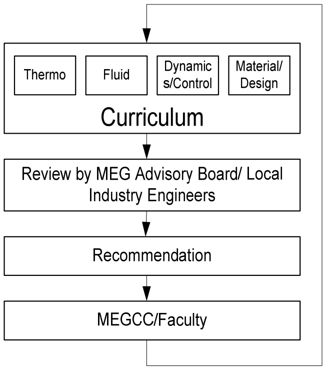
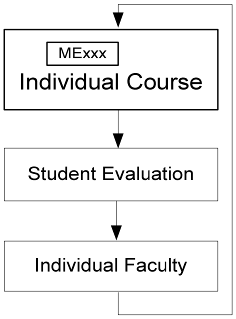
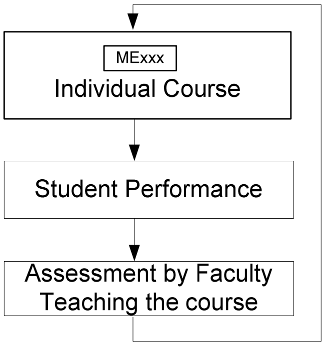
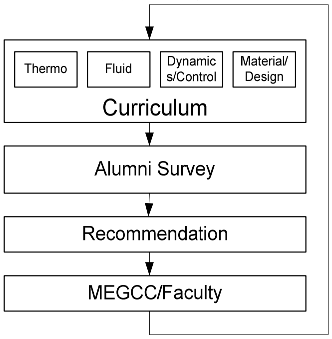
F. Achievement of Program Outcomes

This chapter represents the methods and results of the assessment of the ME Educational Outcomes. Section F.1 presents a brief overview of the assessment methods. Section F.2 contains assessment data from the program constituents. Similar to the assessment of the program objectives, the scale that ranges from 5 to 1 (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 = strongly disagree) is used to assess all outcomes. A score below 3 for an outcome is considered as indicating a weakness and appropriate corrective measures are to be implemented. In the remainder of this chapter, assessment of individual outcomes is presented.

F.1 Assessment methods

As mentioned in the CRITERION 2 Educational Objectives, the department pursues several assessment methods in order to evaluate the effectiveness of our program. Table 3.5 shows assessment and evaluation processes that our program employs to periodically document and demonstrate the degree to which the program outcomes are attained. As shown in this table, the department curriculum committee plays a key role in assessing and making recommendations to faculty. These issues are presented to all faculty members as well as the ME Advisory Board for their input. The following is a brief description of each of the assessment methods and the data obtained. Assessment is done internally and externally, and Table 3.5 also shows the assessment methods discussed in this section, how these assessment procedures are conducted, and the frequency of the assessments.

Table 3.5 Summary of assessment process in Mechanical Engineering Program

<table>
<tr><th colspan="2">Internal Assessments</th><th colspan="2">External Assessments</th></tr>
<tr><td colspan="2">**F.2.1** Course and Instructor Evaluations (Every Semester):
F.2.1.1 Lab Survey (mid-semester)
F.2.1.2 Instructor Evaluation
F.2.1.3 Evaluation of (a)-(k) ABET Educational Outcomes
F.2.1.4 Evaluation of Course Objectives
F.2.2 Exit Interviews (Every Semester)
F.2.3 Assessment by Faculty (Every Semester)
F.2.4 Program Internal Review by University</td><td colspan="2">**F.2.5** FE Exam Results (Every Semester)
F.2.6 Judging Senior Design Competition (Every Semester)
F.2.7 ME Advisory Board / Local Industry Surveys (Annual)
F.2.8 ME Advisory Board / Local Engineers Reports (Tri-Annual)
F.2.9 Alumni Surveys (Tri-Annual)</td></tr>
<tr><th colspan="2">Every-Semester Assessment</th><th>Annual Assessment</th><th>Tri-annual Assessment</th></tr>
<tr><td>**FE Exam (External)**
 </td><td>**Exit Interview (Internal)**
 </td><td rowspan="2">**Local Industry Surveys (External)**
 </td><td>**MEG Program Review (External)**
 </td></tr>
<tr><td>**Student Evaluation of Course Objective, Labs, Teacher, Criterion 3 (a)-(k) (Internal)**
 </td><td>**Faculty Assessment**
 </td><td>**Alumni Survey (External)**
 </td></tr>
</table>

F.2 Assessment Results

F.2.1 Course and Instructor Evaluations (Every Semester)

F.2.1.1 Laboratory Survey

In the last third of the semester, students in our labs are queried about the quality of these labs. Students are asked to indicate their response to specific questions on a five-point scale (strongly agree, agree, neutral, disagree, strongly disagree) as shown in Appendix E.4. The survey is used to monitor the quality of teaching assistants, assess the quality of instruments in a lab, and identify the need for equipment upgrades. Also, both teaching assistants and faculty mentors will prepare their responses for the questions receiving scores below 3 as shown in Table 3.6 (Fall 2009 sample). Results of all survey data from 2005 are available from the department web site at http://me.unlv.edu/GeneralInfo/ABETData.html.

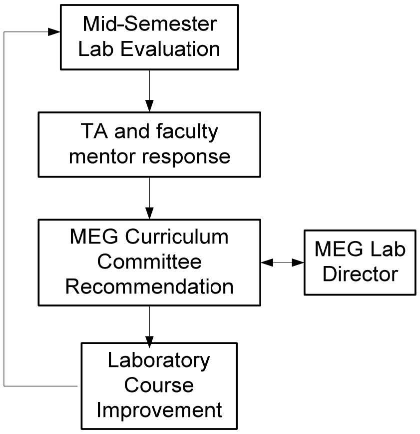


Table 3.6 Sample Laboratory Survey and Faculty Responses (Fall 2009)

FALL 2009 Lab Survey							
MEG 380L 02	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	TA: Uday Vadlamani (udayvadlamani@hotmail.com)	
						Student Comments	**Faculty Responses**
1) The lab manual/notes adequately Describe equipment and experiments. If not, please help us identify problems.	3	6	1	1	0	Pull money from the other colleges to fund some more engineering! The description in lab 1 should be revised. There were issues with the equipment and calculations.	I will revisit the lab 1 description.
2) The lab experiments are reasonable in length and content. If not, how can we change it?	3	7	0	0	0	More equipment to help it go faster.	
3) Do the lab experiments follow the lecture material. If not, please explain.	3	4	2	1	0		It seems that most students feel that the lab follows the lecture.
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	3	8	0	0	0		
5) The lab equipments are functional. If not, please explain.	1	6	4	0	0	Hydrometer's are almost all broken.	
6) The lab is well equipped. If not, what do you think is missing?	1	6	2	2	0	Better layout, desk setup. More hydrometers, thermometers, scales, etc. Some of the lab equipment has structural problems causing more calculated errors during the experiment process.	Since Jon Becker from civil engineering is in charge of lab equipments, we might need to work with him to improve the lab deficiency.

*The number shows the number of responses in each category

Cumulative evaluation results for *each laboratory* class collected from Spring 2005 to Spring 2010 showing averages of *all six questions* (see first column of Table 3.6) is shown in the last column of Table 3.7. Six questions asked to students in the Lab survey are mainly related with the quality of lab instruction and equipment. The data shown in Table 3.7 is especially useful to recommend any corrective actions to individual labs to reflect student assessment in the middle of each semester. Fluctuation of assessment results for some courses from year to year mainly reflects fluctuating in the teaching quality of department teaching assistants (TA). This result also can be considered for evaluating the teaching performance of TA's. All assessment results are shared with faculty supervisor of each laboratory class and any necessary improvement plans are suggested as shown in the last column of Table 3.6.

Table 3.7 Cumulative Lab Assessment for each Lab Class from Spring 2005-Spring 2010

ME Laboratory	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
ME 100L (Intro to MEG & Aero)	3.9	3.3	4	3.3	4.4	3.8	4.3	3.7	4.1	4.2	4.4	3.9
ME 120 (AutoCAD)	4.3	3.8	4.0	3.7	3.8	3.9	3.7	4.1	4.4	4.4	4.6	4.0
ME 130 (Machine Shop Practice)						4.7	4.6	4.6	4.4	4.3	4.8	4.6
ME 220 (Pro Engineering)			4.6	3.7		4		4.4		4.2		4.2
ME 230 (CNC Prog)					4.9				4.9			4.9
ME 240 (Solid Works)	4.3		4.3		4.5		4.1		4.3		3.4	4.3
ME 302L (Strength of Matl Lab)	4.4	4.2	4.3	3.5	4.2	3.5	3.9	4.2	4.2	3.9	4.1	4.0
ME 315 (Thermal Lab)	3.3		3.5		3.9	3.7	3.9	4.2	4.3	4.3	4.5	4.0
ME 319/319L (Programming)	4.4		4.5		3.9		4.1		4.2	4.6	4.4	4.3
ME 337L (Eng Measurement)		4.2		3.3	3.8	3.8		4.1	4.5		4.1	4.0
ME 380L (Fluid Lab)	3.6	3.6	3.8	3.9	3.4	3.3	4.4	3.1	3.5	4	4.2	3.7
ME 421L (Auto Control Lab)		3.5		4.1		3.3		3.8		3.8		3.7

(Excellent=5, Good=4, Neutral=3, Fair=2, Poor=1)

As shown in Table 3.7, ME 380L and ME 421L have lower rating than the other labs, which can be explained as follows:

> ME 380L (Fluid Lab): As shown in Appendix E.4, most of the complaints is a lack of consistency with a lecture, ME 380, since the lab had been taught by teaching assistants from the Civil Engineering. From Fall 2009, a ME faculty supervisor, Dr. H. Zhao, as well as the ME teaching assistant have been assigned to the lab, and there has been a significant improvement in the rating.
>
> ME 421L (Automatic Control): Main complaints have been equipment related issues. In 2009, ME 337L (Engineering Measurement) was integrated with ME 421L to share the resources, and we expect an improved student feedback in the near future. Also, there has been a major effort to improve hands-on experiences of students in this lab.

Table 3.8 shows the same cumulative data for *each question* in the Laboratory Survey (Table 3.8) averaged for *all* laboratory classes from Spring 2005 to Fall 2009. The data shown in Table 3.8 is used to relate the lab survey results effectively to the program educational outcomes. The following outcomes are evaluated:

> **1.b.** *Ability to design and conduct experiments, analyze data, and utilize statistical methods.*

The data averaged for *each* laboratory can be found in Appendix E.4. Detailed survey results of each course are also available from the department web site at http://me.unlv.edu/GeneralInfo/ABETData.html.

Table 3.8 Cumulative LAB Assessment for Each Question from Spring 2005-Spring 2010

Questions in Mid-Lab Survey	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
1) The lab manual/notes adequately Describe equipment and experiments.	4.1	3.9	4.1	3.5	4.0	3.6	3.9	3.8	4.0	4.3	4.1	3.9
2) The lab experiments are reasonable in length and content.	4.1	4.0	4.2	3.7	4.1	3.8	4.0	4.2	4.3	4.4	4.3	4.1
3) Do the lab experiments follow the lecture material.	3.8	3.5	3.9	3.3	4.0	3.6	4.0	4.0	4.1	4.3	4.2	3.9
4) The performance of the lab instructor is satisfactory	4.3	4.3	4.3	4.0	4.2	3.8	4.1	3.9	4.4	4.5	4.4	4.2
5) The lab equipments are functional.	3.9	3.8	4.0	3.7	4.2	4.1	4.3	4.3	4.4	4.5	4.3	4.1
6) The lab is well equipped	4.0	3.8	4.1	N/A*	4.1	3.9	4.2	4.0	4.3	4.3	4.4	4.1
Cumulative total average rating												**4.1**

(Excellent=5, Good=4, Neutral=3, Fair=2, Poor=1)

*Question (6) was skipped in Fall 2006

F.2.1.2 Instructor Evaluation

At the end of each semester, the College of Engineering queries students about their assessment of the teaching quality. We compare the performance of Mechanical Engineering instructors to the remainder of the college. Students rank their response on a five-point system (excellent, good, neutral, fair, poor, N/A). The results below show that the evaluation of our instructors does not differ significantly from that of the college. It varies between "Neutral" and "Good." The following graph indicates cumulative responses of the students in the last five semesters from Spring 2007. More detailed teaching evaluation results can be found in Appendix E.5.

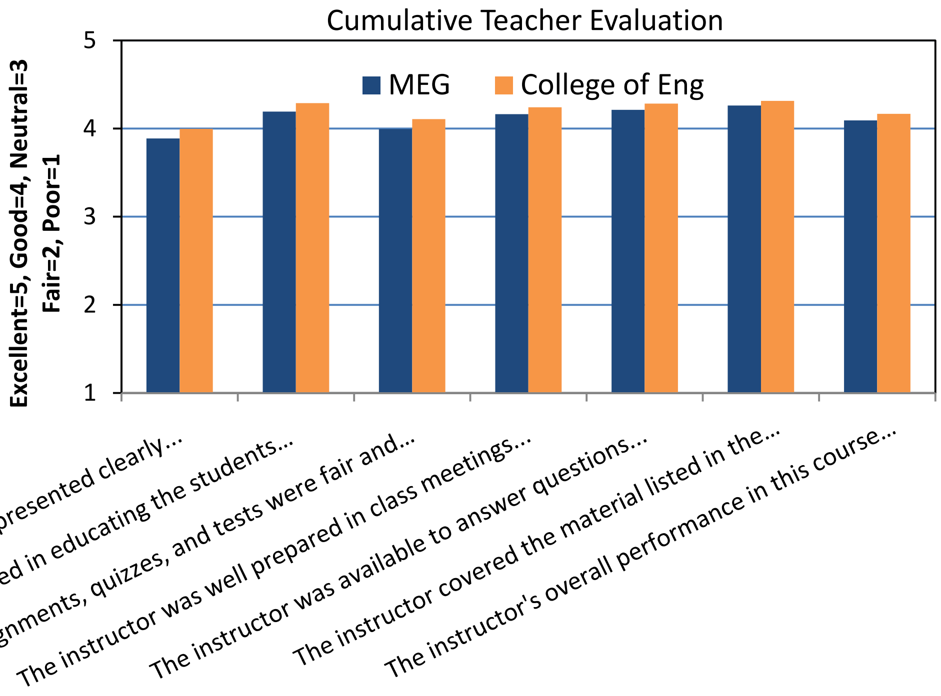


Figure 3.1 Cumulative Student Evaluation of the Instructors from Spring 2007 to Spring 2009

F.2.1.3 Evaluation of (a)-(k) ABET Educational Outcomes

At the end of each semester, the College of Engineering queries students about their assessment of the Criterion 3 (a) through (k) educational outcomes of engineering courses. Students rank their response on a five-point system (excellent, good, neutral, fair, poor, N/A). Courses that address a specific outcome are used to assess it. The data are averaged and normalized to cancel the effect of the number of respondents. Table 3.9 shows cumulative assessment results from Spring 2005 through Spring 2009. Appendix E.6 has a sample data averaged for all course in Spring 2009, and the department web site at http://me.unlv.edu/GeneralInfo/ABETData.html has all data collected from individual courses from Spring 2005.

Table 3.9 End-of-semester Student assessment of CRITERION 3

Semester **Criterion 3 (a)-(k)**	Spring 2005	Fall 2005	Spring 2006	Fall 2006[5]	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	**Cumulative Average***
a) an ability to apply knowledge of mathematics, science, and engineering	3.74	4.04	4.03	N/A	4.2	3.93	3.5	3.9	4	3.88	3.92
b) an ability to design and conduct experiments, …	3.61	3.95	3.89		4.06	3.75	3.3	3.8	3.9	3.79	3.79
c) an ability to design a system, component, or process to meet …	3.61	3.95	3.87		4.05	3.75	3	3.8	3.9	3.84	3.74
d) an ability to function on multidisciplinary teams	3.62	3.75	3.78		3.83	3.55	5	3.7	3.7	3.59	3.87
e) an ability to identify, formulate, and solve engineering problems	3.7	3.97	4.05		4.14	3.8	3.5	3.9	3.9	3.79	3.87
f) an understanding of professional and ethical responsibility	3.56	3.68	3.6		3.65	3.45	4	3.4	3.6	3.35	3.62
g) an ability to communicate effectively	3.48	3.71	3.62		3.74	3.51	3.3	3.6	3.7	3.44	3.59
h) the broad education necessary to understand the impact of engineering solutions in a global, …	3.58	3.73	3.68		3.8	3.51	3.6	3.6	3.7	3.47	3.66
i) a recognition of the need for, and an ability to engage in life-long …	3.67	3.77	3.76		3.93	3.62	4	3.8	3.9	3.7	3.81
j) a knowledge of contemporary issues	3.52	3.64	3.68		3.65	3.38	3.3	3.4	3.6	3.37	3.52
k) an ability to use the techniques, skills, and modern engineering …	3.78	4	4.03		4.19	3.89	3.3	3.8	4	3.92	3.87

(Excellent=5, Good=4, Neutral=3, Fair=2, Poor=1)

*Spring 2010 data was not available at the time of report preparation

F.2.1.4 Evaluation of Class Course Objective (COA)

At the end of each semester, the department queries students about their assessment of the course objectives of individual ME courses. The course objectives for each course are included in the Course Syllabus section in Appendix A. Students rank their response on a five-point system (strongly agree, agree, neutral, disagree, strongly disagree). These data are used by faculty and the curriculum committee to assess the effectiveness of individual courses to deliver specified learning outcomes to students effectively. An example for ME 337 (Engineering Measurements) is shown below, Table 3.10. This data is also used to determine if the outcomes addressed by these courses, as stated in Table 3.3, are met by averaging the number of responses in each course objective by 1(Strongly disagree)-5(strongly agree) scale, and calculate the total average for all course objectives as shown in the bottom of Table 3.10. Appendix E.7 has total averaged COA calculated for all courses offered from Fall 2005 to Fall 2009, and this data is also used to assess whether we accomplished our educational outcomes together with other internal and external assessment data.

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[5] Assessment data is not available in this semester.

The Department web site http://me.unlv.edu/GeneralInfo/ABETData.html has all assessment data collected for all individual courses from Spring 2005.

Table 3.10 Sample Course Objectives Assessment (COA) (Fall 2009)

ME 337 Engineering Measurement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Faculty Response
1. Acquire the common mechanical measurement signals in the laboratory using either conventional measurement instruments or computer based data …	3	5	1	0	0	
2. Design measurement system including the selection of appropriate transducers, …	2	4	2	1	0	
3. Understand dynamic characteristics of measurement signal and instruments.	4	5	0	0	0	
4. Treat measurement data using statistics; probability theory; finite statistics, curve …	4	4	1	0	0	
5. Analyze the measurement data using uncertainty analysis; propagation of …	3	4	2	0	0	
						Total average COA*=4.2

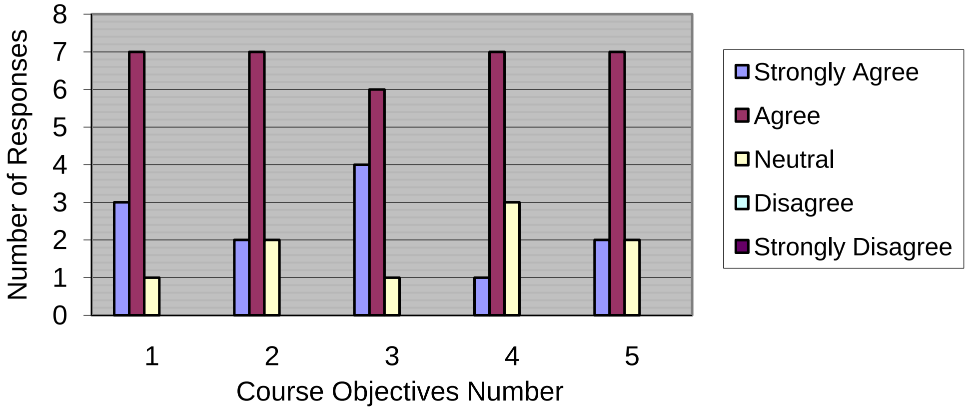


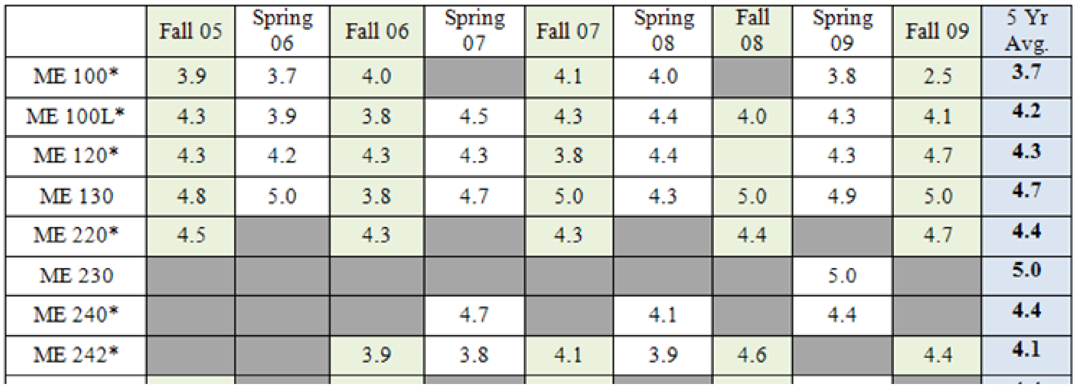
Table 3.11 shows how we assess the ME Educational Outcomes from cumulative COA data shown in Appendix E.7. To relate the cumulative COA data with the ME Educational Outcomes, Table 3.3 is used, which shows the relationship between individual courses and the educational outcomes.

For easier understanding, the following shows how Table 3.11 is used to assess the program outcomes from COA:

- At the end of each semester, the COA is carried out to evaluate how the course objectives are met in each course. Cumulative data for last 5 years is shown in Appendix E.7 as well as in Table 3.10.1 (truncated version).

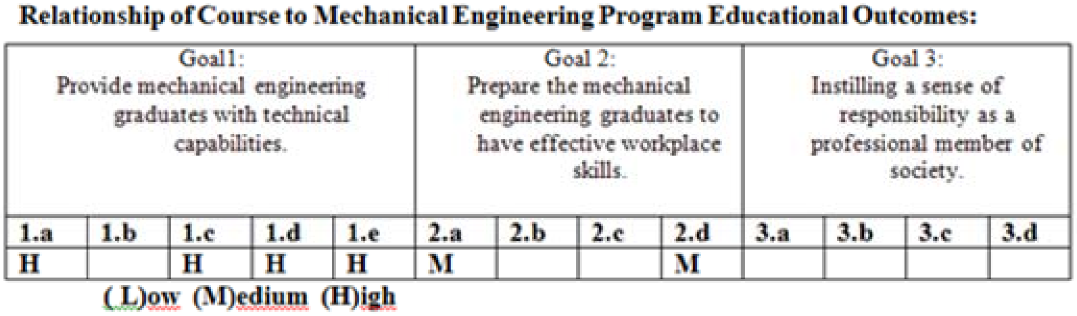
- Table 3.3 shows relationship between ME courses and the program outcomes in three levels of High, Medium, and Low. This relationship is used to assess the program outcomes using the cumulative data of COA in Appendix E.7.
- Since different level of relationship is used, a weighted average is used to calculate the total rating from the cumulative course data in Appendix E.7.
- Table 3.10.1 shows a truncated data (see Appendix E.7 for complete data for all courses) and a sample table used for each course to identify the relationship between each course and the program outcomes.

Table 3.10.1 Data used to create Table 3.11



	Fall 05	Spring 06	Fall 06	Spring 07	Fall 07	Spring 08	Fall 08	Spring 09	Fall 09	5 Yr Avg.
ME 100*	3.9	3.7	4.0		4.1	4.0		3.8	2.5	**3.7**
ME 100L*	4.3	3.9	3.8	4.5	4.3	4.4	4.0	4.3	4.1	**4.2**
ME 120*	4.3	4.2	4.3	4.3	3.8	4.4		4.3	4.7	**4.3**
ME 130	4.8	5.0	3.8	4.7	5.0	4.3	5.0	4.9	5.0	**4.7**
ME 220*	4.5		4.3		4.3		4.4		4.7	**4.4**
ME 230								5.0		**5.0**
ME 240*				4.7		4.1		4.4		**4.4**
ME 242*			3.9	3.8	4.1	3.9	4.6		4.4	**4.1**

For more data, see Appendix E.7 ⋮



Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**	**H**	**H**	**M**			**M**				

(L)ow (M)edium (H)igh

See Appendix A. Course Syllabus for the relationship between the course objective and the program outcomes

Table 3.11 Educational Outcomes evaluation based on the cumulative (Fall 2005-Fall 2009*) Course Objective Assessment (COA) in **Appendix E.7**

ME Educational Objectives	**Courses, (H)igh Relation**		**Courses, (M)edium Relation**		**Courses, (L)ow Relation**		**Weighted Avg.****
1.a. Fundamental knowledge of state-of-the-art and evolving…	ME 100, ME 100L, ME 242, ME 301, ME 302, ME 302L, ME 314, ME 315, ME 319, ME 319L, ME 320, ME 330, ME 380, ME 380L, ME 400, ME 402, ME 415, ME 416, ME 419, ME 421, ME 421L, ME 425, ME 426, ME 427, ME 434, ME 440, ME 446, ME 453, ME 455, ME 456, ME 460, ME 462, ME 470, ME 495, ME 497, ME 498		ME230, ME 311, ME 337, ME 337L, ME 418, ME 429		ME 220, ME 240		**4.2**
	Avg COA*	4.16	Avg COA	4.16	Avg COA	4.37	
1.b. Ability to design and conduct experiments, …	ME 100L, ME 130, ME 302L, ME 315, ME 337, ME 337L, ME 380L, ME 421, ME 421L, ME 434, ME 460, ME 462, ME 470, ME 497, ME 498		ME 100, ME 120, ME 220, ME 240, ME 242, ME 426, ME 427, ME 440, ME 455		ME 302, ME 314, ME 446		**4.2**
	Avg COA	4.21	Avg COA	4.18	Avg COA	4.2	
1.c. Ability to solve open-ended design …	ME 100, ME 100L, ME 320, ME 415, ME 418, ME 419, ME 421, ME 429, ME 440, ME 460, ME 462, ME 495, ME 497, ME 498		ME 302, ME 380, ME 400, ME 416, ME 434, ME 443, ME 446, ME 456		ME 120, ME 220, ME 240, ME 301, ME 302L, ME 311, ME 314, ME 315, ME 319, ME 319L, ME 330		**4.1**
	Avg COA	4.13	Avg COA	3.96	Avg COA	4.29	
1.d. Ability to use modern computational…	ME 100, ME 100L, ME 120, ME 220, ME 240, ME 242, ME 315, ME 319, ME 319L, ME 320, ME 330, ME 337, ME 337L, ME 380, ME 400, ME 402, ME 421, ME 421L, ME 425, ME 429, ME 443, ME 453, ME 456, ME 495, ME 497, ME 498		ME 415, ME 416, ME 434, ME 440, ME 455, ME 460, ME 462		ME 230, ME 314, ME 426, ME 427, ME 446, ME 470		**4.1**
	Avg COA	4.13	Avg COA	3.98	Avg COA	4.4	
1.e. Ability to mathematically …	ME 100, ME 100L, ME 242, ME 240, ME 302, ME 314, ME 315, ME 319, ME 319L, ME 320, ME 330, ME 337, ME 337L, ME 380, ME 440, ME 415, ME 416, ME 421, ME 421L, ME 425, ME 429, ME 434, ME 440, ME 443, ME 446, ME 453, ME 455, ME 495, ME 497, ME 498		ME 120, ME 220, ME 240, ME 402, ME 418, ME 419, ME 426, ME 427, ME 460, ME 462, ME 470		ME 230, ME 302L, ME 311, ME 337, ME 337L, ME 456		**4.2**
	Avg COA	4.13	Avg COA	4.23	Avg COA	4.25	
2.a. Oral and written presentation …	ME 100, ME 100L, ME 120, ME 220, ME 240, ME 315, ME 380L, ME 400, ME 415, ME 421, ME 421L, ME 440, ME 460, ME 462, ME 470, ME 495, ME 497, ME 498		ME 319, ME 319L, ME 320, ME 425, ME 426, ME 427, ME 429, ME 443, ME 456		ME 242, ME 302, ME 302L, ME 311, ME 330, ME 337, ME 337L, ME 380, ME 418, ME 419, ME 446, ME 455		**4.2**
	Avg COA	4.15	Avg COA	4.18	Avg COA	4.09	

2.b. Introductory knowledge of economics…	ME 462		ME 415, ME 460, ME 497, ME 498		ME 418, ME 416, ME 427, ME 440, ME 446, ME 455, ME 456, ME 495		**4.2**
	Avg COA	-	Avg COA	4.4	Avg COA	3.91	
2.c. Working on a multi-disciplinary …	ME 100, ME 100L, ME 302, ME 302L, ME 415, ME 421L, ME 440, ME 446, ME 460, ME 462, ME 470		ME 380L, ME 497, ME 498		ME 319, ME 319L, ME 337, ME 337L, ME 425, ME 426, ME 427, ME 429, ME 455, ME 495		**4.2**
	Avg COA	4.18	Avg COA	4.23	Avg COA	4.16	
2.d. Motivation to pursue lifelong…	ME 455, ME 497, ME 498		ME 100, ME 100L, ME 120, ME 220, ME 240, ME 242, ME 301, ME 311, ME 315, ME 320, ME 330, ME 380, ME 380L, ME 400, ME 415, ME 416, ME 418, ME 419, ME 421L, ME 426, ME 427, ME 434, ME 440, ME 443, ME 446, ME 453, ME 456, ME 460, ME 462, ME 495		ME 302, ME 302L, ME 421, ME 429, ME 470		**4.2**
	Avg COA	4.2	Avg COA	4.11	Avg COA	4.33	
3.a. Commitment to professional …	ME 100, ME 315, ME 455		ME 100L, ME 242, ME 415, ME 421, ME 421L, ME 426, ME 427, ME 497, ME 498		ME 120, ME 220, ME 240, ME 418, ME 419, ME 440, ME 446, ME 460, ME 462, ME 470		**4.0**
	Avg COA	3.93	Avg COA	4.17	Avg COA	4.26	
3.b. Awareness of world affairs and …			ME 301, ME 455, ME 497, ME 498		ME 426, ME 427, ME 456, ME 460, ME 462		**4.2**
	Avg COA	-	Avg COA	4.25	Avg COA	4.2	
3.c. Recognition of the impact …			ME 100, ME 301, ME 311, ME 415, ME 418, ME 419, ME 426, ME 427, ME 455, ME 460, ME 495, ME 497, ME 498		ME 315, ME 380, ME 400, ME 434, ME 453, ME 456, ME 462		**4.1**
	Avg COA	-	Avg COA	4.16	Avg COA	4.12	
3.d. Seeking professional licensure…	ME 380, ME 400		ME 418, ME 419, ME 460		ME 302, ME 302L, ME 415, ME 426, ME 427, ME 440, ME 446, ME 455, 462, ME 470, ME 497, ME 498		**3.9**
	Avg COA	3.8	Avg COA	3.9	Avg COA	4.3	

* Average COA is calculated using the cumulative value calculated from F05 to F09 in **Appendix E.7**

** Weighted average is calculated for weight of 10 for High, 6 for Medium, and 2 for Low

F.2.2 Exit Interviews

An extensive seven-page exit survey questionnaire is administered every semester on a voluntary basis. While the survey is voluntary, we have experienced close to 100% participation. Appendix E.8 has the Exit Interview form used for Fall 2009 and its summary of interview results. The interview results for all other semesters are available in the department web site at http://me.unlv.edu/GeneralInfo/ABETData.html, where student's comments are included. As shown in Table 3.12-14, the questionnaire covers assessment the program objectives and outcomes, faculty, staff, and labs. It also has a section to query them about their post-graduation plans. The survey is distributed near the end of each semester. After students fill in the questionnaire, they meet individually with the department chairman to discuss their undergraduate experience immediately after the semester ends.

Table 3.12 Cumulative Summary of Graduate Exit Interview for ME Program Outcomes from Spring 2005 to Spring 2010

Semester **ME Program Outcomes**	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
1.a. Fundamental knowledge of state-of-the-art and evolving areas …	3.9	4.5	4.2	4.1	3.8	3.9	4.2	4.0	4.3	4.0	4.5	4.1
1.b. Ability to design and conduct experiments, analyze data, …	3.7	4.25	4.3	4.5	4.2	3.5	4.4	4.3	4.3	4.0	4.7	4.2
1.c. Ability to solve open-ended design problems.	4.3	4.5	4.6	4.6	4.3	4.1	4.3	4.5	4.5	4.3	4.4	4.4
1.d. Ability to use modern computational techniques …	4.1	4.75	4.3	4.3	4.3	3.8	4.1	4.1	4.3	4.1	4.6	4.2
1.e. Ability to mathematically …	4.4	4.5	4.7	4.4	4.3	4.4	4.1	4.4	4.3	4.1	4.7	4.4
2.a. Oral and written presentation of technical information.	4.1	4.5	4.2	4.5	4.5	4.1	3.7	4.2	4.0	3.8	4.2	4.2
2.b. Introductory knowledge of economics.	4.4	4.5	4.5	4.1	4.2	4.1	4.1	4.4	4.3	4.1	4.4	4.3
2.c. Working on a multi-disciplinary team with peers.	4.4	4.75	4.7	4.7	4.8	4.5	4.4	4.6	4.7	4.3	4.7	4.6
2.d. Motivation to pursue lifelong learning.	4.0	4.75	3.9	4.5	4.3	4.3	3.8	4.5	4.5	4.3	4.6	4.3
3.a. Commitment to professional and ethical behavior …	4.0	4.5	3.9	4.2	4.3	4.1	4.3	4.3	4.3	4.3	4.4	4.2
3.b. Awareness of world affairs and cultures.	3.7	3.75	3.4	3.2	3.7	3.1	3.2	3.4	3.5	3.2	3.6	3.4
3.c. Recognition of the impact of engineering on …	3.7	3.5	3.8	3.5	3.8	3.8	3.7	4.1	4.1	3.3	4.1	3.8
3.d. Seeking professional licensure.	3.6	4	3.5	3.7	4.3	4.0	4.1	3.7	3.9	3.6	3.8	3.8

In Table 3.12, the outcome 3.b *Awareness of world affairs and cultures* has a lowest rating of 3.4 compared with other outcomes, which is rather consistent in last five years of evaluation. In the engineering curriculum, it is a rather difficult task to achieve a high score in this outcome. As shown in Table 3.1 and 3.4, the Multicultural and International components in the UNLV General Education Curriculum are directly related with the outcome 3.b. The following is the 2010-2012 Undergraduate Catalog description of these components:

- Multicultural courses examine cultural similarities and differences in the United States based upon two or more attributes (e.g. ethnicity, race, gender, age, religion, sexual orientation and disabilities).
- The primary purpose of International courses is to examine attributes (e.g. current language, institutions, and culture) of existing peoples and societies outside of the United States.

It should be noted that a minimum of six credits to be composed of a three-credit multicultural requirement and a three-credit international requirement that may simultaneously fulfill other general education core requirements.

In addition to the Multicultural and International components in the UNLV General Education Curriculum, some of the ME technical elective courses are also related with the outcome 3.d as shown in Table 3.3. These are technical elective courses in the field of manufacturing (ME 426, ME 427), nuclear (ME 455, ME 456), design courses (ME 460, ME 462, ME 497, ME 498), but the levels of relationship with the outcome is low to medium.

To improve the outcome 3.b in the future, the department curriculum committee recommends to increase or emphasize the components of “world affair and cultures” in the related technical elective courses.

Table 3.13 shows the Exit Interview results for the laboratory. Even if the Lab Survey has been done in each semester, the lab survey in the exit interview can be used to attain more qualitative evaluation of *all* laboratory classes from graduating seniors, and an effective tool to see any improvement in the quality of the lab instruction in the program. Table 3.13 also shows the plot of an improvement for last three years. Only data over last three years is plotted since the number of graduates in this period has been over 20 students, which produces more statistically meaningful data for the improvement.

Overall, there has been a significant improvement in laboratory instruction as shown in this plot.

Table 3.13 Cumulative Summary of Graduate Exit Interview for Lab from Spring 2005 to Spring 2010

Semester **Laboratory Survey**	Spring 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
1. The lab manual/notes adequately describe equipment and experiments.	3.1	4.25	4.1	3.8	3.7	3.5	3.3	3.7	3.9	4.1	4.1	3.8
2. The lab experiments are reasonable in length and content. If not, how can we change it?	3.9	4	3.8	3.8	3.8	3.3	3.7	4.0	4.1	3.8	4.3	3.9
3. The lab experiments follow the lecture material. If not please explain.	3.4	3.5	3.7	3.8	3.7	3.4	3.4	3.7	3.4	3.5	4.1	3.6
4. The performance of the lab instructors is satisfactory. If not, how can they improve it.	2.9	4	3.5	3.9	4.5	3.5	3.0	3.7	3.8	3.8	4.4	3.7
5. The lab equipment is functional. If not, please explain.	2.3	3.25	2.9	3.2	3.3	2.5	2.6	3.4	3.6	3.7	4.1	3.2
6. The lab is well equipped. If not, what do you think is missing.	2.9	3.75	3.3	3.8	3.8	3.1	2.8	3.7	3.8	3.6	4.1	3.5

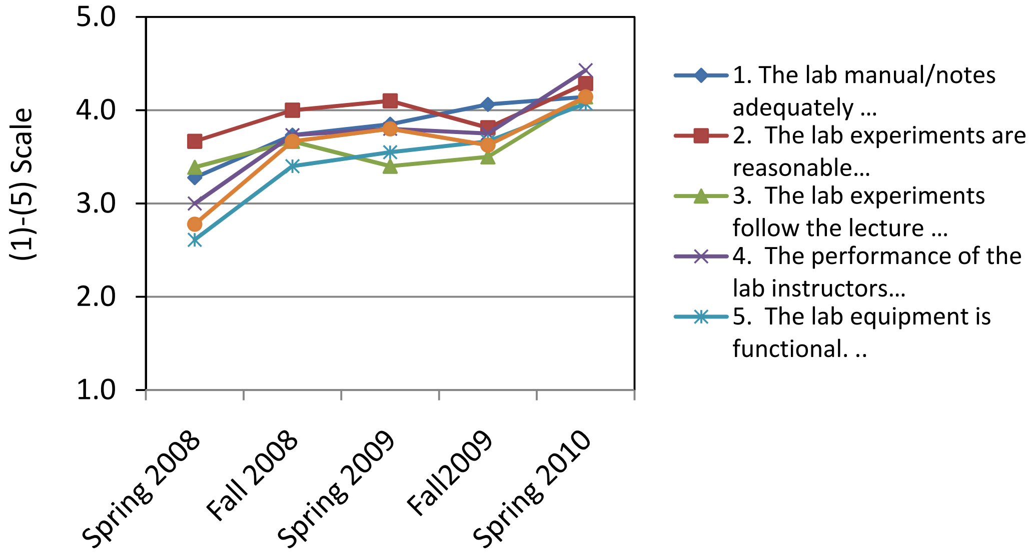


Table 3.14 shows the results for post-graduate part of the survey. A large number of students had internship opportunities (>70%) during their time in the program by local firms, and a little more than 40% answered that their employment is a result of an internship. Also, a large percentage of

students (~80%) answered that they are planning to pursue a graduate degree, and over 30% of them already applied for the graduate program. This result also can be used to evaluate the outcome ***2.d***. *"Motivation to pursue lifelong learning"*.

Table 3.14 Cumulative Summary of Exit Interview for Post-Graduate Survey from Spring 2005 to Spring 2010

Semester **Post-Graduate Survey**	Sp 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
1. Are you currently employed or do you have an employment offer?	71.4%	75.0%	100.0%	76.9%	16.7%	62.5%	61.1%	78.6%	68.4%	70.0%	63.6%	68.1%
2. Is your employment related to Mechanical Engineering?	83.3%	75.0%	60.0%	58.3%	50.0%	80.0%	100.0%	76.9%	75.0%	66.7%	62.5%	72.5%
3. Did you have an internship while you were student at UNLV?	71.4%	100.0%	90.0%	85.7%	50.0%	87.5%	83.3%	73.3%	65.0%	80.0%	72.7%	78.6%
3.a. Was your internship with a local firm/organization?	60.0%	0.0%	66.7%	63.6%	100.0%	85.7%	92.9%	91.7%	91.7%	80.0%	75.0%	73.2%
3.b Was it related to your field of study?			87.5%	81.8%	100.0%			66.7%	92.3%	100.0%	75.0%	88.0%
3.c. Was your internship with a research project within the department?	60.0%	100.0%	44.4%	54.5%	0.0%	14.3%	33.3%	22.2%	23.1%	40.0%	25.0%	39.2%
3.d. Is your employment a result of an internship?	50.0%	100.0%	30.0%	27.3%	33.3%	66.7%	25.0%	50.0%	41.2%	11.1%	22.0%	43.5%
4. Are you planning to pursue a graduate degree?	100.0%	75.0%	77.8%	78.6%	57.1%	87.5%	70.6%	92.9%	82.4%	87.5%	78.0%	80.9%
5. If so, have you applied?	60.0%	75.0%	25.0%	50.0%	25.0%	0.0%	33.3%	35.7%	41.2%	10.0%	30.0%	35.5%

F.2.3 Assessment by Faculty:

At the end of the semester, each ME faculty reviews the grades of the students in the courses they teach and give an average letter grade on A-F scale (4.0 scale) that reflects the collective performance of the students in that course. In this assessment the same grade scale is used to evaluate the educational outcomes using Table 3.3 that shows the relationship between each course and the outcomes. For the grade of each course, the average grades from Fall 2007 to Fall 2009 are used, and they are shown in Appendix E. 11. Using the relationship shown in Table 3.3, all related courses' grades are averaged for each educational outcome as shown in Table 3.14. It should be noted that 4.0 scale is converted to a 1(Strongly Disagree)-5(Strongly Agree) scale by multiplying 1.25 for use in the section **F.3** Level of Achievement together with other assessment methods with 1-5 scale.

The data are used to identify courses where student's performance is below average. The reasons for the deficiency, e.g., course material, student preparation, and relation to prerequisites, will be investigated. We expect that its relevance will increase in the future. Overall, the results of assessment by faculty are in general lower than how students assessed the achievement of the course objectives, which may indicate the level of the strict grading by faculty.

Additionally, each faculty reviews the performance of student and their evaluations after the semester end and prepares a report to indicate how he/she is using this evaluation to improve the course in the future offering. Appendix E.11 lists faculty responses for different types of student evaluations.

Table 3.15 Educational Outcomes Assessed by Faculty Evaluation of Students (Fall 2007-Fall 2009) based on **Table** 3.3

Educational Outcomes	Avg. GPA (4.0 scale)	1(Strongly Disagree)-5(Strongly Agree) scale
1.a. Fundamental knowledge of state-of-the-art …	3.1	3.9
1.b. Ability to design and conduct experiments, analyze …	3.2	4.0
1.c. Ability to solve open-ended design problems.	3.1	3.9
1.d. Ability to use modern computational techniques …	3.1	3.9
1.e. Ability to mathematically model and analyze …	3.1	3.9
2.a. Oral and written presentation of technical information.	3.1	3.9
2.b. Introductory knowledge of economics.	3.5	4.4
2.c. Working on a multi-disciplinary team with peers.	3.1	3.9
2.d. Motivation to pursue lifelong learning.	3.1	3.9
3.a. Commitment to professional and ethical behavior …	3.3	4.1
3.b. Awareness of world affairs and cultures.	3.5	4.4
3.c. Recognition of the impact of engineering on local …	3	3.8
3.d. Seeking professional licensure.	3.2	4.0

F.2.4 Program Internal Review by the University

The Academic Assessment for all programs in the University of Nevada, Las Vegas is periodically assessed by the Office of Academic Assessment (http://provost.unlv.edu/Assessment/) under the Office of the Executive Vice President and Provost. This assessment is done in every semester, and the report for ME department can be found in http://provost.unlv.edu/Assessment/reports_engine.html. The programs assessed by the Academic Assessment office are:

- B.S. Mechanical Engineering
- M.S. Aerospace Engineering
- M.S. Mechanical Engineering
- M.S. Biomedical Engineering
- M.S. Material and Nuclear Engineering
- Ph.D. Mechanical Engineering

F.2.5 FE Exam Results (Every Semester)

The FE Exam is a nationally-normed test that covers the basics of engineering. All mechanical engineering students are required to take the Fundamentals of Engineering Discipline Specific Mechanical Engineering Examination as a graduation requirement. Students who fail to pass the exam are required to take the examination a second time. Results of the exams are tabulated and discussed regularly in department meetings to identity deficiencies in our ME curriculum, and the results can be used as a direct measurement tool for the program outcome.

The data below shows that the passing rate of our students is generally lower than a national norm, but it is observed that it is improving in recent years. As shown in Table 3.16, the number of students who took the FE Exam before 2005 is very low and the passing rate is not a meaningful indicator of our program. As shown in Figure 3.2, there is a gradual improvement in the passing percentage of our students. It should be noted that while we require students to take the FE exam, it is elective in many schools where only the best and most motivated students take it. This disparity leads us to expect the lower results in the FE exam for our students.

Table 3.16 Results of FE Exam

Date of FE Exam	Number of Students Taken	Number Passed
Spring 2005	5	4
Fall 2005	11	5
Spring 2006	11	7
Fall 2006	10	7
Spring 2007	9	6
Fall 2007	11	9
Spring 2008	12	5
Fall 2008	22	12
Spring 2009	23	11
Fall 2009	14	8

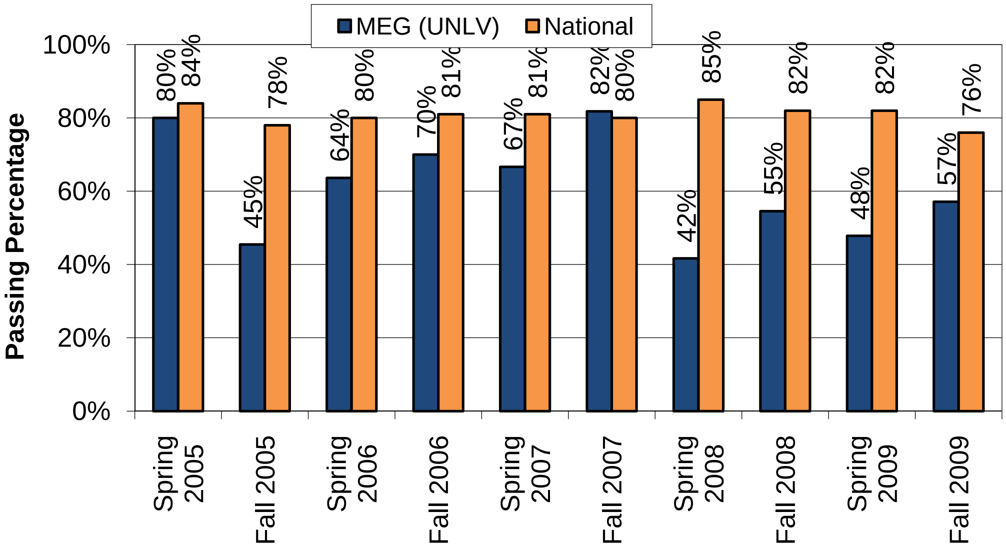


Figure 3.2 Passing Percentage of ME students in the FE Exam Versus National Data

In 2008, as one of the efforts to improve a passing rate of the FE exam for our students, the department passed the major program change which requires all students to pass the FE exam to graduate to motivate students to prepare it more seriously. To implement this change, students have been advised to take the FE exam two semesters before the target graduation date since student must take it again if they fail the first one. The students who failed the first exam can graduate by just taking the second exam in the following semester. However, the effectiveness of this program change is being carefully examined by ME faculty since the change requires students take the exam one semester earlier compared to the past, which will result in a deficiency in appropriate knowledge needed, especially, for the PM subjects from the technical elective courses. Another option for helping to solve the problem is to offer technical elective course every semester, which requires additional faculty members for the program, which is not a near-term solution under the economic condition of the state.

Figure 3.3 shows cumulative percentages of correct answers of ME students normalized by the national norm from Fall 2006 to Fall 2009.

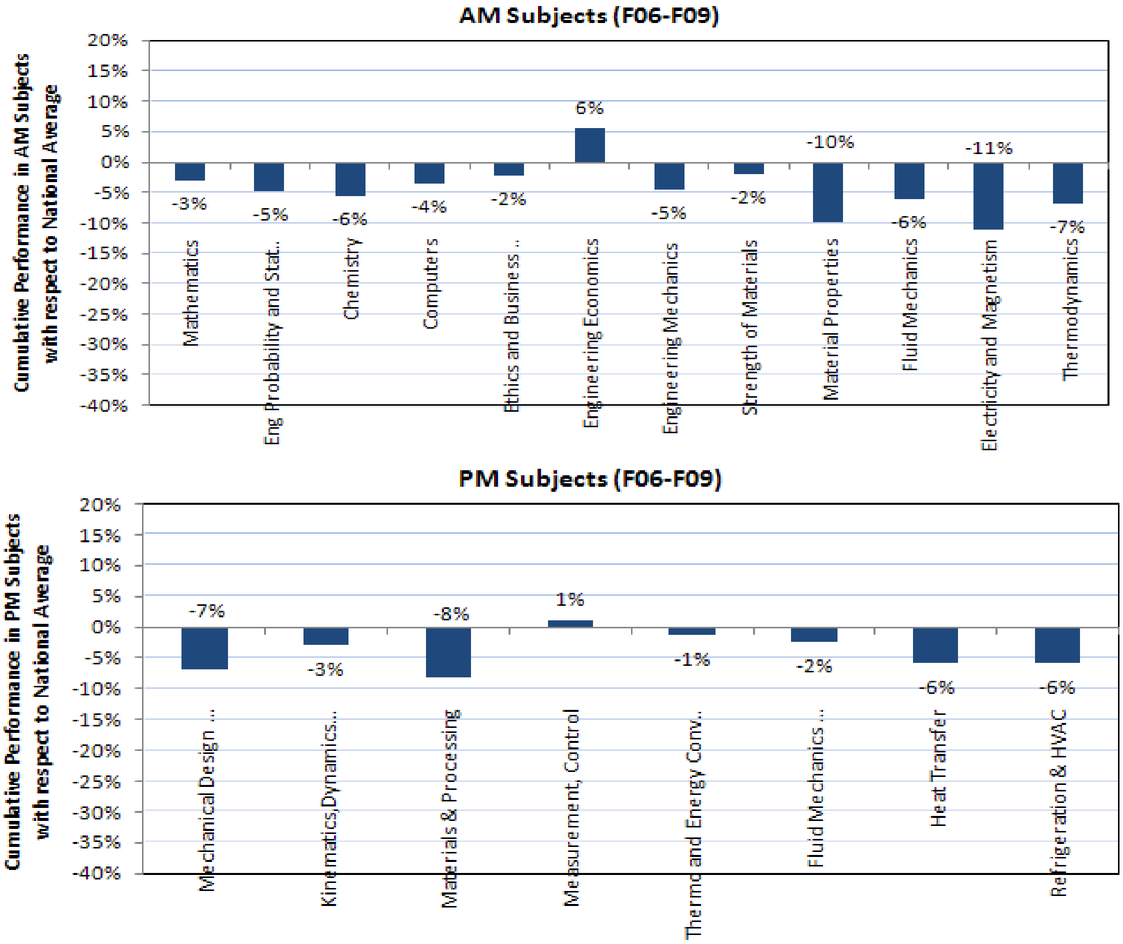


Figure 3.3 Cumulative Performance in AM and PM Subjects Compared with respect to National Average (Detailed scores of the FE exam results for last five years are available at http://me.unlv.edu/GeneralInfo/ABETData.html.)

When the FE Exam results are released every semester, ME faculty members discuss the result with a view to identify any serious deficiency in our curriculum, and want to treat the data cautiously due to the small number of the students who take the exam every semester. Also, they prefer to concentrate on the long term trends of the data. With this note of caution, the following conclusions may be reached based on the available data:

1) Percentages of UNLV mechanical engineering students who pass the test are lower than the national averages, but it should be noted that while we made the FE exam as one of the graduation requirements, it is an elective in many schools where only the best and most motivated students take it. This disparity may partly explain why our students have lower pass rate compared with the national one in the FE exam.
2) The performance of UNLV mechanical engineering students is comparable to the performance of mechanical engineering students nationally (within ± 15%) in most areas of the AM and PM tests.

From Figure 3.3, four areas can be identified where the performance of our students are significantly below the national average. Table 3.17 shows explanation for these deficiencies.

Table 3.17 Areas of weak FE exam score for students

AM Subject	Material Properties	The Material Sciences area suffered from the loss of the faculty member with the strongest expertise in this area in Fall 2008. This position was never filled due to university budget crisis that started from 2009.
	Electricity and Magnetism	These topics are introduced mainly from ECE 290 Introduction to Electrical Engineering as well as in ME 337 (Engineering Measurement), required course for ME students. We are working with the chair of Electrical and Computer Engineering for this issue. The course has gone through some changes when Professor Kachroo started teaching it. We will continue to monitor this project, and expect better results in upcoming FE exams.
PM Subject	Mechanical Design and Analysis	The Mechanical Design portion of the exam covers some areas that are not covered in the required mechanical design course such as springs, epicyclic gear trains, and journal bearings, which affects the performance of our students in this area in general.
	Materials and Processing	This topic is covered in elective courses. The department has made a conscious decision of reducing the total number of credit hours with the knowledge that we will not be able to cover all mechanical engineering topics.

<u>Relation of the FE Exam Results to the Educational Outcomes:</u> The FE exam results are also used to evaluate the program educational outcomes. Table 3.18 shows the conversion scale used for the percentage differences calculated by normalizing student scores with respect to national norms for AM and PM subjects. The same scale of Strongly Agree(5)-Strongly Disagree(1) as other assessment methods used in this section is used. It can be controversial to convert a percentage greater than 0% compared with the national norm to the scale 5 (Strongly Agree), however, as mentioned previously, we considered the fact that all students must take the FE exam as one of the graduation requirements and a direct one-to-one comparison with the national norm is not fair for evaluating our student scores.

Table 3.18 Values Used by the Department to Assess the Performance of Our Students in the FE Exam (After Normalization with Respect to National Results)

Percentage Difference	> 0	>-5	>-10	>-15	>-20
Ranking (5= Strongly Agree, 1, Strongly Disagree)	5	4	3	2	1

Table 3.19 shows the relationships between the AM and PM subjects with our program outcomes as well as associated normalized percentages. From Table 3.19, the following outcomes are assumed to be related with the FE exam subjects.

1.a. Fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field.
1.b. Ability to design and conduct experiments, analyze data, and utilize statistical methods.
1.d. Ability to use modern computational techniques to solve engineering problems.
1.e. Ability to mathematically model and analyze engineering systems.
2.b. Introductory knowledge of economics.
3.a. Commitment to professional and ethical behavior in the workplace.

In Table 3.19, even if percentage values are used for each subject area, an average cumulative rating from Fall 2006 to Fall 2009 for the subjects associated with each outcome is converted to the same scale (5= Strongly Agree, 1, Strongly Disagree) as other assessment methods using Table 3.18.

The following observations are made from Table 3.19:

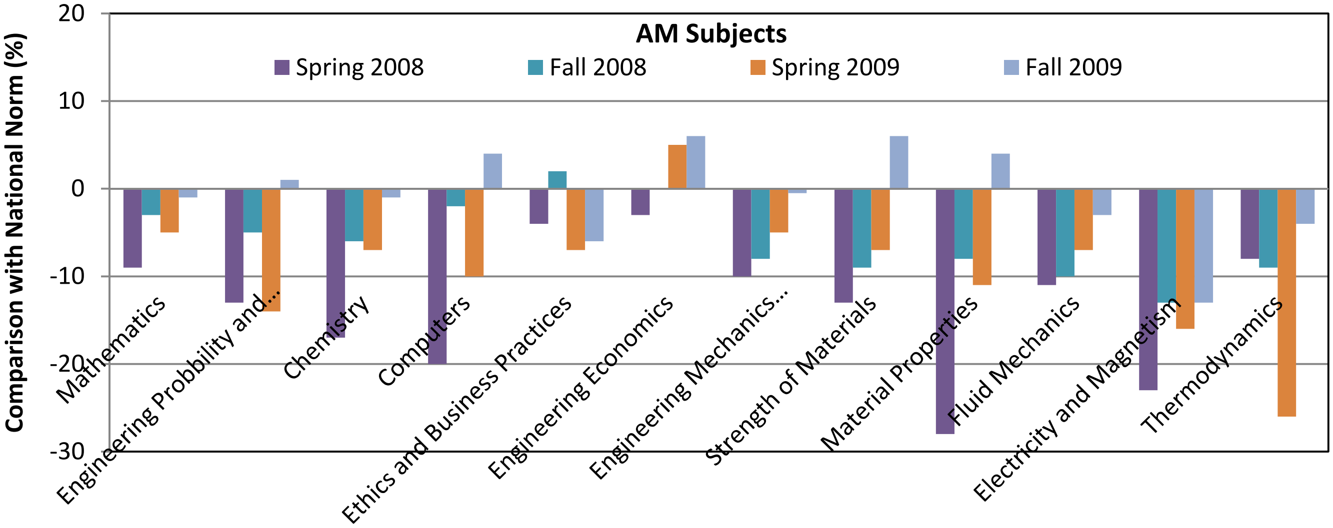
- Students demonstrated a solid performance in the outcome 2.b *Introductory knowledge of economics,* which is a direct result of EGG 307 Engineering Economics being a required course in our curriculum.
- Low score in FE Exam relates to the outcome 1.a. where most of AM subjects are used to assess the outcome. Especially, students show a weakness in the following two subjects:
  - Material Properties
  - Electricity and Magnetism

Table 3.17 explains possible causes of this deficiency and the plan to fix it.

Table 3.19 Relationship between FE Exam AM/PM subjects to the ME Program Outcomes and Cumulative Average Ranking of Each Outcome

FE Exam Subject / **ME Program Outcomes**	**AM Subjects**												**PM Subjects**								**Total Cumulative Rating in %**	**Total Cumulative Rating in (1)-(5) Scale**
	Mathematics	Probability and Statistics	Chemistry	Computers	Ethics and Business	Engineering Economics	Engineering Mechanics	Strength of Materials	Material Properties	Fluid Mechanics	Electricity and Magnetism	Thermodynamics	Mechanical Design and Analysis	Kinematics, Dynamics, and Vibration	Materials & Processing	Measurement, Instrumentation, and Controls	Thermodynamics and Energy Conversion Processes	Fluid Mechanics and Fluid Machinery	Heat Transfer	Refrigeration & HVAC		
1.a. Fundamental knowledge of state-of-the-art ...	-3%		-6%				-5%	-2%	-10 %	-6%	-11 %	-7%									**-6.3%**	**3.8**
1.b. Ability to design and conduct experiments…		-5%														1%					**-2%**	**4.6**
1.d. Ability to use modern computational …				-4%																	**-4%**	**4.2**
1.e. Ability to mathematically model…								-2%	-10 %	-6%		-7%	-7%	-3%	-8%	1%	-1%	-2%	-6%	-6%	**-4.9%**	**4**
2.b. Introductory knowledge of economics.						6%															**6%**	**5**
3.a. Commitment to professional and ethical …					-2%																**-2%**	**4.6**

For the effective assessment of the program, it is important to find out the general trend of the normalized individual subject scores of the FE exam in each semester, rather than the cumulative average. Figure 3.4 shows our student performance in AM and PM subjects compared to national average from Spring 2008 to Fall 2009. Those four semesters are chosen since more students took the exam in these semesters compared with earlier semesters as shown in Table 3.16. As shown in Figure 3.4, there has been a significant improvement, especially, in PM subjects which covers mechanical engineering specific subjects, in students' performance in the FE exam.



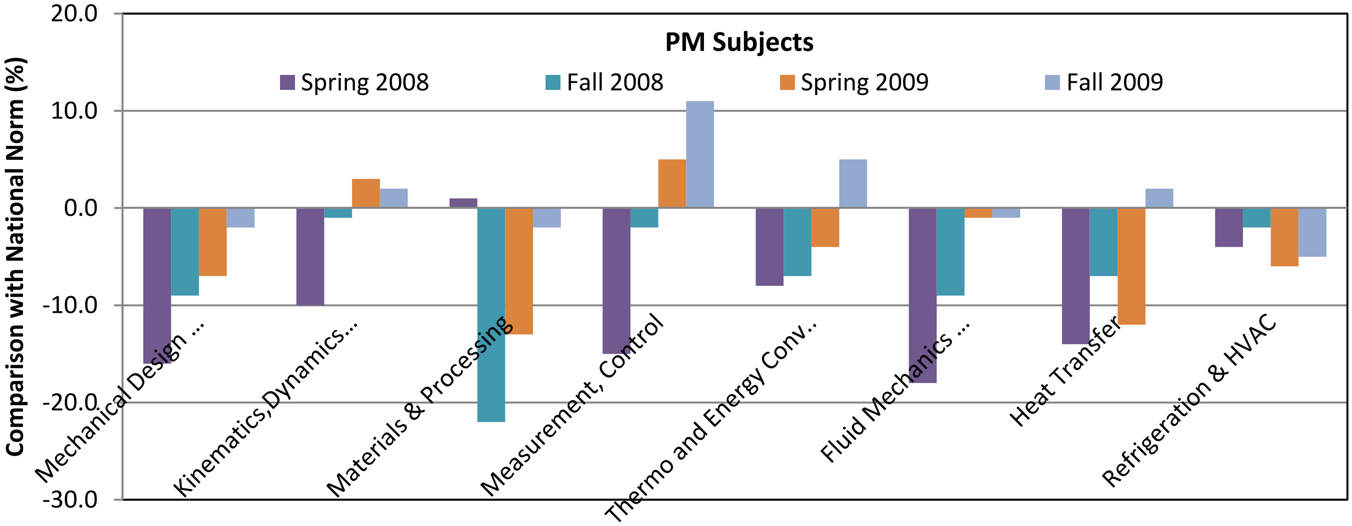


Figure 3.4 Trend Plots in AM and PM Subjects in last two years compared with national average **(**Detailed scores of the FE exam results for last five years are available at http://me.unlv.edu/GeneralInfo/ABETData.html.**)**

F.2.6 Judging Senior Design Competition (Every Semester)

We invite local engineers to judge the Senior Design Competition. They grade projects on many factors including innovation, commercial potential, technical merit, clarity of the project, presentation (oral), and presentation (poster). A sample of score sheet is shown in Appendix E.10, and the following areas are evaluated by three judges for each project.

Project #	Judge 1	Judge 2	Judge 3	Totals
Innovation (10 points)				
Potential for Commercialization/Implementation (10 points)				
Technical Merit (10 points)				
Clarity and soundness of the project (10 points)				
Presentation (oral) (5 points)				
Presentation (Poster) (5 points)				

Table 3.20 shows the conversion scale of percentage values used to assess the performance of our students in the Senior Design Competition into (5= Strongly Agree, 1, Strongly Disagree) scale used for other assessment methods. Using the same scale as other assessment methods is needed to evaluate the educational outcomes together with them.

Table 3.20 Values Used to Assess the Performance of Students in Senior Design Competition

Grade Percentage	> 90%	89-80%	79-70%	69-60%	<59%
Ranking (5= Strongly Agree, 1, Strongly Disagree)	5	4	3	2	1

In evaluating the educational outcomes of the program, the following categories are used to assess the outcomes 1.c, 2.a, 2.b, and 2.c. The relation shown below is eventually used in the Section F.3 to quantify the level of achievement of CRITERION 3.

Educational Outcome	Categories from Sr. Design Score Sheet
1.c *The ability to solve open-ended design problems*	• Technical Merit; Innovation; Clarity and soundness of the project
2.a *Oral and written presentation of technical information*	• Presentation (Oral); Presentation (Poster)
2.b *Introductory knowledge of economics*	• Potential for Commercialization/Implementation
2.c *Working on multi-disciplinary team with peers*	• Average grade for multi-disciplinary design teams

Table 3.21(a) shows cumulative evaluation results for last five semesters for each of five areas evaluated for each project. Appendix E.10 has detailed scores and project names for each semester. It should be noted that some projects have interdisciplinary components in them with students from Electrical and Computer Engineering. In Table 3.21(a), the score in each

evaluation area is converted to a percentile value, and again to the same scale of (5= Strongly Agree, 1, Strongly Disagree) as used for assessing all other educational outcomes. It should be noted that the last row of Table 3.21 shows the performance of all multidisciplinary design teams in each semester to evaluate the educational outcome 2.c. Total percentile average for each design team is available in Appendix E.10.

Table 3.21(a) Cumulative average of Senior Design Score Sheet during last 3 years

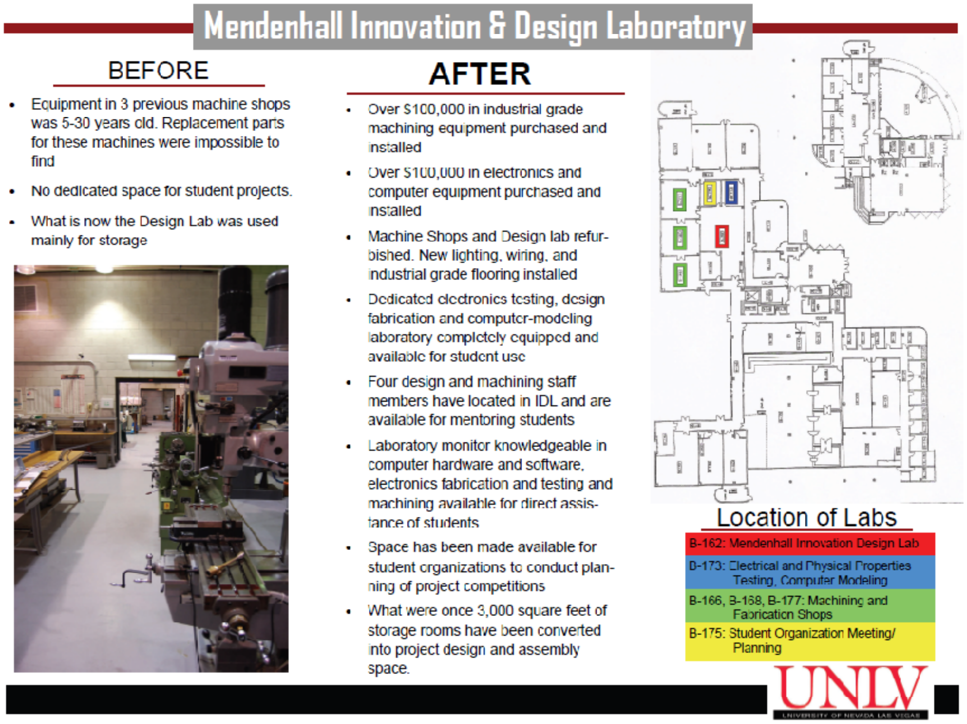
	Avg. Points per Evaluated Areas for all Project in each semester					**Cumulative Average (F07-F09)**		**(1)-(5) scale using Table 3.20**
	Fall 2007	**Spring 2008**	**Fall 2008**	**Spring 2009**	**Fall 2009**			
Innovation (10 points)	7.6	7.0	7.4	7.8	7.6	**7.5/10.0**	**75%**	**3.5**
Potential for Commercialization/Implementation (10 points)	7.7	8.2	7.5	8.6	8.1	**8.0/10.0**	**80%**	**4.0**
Technical Merit (10 points)	7.7	7.7	8.0	8.2	7	**7.7/10.0**	**77%**	**3.7**
Clarity and soundness of the project (10 points)	7.8	7.8	7.8	8.2	7	**7.7/10.0**	**77%**	**3.7**
Presentation (oral) (5 points)	4.4	3.9	4.4	4.5	4	**4.2/5.0**	**84%**	**4.4**
Presentation (Poster) (5 points)	3.5	4.1	3.9	4.2	4	**3.9/5.0**	**78%**	**3.8**
Multidisciplinary Team Performance in each Semester								
Avg. for all six categories	N/A	84%	91%	89%	77.3%	**N/A**	**85.3 %**	**4.5**

Using Table 3.21(a), we can determine the following assessment result for the associated educational outcomes with the senior design project experiences:

Table 3.21(b) Assessment Results of Educational Outcomes by Senior Design Scores

Educational Outcome	**Categories from Sr. Design Score Sheet**	**Avg. Rating from Table 3.21**	**Total Avg. for each Outcome**
1.c *The ability to solve open-ended design problems*	Technical Merit	3.7	**3.6**
	Innovation	3.5	
	Clarity and soundness of the project	3.7	
2.a *Oral and written presentation of technical information*	Presentation (Oral)	4.4	**4.1**
	Presentation (Poster)	3.8	
2.b *Introductory knowledge of economics*	Potential for Commercialization/Implementation	**4.0**	**4.0**
2.c *Working on multi-disciplinary team …*	Average grade for multi-disciplinary design teams	4.5	**4.5**

One important improvement we can observe in the senior design score sheet in Table 3.21(a) is a high rating associated with *multidisciplinary team performance* in each semester. The Mendenhall Innovation & Design Laboratory (MIDL) can be credited for this improvement. The Mendenhall Innovation Program was initiated in 2008 by $1.5 million gift from Robert and Pamela Mendenhall for the purpose of enriching student experience in the commercialization of technology through students' hands-on activities. This program has provided an excellent laboratory space for all engineering college students to work together on their design projects.



Mendenhall Innovation & Design Laboratory

BEFORE

- Equipment in 3 previous machine shops was 5-30 years old. Replacement parts for these machines were impossible to find
- No dedicated space for student projects.
- What is now the Design Lab was used mainly for storage

AFTER

- Over $100,000 in industrial grade machining equipment purchased and installed
- Over $100,000 in electronics and computer equipment purchased and installed
- Machine Shops and Design lab refurbished. New lighting, wiring, and industrial grade flooring installed
- Dedicated electronics testing, design fabrication and computer-modeling laboratory completely equipped and available for student use
- Four design and machining staff members have located in IDL and are available for mentoring students
- Laboratory monitor knowledgeable in computer hardware and software, electronics fabrication and testing and machining available for direct assistance of students
- Space has been made available for student organizations to conduct planning of project competitions
- What were once 3,000 square feet of storage rooms have been converted into project design and assembly space.

Location of Labs

🟥 B-162: Mendenhall Innovation Design Lab

🟦 B-173: Electrical and Physical Properties Testing, Computer Modeling

🟩 B-166, B-168, B-177: Machining and Fabrication Shops

🟨 B-175: Student Organization Meeting/ Planning

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From Spring 2010 two categories were added for the judge score sheet. One is to evaluate sustainability and the other is their report. Due to this change, the scores for Spring 2010 Design Competition is dropped from Table 3.21 to maintain consistency in the data. A new cumulative average data will be prepared starting from Spring 2010 for the next ABET accreditation report.

Project #	**Judge 1**	**Judge 2**	**Judge 3**	**Totals**
Technical Merit (maximum 20 points)				
Innovation (maximum 10 points)				
Commercial Potential (maximum 10 points)				
Sustainability (maximum 10 points)*				
Clarity of the Project (maximum 10 points)				
Report (Maximum 10 points)*				
Presentation (Oral) (maximum 5 points)				
Presentation (Poster) (maximum 5 points)				
Totals				

*New categories added from Spring 2010

F.2.7 ME Advisory Board / Local Industry Surveys (Annual)

A survey, shown in Appendix E.1, is sent to practicing engineers and employers within Southern Nevada every spring semester. The survey is also sent to members of the department Advisory board. The survey is used to obtain the assessment of the respondents on how our graduates meet program educational outcomes and their quality as engineers. The results of the 2009 survey is listed in Appendix E.1, and more detailed cumulative results from Spring 2005 to Spring 2009 are shown in Table 2.10 (pp.46) of CRITERION 2. Table 3.22 shows the cumulative results for the assessment of the educational outcomes. Detailed analysis and results of the survey is presented in Section F.2 of CRITERION 2 on page 43.

Table 3.22 Cumulative Industry Survey Results for the educational outcomes

	Spring 2005	Spring 2006	Spring 2007	Spring 2008	Spring 2009	**5 yr Average**
1.a A fundamental knowledge of state-of-the-art and …	4.2	4.2	3.3	3.6	3.1	**3.7**
1.b The ability to design and conduct experiments, analyze data, and utilize statistical methods	3.6	4.7	3.1	4.2	3.2	**3.7**
1.c The ability to solve open-ended design problems	4.2	4.0	3.4	4.2	3.1	**3.8**
1.d The ability to use computers in solving engineering…	4.0	4.2	3.9	4.6	3.5	**4.0**
1.e The ability to mathematically model and analyze …	3.6	4.2	3.5	3.4	3.1	**3.5**
2.a Oral and written presentation of technical information	3.4	4.5	3.5	3.0	2.8	**3.5**
2.b Introductory knowledge of economics	3.4	3.5	3.0	3.6	3.0	**3.3**
2.c Working on multi-disciplinary team with peers	3.9	4.5	3.3	3.8	2.9	**3.7**
2.d Motivation to pursue life-long learning	3.9	4.7	3.4	4.0	3.5	**3.9**
3.a A commitment to professional and ethical behavior…	4.6	5.0	3.9	4.4	3.0	**4.2**
3.b An awareness of world affairs and cultures	3.2	3.2	2.9	3.4	3.3	**3.2**
3.c Recognition of the impact of engineering on local and …	3.3	3.0	3.0	3.6	2.9	**3.2**
3.d Seeking professional licensure	3.7	3.3	3.4	3.2	3.0	**3.3**

Ranking (5=Strongly Agree and 1=Strongly Disagree)

F.2.8 ME Advisory Board / Local Engineers Reports (Tri-Annual)

The ME curriculum was divided into four areas: thermal sciences, fluid mechanics, materials and design, and dynamics and control. The ME Advisory Board identified one or two persons to review selected courses. The reports, using the form of Appendix E.3, are used for evaluating ME courses, and the associated faculty responds to these reports. The ME Advisory Board conducted this review in Fall 2009. No major area of weakness was identified. The review reports are listed in Appendix E.3 as well as the faculty responses.

F.2.9 Alumni Surveys (Tri-Annual)

The department conducted a survey, Appendix E.2, of alumni in 2008. The survey, which is one page only, was sent to all graduates with contact information (about 270 at the time of the survey). The survey questions the alumni about their current positions and the areas of weakness within our curriculum. We had a 25% response. In addition to using the survey to evaluate the program educational objectives as shown in Criterion 2, we used it to evaluate some of the outcomes. The following figure shows 2005 and 2008 survey data averaged for all responses for evaluating the educational outcomes. Actual numbers of responses and rating averages for each category can be found in Appendix E.2 as well as the department web site at http://me.unlv.edu/GeneralInfo/ABETData.html. Also, detailed analysis and results of the survey is presented in Section F.1 of CRITERION 2 chapter on page 36.

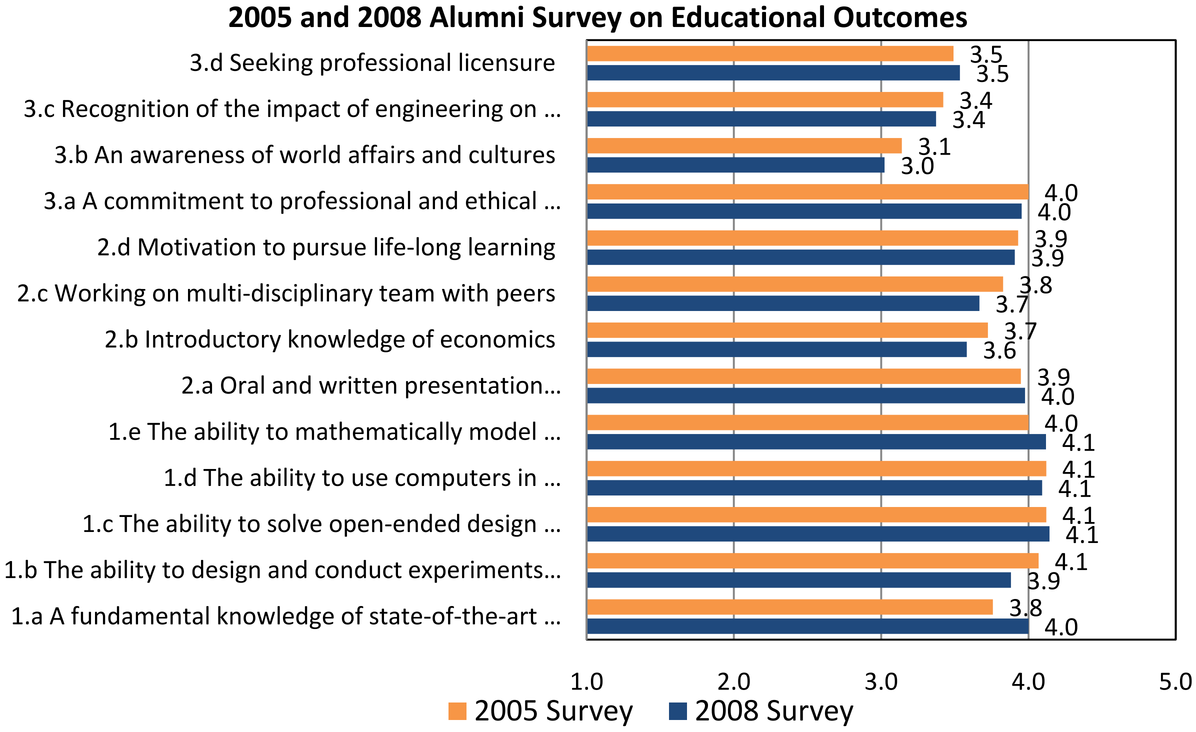

Figure 3.6 Educational outcome evaluation from 2005 and 2008 Alumni Survey

F.3 Level of Achievements in Program Outcomes

In this section, all assessment results obtained for ME Educational Outcomes will be summarized for determining the level of achievement in each category of CRITERION 3(a)-(k). The level of the achievement in CRITERION 3(a)-(k) is evaluated through the mapping of the assessment data in Section F.2 to CRITERION 3 (a)-(k) using Table 3.1. As shown in Table 3.1, more than one outcome is related to each category of CRITERION 3.

Table 3.23 shows the assessment tools discussed in Sections F.1 and F.2, and their relationship with ME Educational Outcomes as well as the average ratings calculated for each educational outcome. It should be noted that all assessment tools use the same scale of 1 (*Strongly Disagree)* through 5 (*Strongly Agree*), and table numbers associated with each rating is shown in the first row of Table 3.23. The results shown in Table 3.23 is used together with the direct assessment of CRITERION 3(a)-(k) by students in every semester to determine the level of the achievements in the Program Outcomes. All assessment data are cumulative one for the last five years.

Table 3.23 Summary of Assessment Results for the Educational Outcomes Discussed in Section F.2 and the Average Rating for Each Program Educational Outcome

Assessment Methods used in Section F.2 **ME Educational Outcomes**	**F.2.1.1 Lab Survey (Table 3.7)**	**F.2.1.4 Evaluation of Course Objectives by Students (Table 3.11)**	**F.2.2 Exit Interviews (Table 3.12)**	**F.2.3 Assessment by Faculty (Table 3.15)**	**F.2.5 FE Exam Results (Table 3.19)**	**F.2.6 Judging Senior Design Competition (Table 3.21(b))**	**F.2.7 ME Advisory Board / Local Industry Surveys (Table 3.22)**	**F.2.9 Alumni Surveys (Figure 3.6)**	**Average Rating**
1.a. Fundamental knowledge of state-of-the-art and evolving …		4.2	4.1	3.9	3.8		3.7	3.9	**3.8**
1.b. Ability to design and conduct experiments, analyze data …..	4.1	4.2	4.1	4.0	4.6		3.7	4.0	**4.0**
1.c. Ability to solve open-ended design problems.		4.1	4.4	3.9		3.6	3.8	4.1	**4.0**
1.d. Ability to use modern computational tech …		4.1	4.2	3.9	4.2		4.0	4.1	**4.1**
1.e. Ability to mathematically model and analyze engineering …		4.2	4.4	3.9	4.0		3.5	4.1	**4.0**
2.a. Oral and written presentation of technical information.		4.2	4.2	3.9		4.1	3.5	4.0	**4.0**
2.b. Introductory knowledge of economics.		4.2	4.3	4.4	5.0	4.0	3.3	3.7	**4.1**
2.c. Working on a multi-disciplinary team …		4.2	4.6	3.9		4.5	3.7	3.8	**4.1**
2.d. Motivation to pursue lifelong learning.		4.2	4.3	3.9			3.9	3.9	**4.0**
3.a. Commitment to professional and ethical behavior ….		4.0	4.2	4.1	4.6		4.2	4.0	**4.1**
3.b. Awareness of world affairs and cultures.		4.2	3.4	4.4			3.2	3.1	**3.7**
3.c. Recognition of the impact of engineering on local and …..		4.1	3.7	3.8			3.2	3.4	**3.6**
3.d. Seeking professional licensure.		3.9	3.8	4.0			3.3	3.5	**3.7**

F.3.1 Level of Achievements of CRITERION 3(a)

CRITERION 3(a) is evaluated mainly using the Program Educational Outcome 1.a (See Table 3.1), and the outcome 1.a is assessed by using the methods outlined in Table 3.23.

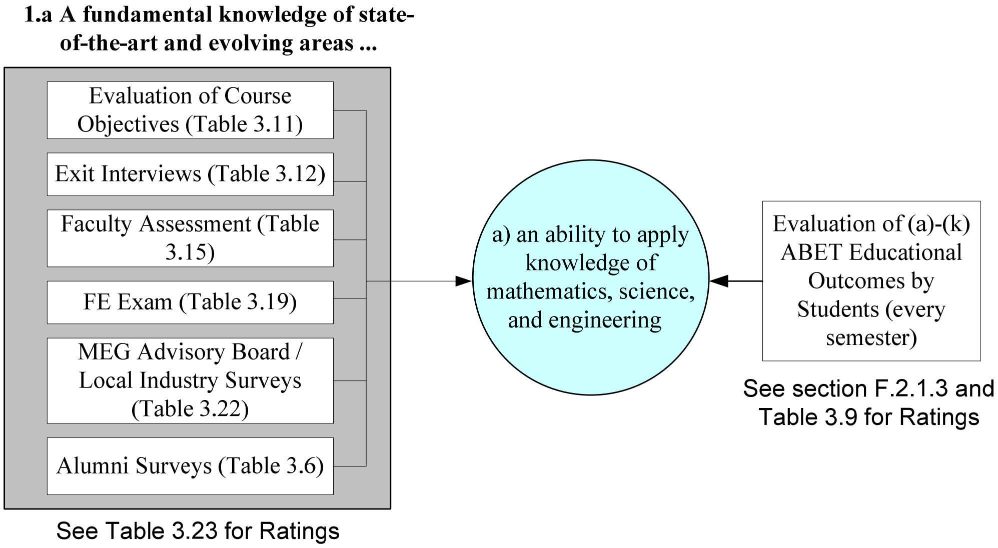

Figure 3.7 Assessment Methods used for the Level of Achievement of Criterion (a)

As shown in Figure 3.7, the Criterion (a) is evaluated by using the cumulative assessment results of the ME Program Outcome 1.a as well as the student evaluation of the ABET (a)-(k). Table 3.23 shows associated assessment results of each ME Program Outcome. For the result related with the FE Exam, the most of AM subjects are used to evaluate the outcome 1.a. For other assessment methods, it is rather straightforward to find out the cumulative assessment results as explained in Section F.2. Figure 3.8 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (a)	ME Outcome 1.a
Evaluation of Course Objective(Table 3.11)	4.2
Exit Interview (Table 3.12)	4.1
Faculty Assessment (Table 3.15)	3.9
FE Exam (Table 3.19)	3
Industry Survey (Table 3.22)	3.7
Alumni Survey (Table 3.6)	3.9
Student Evaluation of (a)-(k) (Table 3.9)	3.92

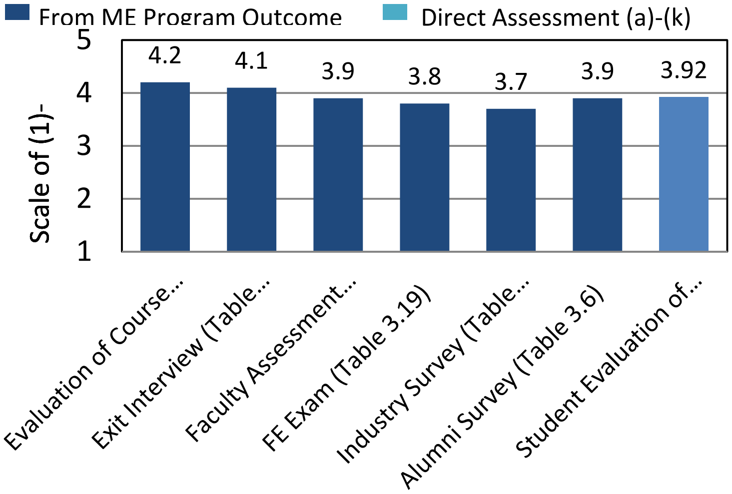

Figure 3.8 Level of Achievement of Criterion3 (a)

F.3.2 Level of Achievements of CRITERION 3(b)

CRITERION 3(b) is evaluated using the Program Educational Outcome 1.b (See Table 3.1) using the assessment methods outlined in Table 3.23. Figure 3.9 shows a diagram summarizing the assessment structure for evaluating Criterion 3(b).

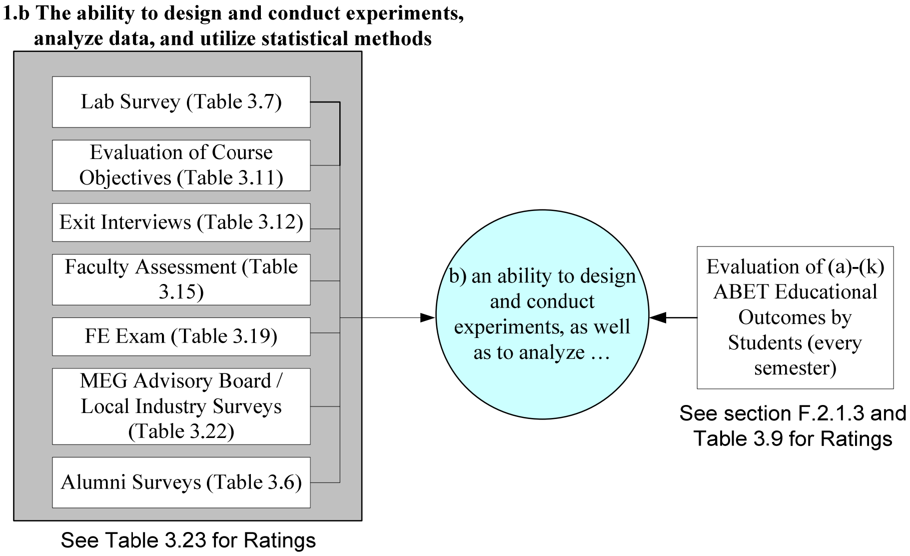

Figure 3.9 Assessment Methods used for the Level of Achievement of Criterion (b)

Of the various assessment methods, the Lab Survey is a key instrument to evaluate our undergraduate laboratory classes. Figure 3.10 is the plots of Table 3.7 and 3.8 which show cumulative laboratory assessment data for each laboratory class and six-question query from Spring 2005 to Spring 2010.. Even if both data are the same in nature, the individual lab data (Table 3.7) has been very useful to identify the quality and improvement of each lab in our undergraduate education. Total average scale for the following two plots is 4.1 out of 5.0, which is acceptable. Machine shop and CNC Programming courses show very positive review.

As shown in Table 3.7, the rating for ME 380L and ME 421L is low compared with other labs, but the following action has been implemented for each lab to the improvement:

> <u>ME 380L (Fluid Lab):</u> Most of complaint is a lack of consistency with a lecture, ME 380, since the lab had been taught by teaching assistants from the Civil Engineering[6]. From Fall 2009, a ME faculty supervisor, Dr. H. Zhao, as well as ME teaching assistant have been assigned to the lab, and there has been a significant improvement in the rating in last two semesters.
>
> <u>ME 421L (Automatic Control):</u> Main complaints have been equipment related issues. In 2009, ME 337L (Engineering Measurement) was integrated with ME 421L to share the resources, and we expect an improved student feedback in the near future. Also, there has been a significant effort to improve hands-on experiences of students in this lab.

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[6] In exchange, ME department had taught ME 302L for civil students.

Table 3.13 also shows a significant improvement in lab instruction based on the Exit Interview by graduating students for last three years.

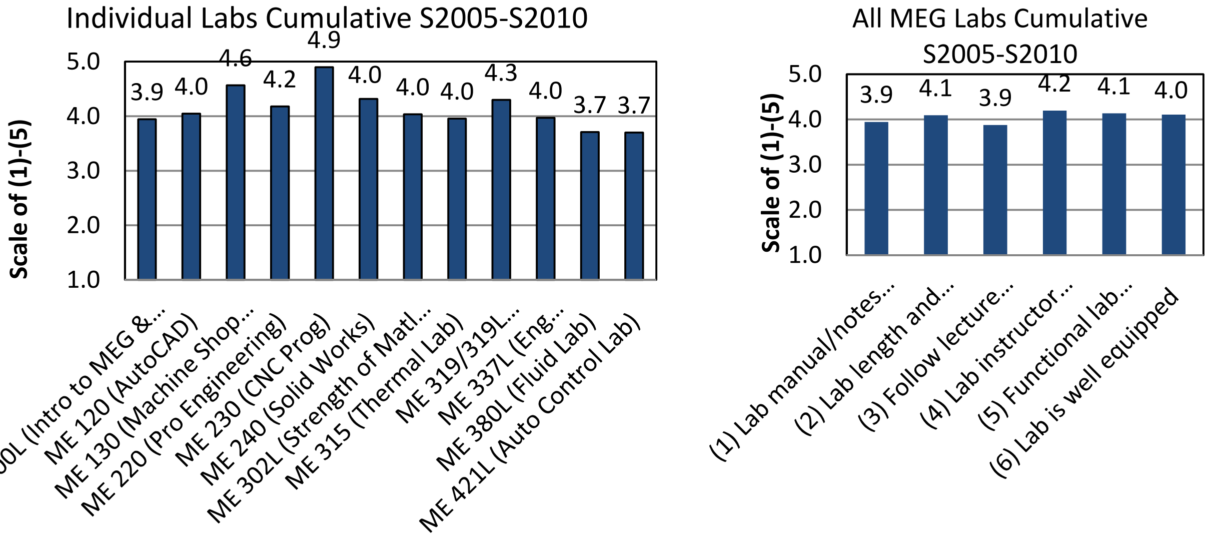


Figure 3.10 Lab Survey Summary (Also see Table 3.7 and 3.8)

For the FE exam, the following two subjects are used to evaluate the ME Educational Outcomes 1.b.,

- Engineering Probability and Statistics (AM subject)
- Measurement, Instrumentation, and Controls (PM subject)

The assessment results for these subjects are shown in Table 3.19. For other assessment methods, it is rather straightforward to find out the cumulative assessment results in appropriate tables. Figure 3.11 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (b)	**ME Outcome 1.b**
Lab Survey (Table 3.7)	4.1
Evaluation of Course Objective(Table 3.11)	4.2
Exit Interview (Table 3.12)	4.1
Faculty Assessment (Table 3.15)	4
FE Exam (Table 3.19)	4.6
Industry Survey (Table 3.22)	3.7
Alumni Survey (Table 3.6)	4
Student Evaluation of (a)-(k) (Table 3.9)	3.79

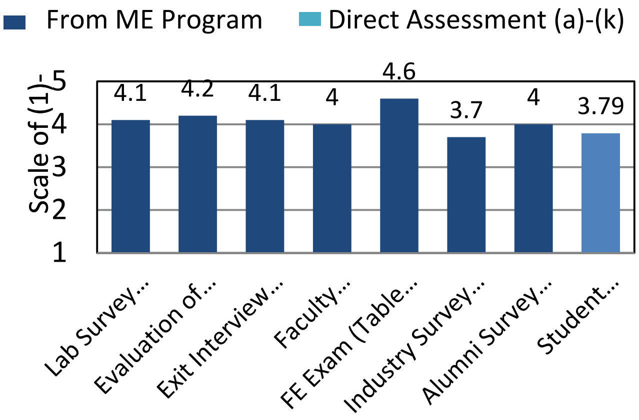


Figure 3.11 Level of Achievement of Criterion3 (b)

F.3.3 Level of Achievements of CRITERION 3(c)

CRITERION 3(c) is evaluated using the ME Educational Outcome 1.c and 1.e (See Table 3.1) using and the assessment methods outlined in Table 3.23. the associated outcomes are assessed by using the methods outlined in Table 3.23. Figure 3.12 shows a diagram summarizing the assessment structure for evaluating Criterion 3(c).

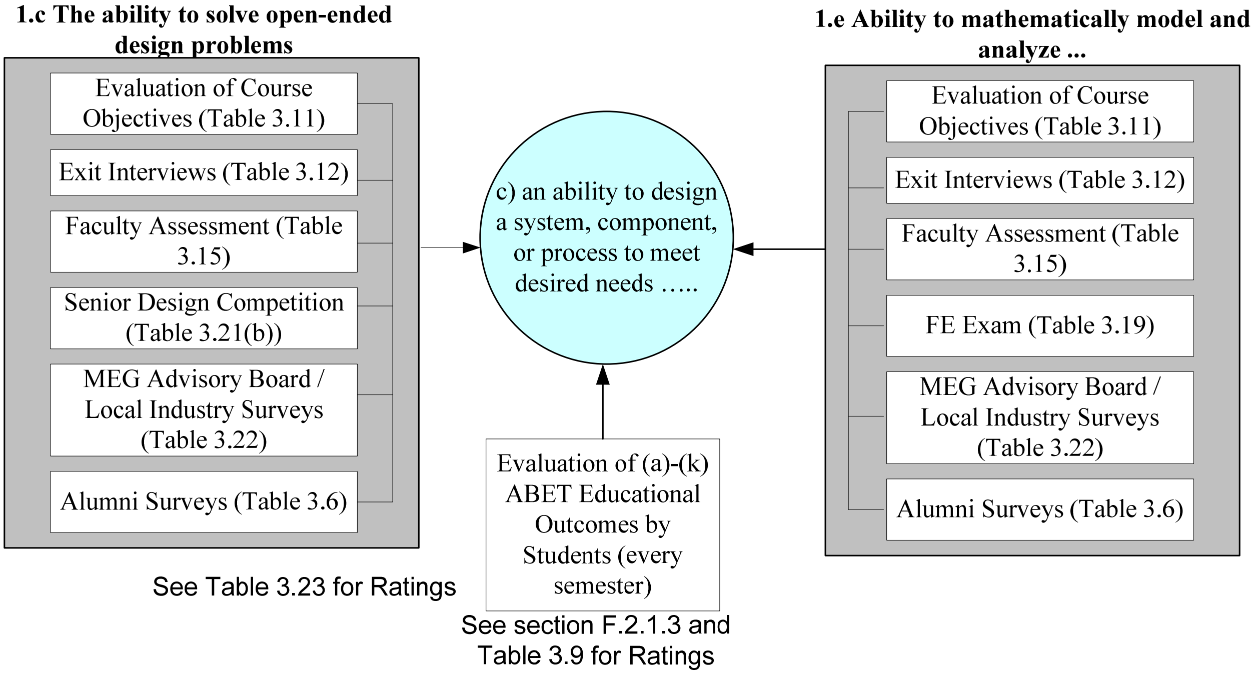


Figure 3.12 Assessment Methods used for the Level of Achievement of Criterion (c)

Table 3.21(a) and (b) show the cumulative results obtained from the evaluation sheet collected from the senior design competition judges. To evaluate the outcome 1.c. *Ability to solve open-ended problem*, the following categories are used for evaluation:

- Technical Merit
- Innovation
- Clarity and soundness of the project

As shown in Table 3.21(b), the total cumulative average rating for the outcome 1.c is 3.6 in (1)-(5) scale.

The FE exam result is also used to evaluate the outcome 1.e. *Ability to mathematically model and analyze engineering….* As shown in Table 3.19, all PM subject scores as well as some of AM subjects are used, and the total cumulative average rating for the outcome 1.e is 4.0 in (1)-(5) scale.

Table 3.23 shows the results for other assessment methods used to evaluate the outcomes 1.c and 1.e. Figure 3.13 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (c)	**ME Outcome 1.c**	**ME Outcome 1.e**	**average**
Evaluation of Course Objective(Table 3.11)	4.1	4.2	4.15
Exit Interview (Table 3.12)	4.4	4.4	4.4
Faculty Assessment (Table 3.15)	3.9	3.9	3.9
FE Exam (Table 3.19)	NOT USED	4	4
Senior Design (Table 3.21(b))	3.6	NOT USED	3.6
Industry Survey (Table 3.22)	3.8	3.5	3.65
Alumni Survey (Table 3.6)	4.1	4.1	4.1
Student Evaluation of (a)-(k) (Table 3.9)			3.74

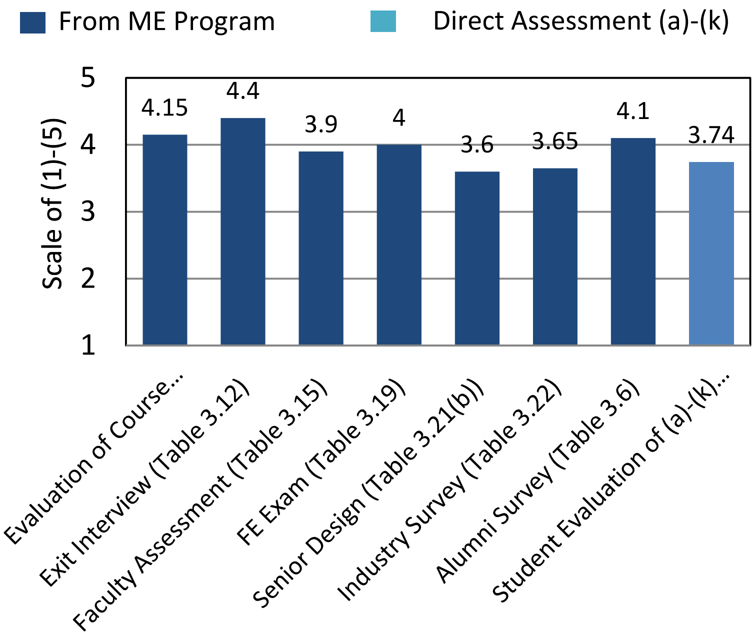
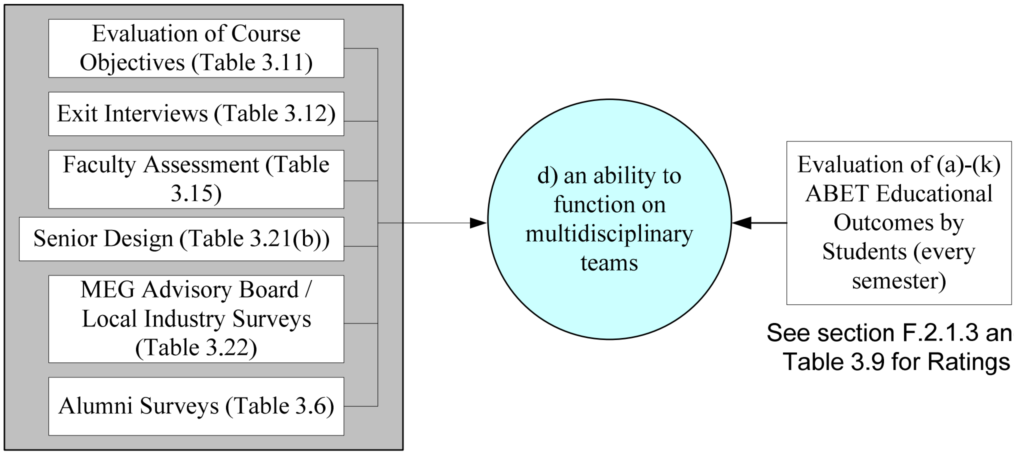


Figure 3.13 Level of Achievement of Criterion3 (c)

F.3.4 Level of Achievements of CRITERION 3(d)

CRITERION 3(d) is evaluated using the Program Educational Outcome 2.c (See Table 3.1) using the assessment methods outlined in Table 3.23. Figure 3.14 shows a diagram summarizing the assessment structure for evaluating Criterion 3(d).

2.c Working on a multi-disciplinary team with peers



See section F.2.1.3 and Table 3.9 for Ratings

See Table 3.23 for Ratings

Figure 3.14 Assessment Methods used for the Level of Achievement of Criterion (d)

Table 3.21(a) and (b) show the cumulative results obtained from the evaluation sheet collected from the senior design competition judges. To evaluate the outcome 2.c. *Working on a multidisciplinary teams with peers,* the average score calculated for the multidisciplinary teams in each semester. The department has strongly encouraged students to form multidisciplinary teams for their senior design projects, and the most of the teams has electrical and computer engineering students as their team members. Appendix E.10 has the name of the multidisciplinary teams in each year as well as their scores in each category.

As shown in Table 3.21(b), the cumulative average rating for those teams is 4.5 out of (1)-(5) scale, and it can be observed that multidisciplinary teams usually received higher scores from the judges compared with other teams (Appendix E.10). The Mendenhall Innovation & Design Laboratory (MIDL) may be credited for this improvement. As mentioned previously, the MIDL was founded in 2008 based on a gift fund of $1.5M for the purpose of enriching student experience in the commercialization of technology through students' hands-on activities in the College of Engineering.

Table 3.23 shows the results for other assessment methods used to evaluate the outcomes 2.c. Figure 3.15 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (d)	**ME Outcome 2.c**
Evaluation of Course Objective(Table 3.11)	4.2
Exit Interview (Table 3.12)	4.6
Faculty Assessment (Table 3.15)	3.9
Senior Design (Table 3.21(b))	4.5
Industry Survey (Table 3.22)	3.7
Alumni Survey (Table 3.6)	3.8
Student Evaluation of (a)-(k) (Table 3.9)	3.87

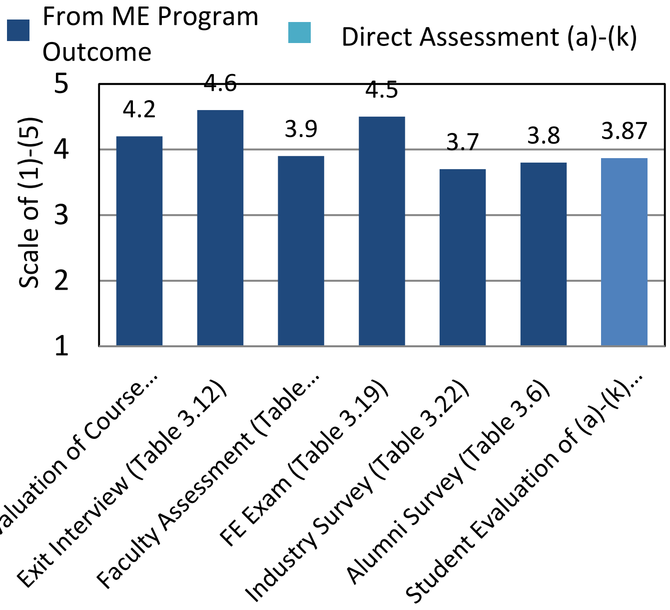


Figure 3.15 Level of Achievement of Criterion3 (d)

F.3.5 Level of Achievements of CRITERION 3(e)

CRITERION 3(e) is evaluated using the ME Educational Outcome 1.e (See Table 3.1) using the assessment methods outlined in Table 3.23. Figure 3.16 shows a diagram summarizing the assessment structure for evaluating Criterion 3(e).

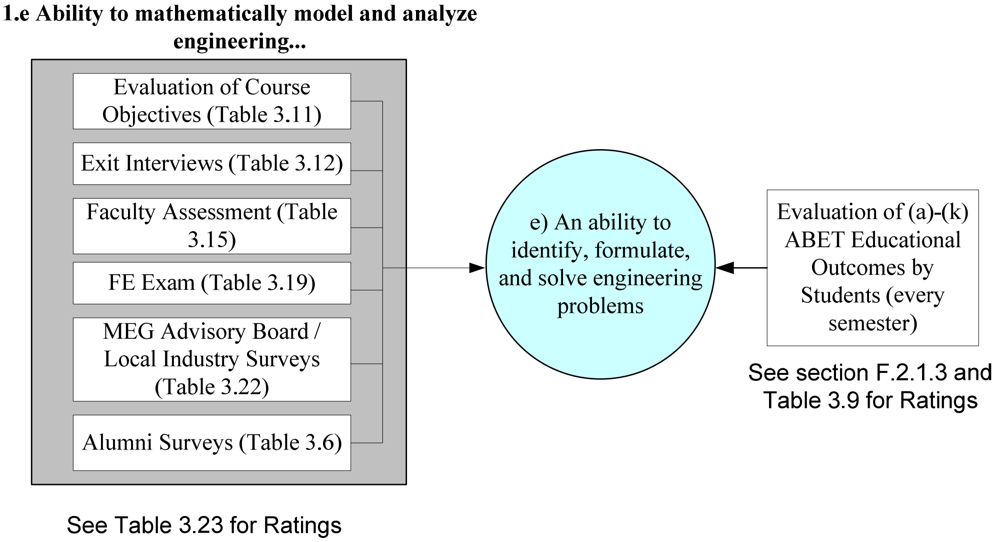


Figure 3.16 Assessment Methods used for the Level of Achievement of Criterion (e)

The FE exam results are used to evaluate the outcome 1.e. *Ability to mathematically model and analyze engineering…*. As shown in Table 3.19, all PM subject scores as well as some of AM subjects are used, and the total cumulative average rating for the outcome 1.e is 4.0 in (1)-(5) scale.

Table 3.23 shows the results for other assessment methods used to evaluate the outcomes 1.e. Figure 3.17 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (e)	**ME Outcome 1.e**
Evaluation of Course Objective(Table 3.11)	4.2
Exit Interview (Table 3.12)	4.4
Faculty Assessment (Table 3.15)	3.9
FE Exam (Table 3.19)	4
Industry Survey (Table 3.22)	3.5
Alumni Survey (Table 3.6)	4.1
Student Evaluation of (a)-(k) (Table 3.9)	3.87

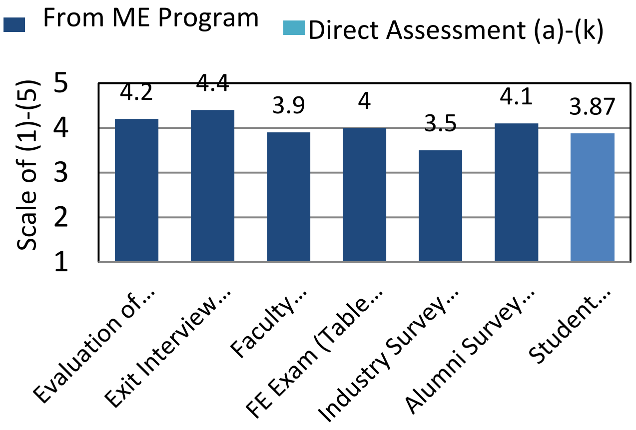
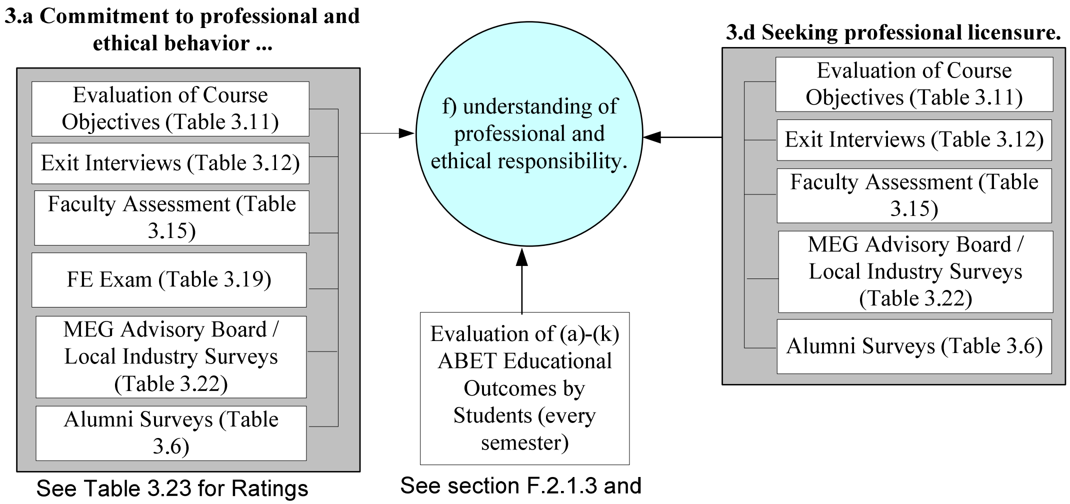


Figure 3.17 Level of Achievement of Criterion3 (e)

F.3.6 Level of Achievements of CRITERION 3(f)

CRITERION 3(f) is evaluated using the ME Educational Outcome 3.a and 3.d (See Table 3.1) and the associated outcomes are assessed by using the methods outlined in Table 3.23. Figure 3.18 shows a diagram summarizing the assessment structure for evaluating Criterion 3(f).



See Table 3.23 for Ratings

See section F.2.1.3 and Table 3.9 for Ratings

Figure 3.18 Assessment Methods used for the Level of Achievement of Criterion (f)

The assessment methods used for evaluating the ME outcomes 3.a and 3.d are explained in Section F.2 and its results are shown in Table 3.23. It should be noted that AM subject of Ethics and Business of the FE Exam are used to evaluate the outcome 3.a, and its result is shown in Table 3.19. Figure 3.19 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (f)	ME Outcome 3.a	ME Outcome 3.d	average
Evaluation of Course Objective(Table 3.11)	4	3.9	3.95
Exit Interview (Table 3.12)	4.2	3.8	4
Faculty Assessment (Table 3.15)	4.1	4	4.05
FE Exam (Table 3.19)	4.6	NOT USED	4.6
Industry Survey (Table 3.22)	4.2	3.3	3.75
Alumni Survey (Table 3.6)	4	3.5	3.75
Student Evaluation of (a)-(k) (Table 3.9)			3.62

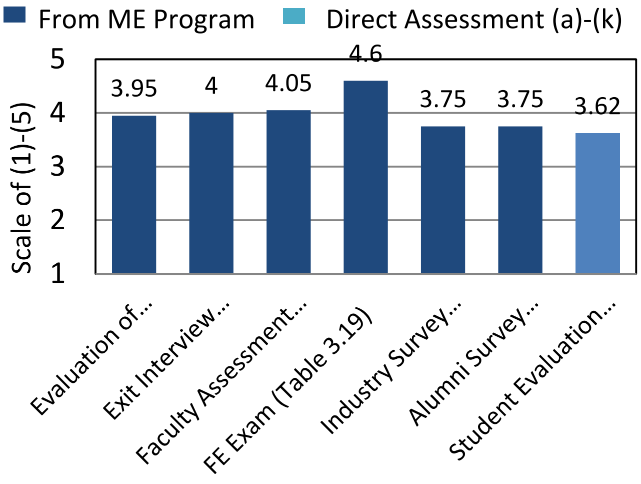


Figure 3.19 Level of Achievement of Criterion3 (f)

F.3.7 Level of Achievements of CRITERION 3(g)

CRITERION 3(g) is evaluated using the ME Educational Outcome 2.a and 2.c (See Table 3.1) and the associated outcomes are assessed by using the methods outlined in Table 3.23. Figure 3.20 shows a diagram summarizing the assessment structure for evaluating Criterion 3(g).

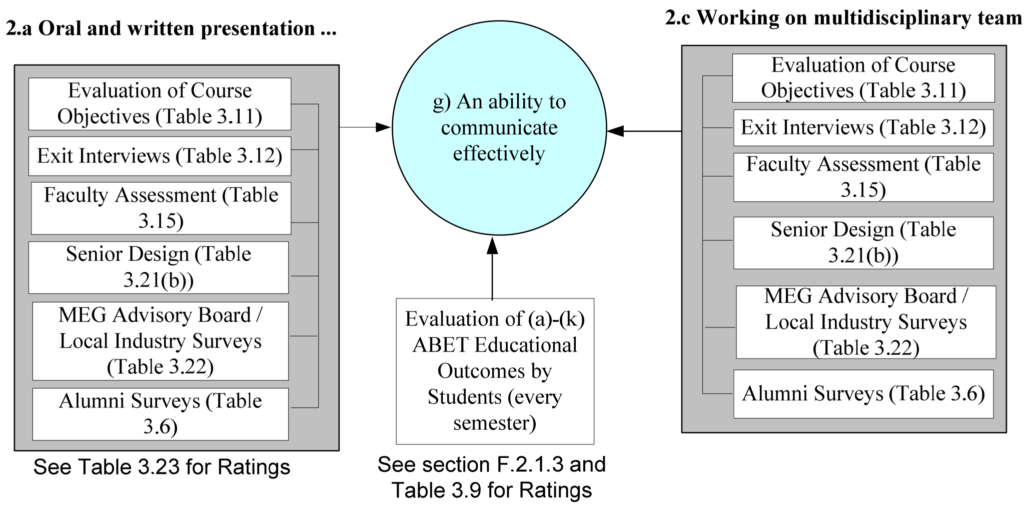


Figure 3.20 Assessment Methods used for the Level of Achievement of Criterion (g)

The assessment methods used for evaluating the ME outcomes 2.a and 2.c are explained in Section F.2 and their results are shown in Table 3.23. It should be noted that the results of the cumulative senior design scores by three judges are included in this evaluation as shown in Table 3.21(b). Figure 3.21 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (g)	ME Outcome 2.a	ME Outcome 2.c	average
Evaluation of Course Objective(Table 3.11)	4.2	4.2	4.2
Exit Interview (Table 3.12)	4.2	4.6	4.4
Faculty Assessment (Table 3.15)	3.9	3.9	3.9
Senior Design (Table 3.21(b))	4.1	4.5	4.3
Industry Survey (Table 3.22)	3.5	3.7	3.6
Alumni Survey (Table 3.6)	4	3.8	3.9
Student Evaluation of (a)-(k) (Table 3.9)			3.59

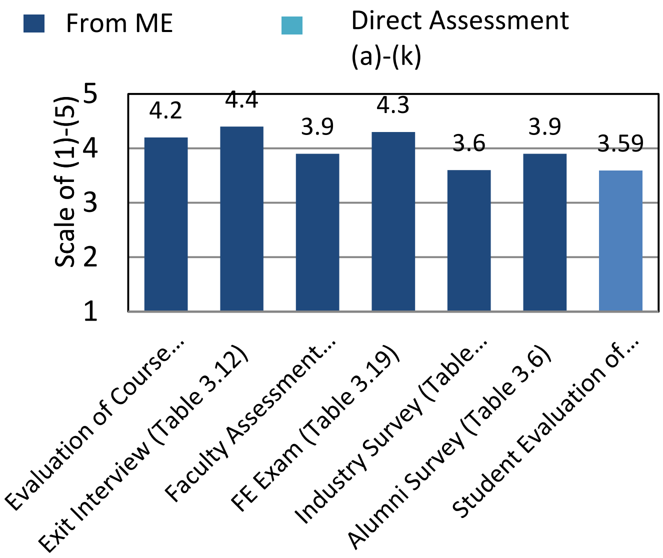
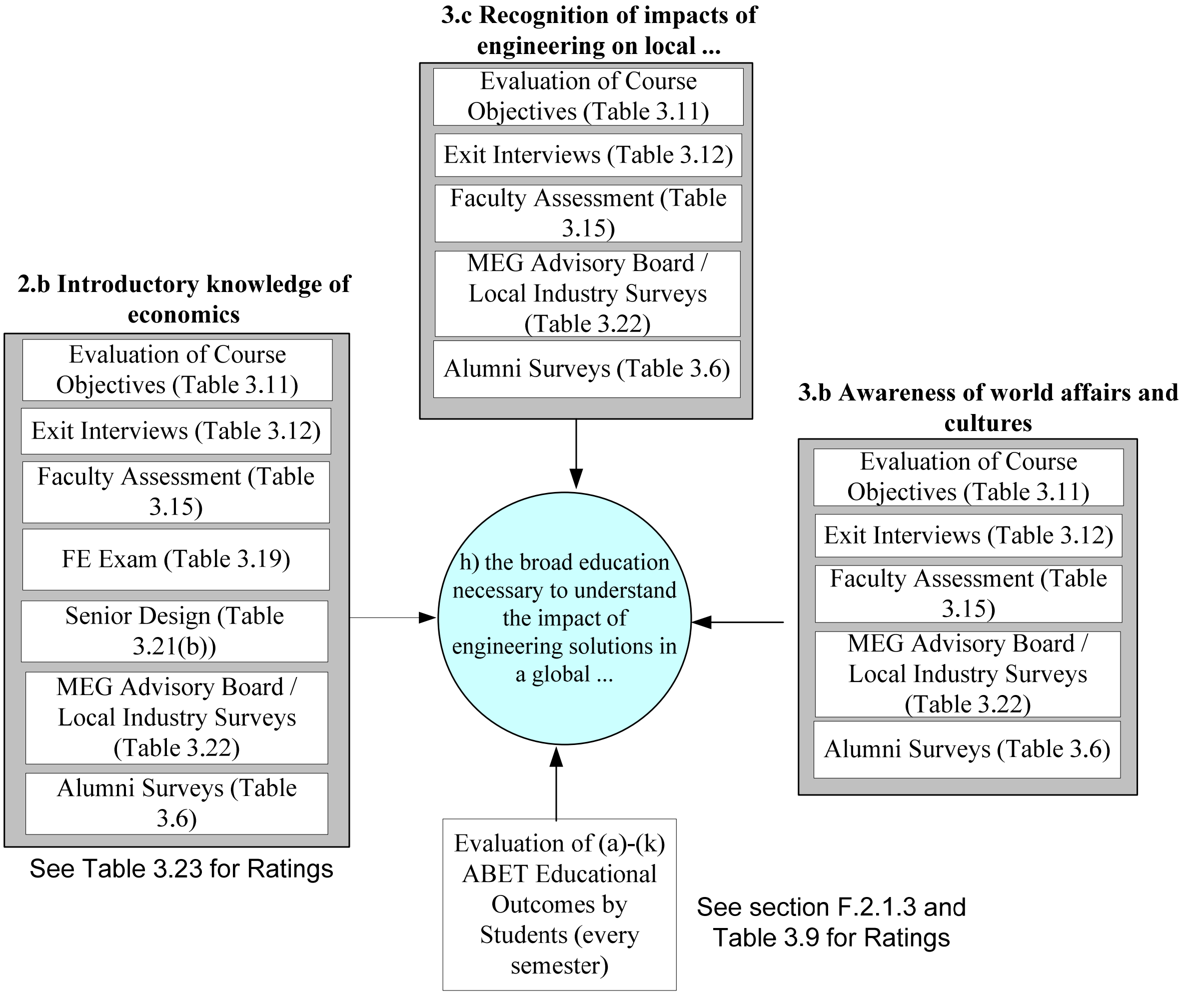


Figure 3.21 Level of Achievement of Criterion3 (f)

F.3.8 Level of Achievements of CRITERION 3(h)

CRITERION 3(h) is evaluated using the ME Educational Outcome 2.b, 3.b, and 3.c (See Table 3.1) using the methods outlined in Table 3.23. Figure 3.22 shows a diagram summarizing the assessment structure for evaluating Criterion 3(h).



See Table 3.23 for Ratings

See section F.2.1.3 and Table 3.9 for Ratings

Figure 3.22 Assessment Methods used for the Level of Achievement of Criterion3 (h)

The assessment methods used for evaluating the ME outcomes 2.b, 3.b, and 3.c are explained in Section F.2 and their results are shown in Table 3.23. The following needs to be noted for better understanding of the assessment method used for the ME program outcome 2.b. *Introductory Knowledge of Economics*:

- In FE Exam, the AM subject of Engineering Economics score is used. It should be noted that students demonstrated a solid performance in the FE exam for the AM subject of Engineering Economics. The credit must go to both students and instructors of EGG 307 Engineering Economics which is a required course in the curriculum.

- In Senior Design, three judge score of the Potential for Commercialization/Implementation is used.

Figure 3.23 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (h)	ME Outcome 2.b	ME Outcome 3.b	ME Outcome 3.c	average
Evaluation of Course Objective(Table 3.11)	4.2	4.2	4.1	4.17
Exit Interview (Table 3.12)	4.3	3.4	3.7	3.80
Faculty Assessment (Table 3.15)	4.4	4.4	3.8	4.20
FE Exam (Table 3.19)	5	NOT USED	NOT USED	5.00
Senior Design (Table 3.21(b))	4	NOT USED	NOT USED	4.00
Industry Survey (Table 3.22)	3.3	3.2	3.2	3.23
Alumni Survey (Table 3.6)	3.7	3.1	3.4	3.40
Student Evaluation of (a)-(k) (Table 3.9)				3.66

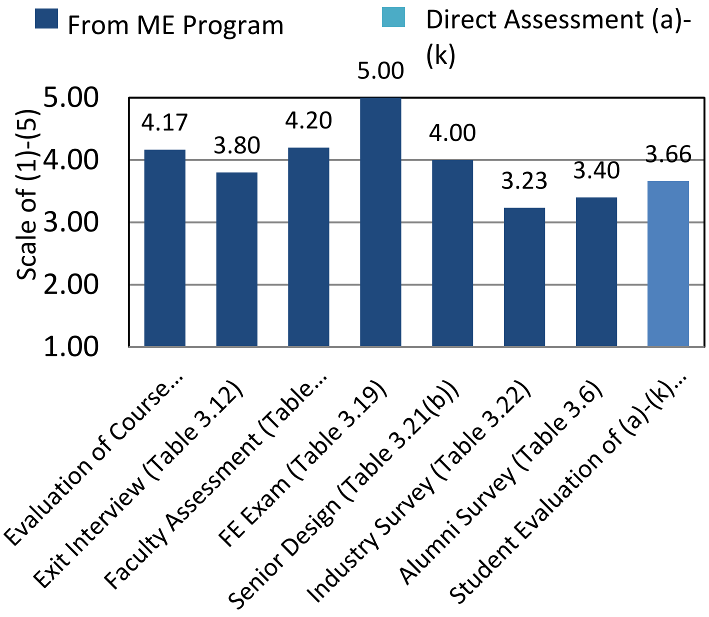


Figure 3.23 Level of Achievement of Criterion3 (h)

F.3.9 Level of Achievements of CRITERION 3(i)

CRITERION 3(i) is evaluated using the ME Educational Outcome 2.d (See Table 3.1) using the methods outlined in Table 3.23. Figure 3.24 shows a diagram summarizing the assessment structure for evaluating Criterion 3(i).

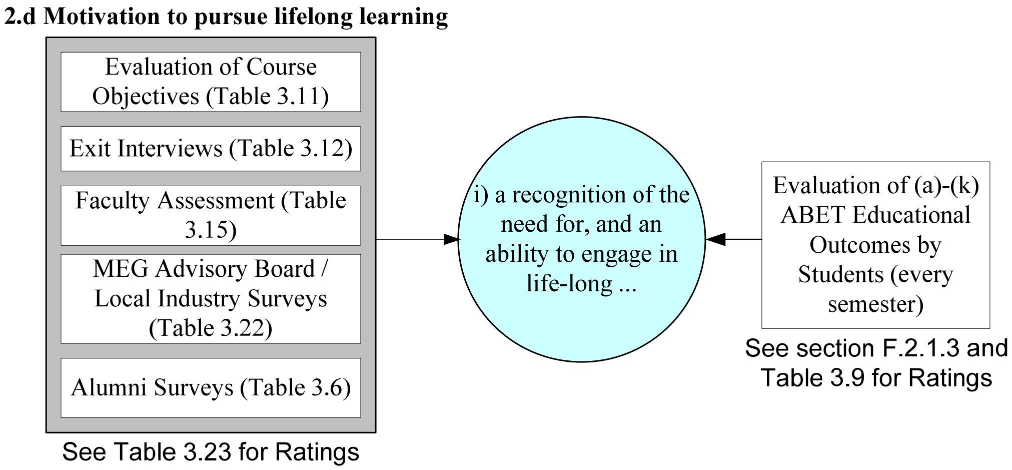


Figure 3.24 Assessment Methods used for the Level of Achievement of Criterion3 (i)

The assessment methods used for evaluating the ME program outcome 2.d is explained in Section F.2 and their results are shown in Table 3.23. Especially, the Exit Interview by graduating students showed a large percentage of students (~80%) answered that they are planning to pursue a graduate degree, and over 30% of them already applied for the graduate program, which can be an example of an ability to engage in life-long learning.

Figure 3.25 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (i)	ME Outcome 2.d
Evaluation of Course Objective(Table 3.11)	4.2
Exit Interview (Table 3.12)	4.3
Faculty Assessment (Table 3.15)	3.9
Industry Survey (Table 3.22)	3.9
Alumni Survey (Table 3.6)	3.9
Student Evaluation of (a)-(k) (Table 3.9)	3.81

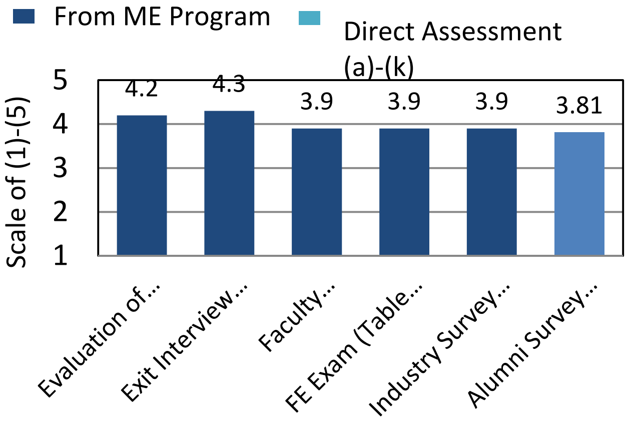
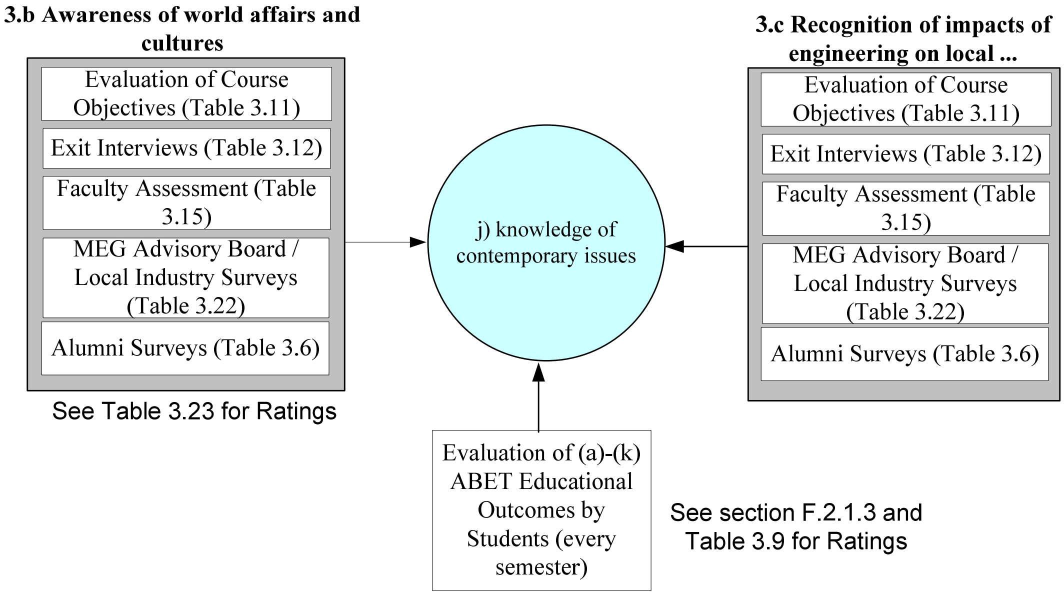


Figure 3.25 Level of Achievement of Criterion3 (i)

F.3.10 Level of Achievements of CRITERION 3(j)

CRITERION 3(j) is evaluated using the ME Educational Outcome 3.b and 3.c (See Table 3.1) and the associated outcomes are assessed by using the methods outlined in Table 3.23. Figure 3.26 shows a diagram summarizing the assessment structure for evaluating Criterion 3(j).



See Table 3.23 for Ratings

See section F.2.1.3 and Table 3.9 for Ratings

Figure 3.26 Assessment Methods used for the Level of Achievement of Criterion3 (j)

The assessment methods used for evaluating the ME program outcomes 3.b and 3.c are explained in Section F.2 and their results are shown in Table 3.23. Figure 3.27 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (j)	ME Outcome 3.b	ME Outcome 3.c	average
Evaluation of Course Objective(Table 3.11)	4.2	4.1	4.15
Exit Interview (Table 3.12)	3.4	3.7	3.55
Faculty Assessment (Table 3.15)	4.4	3.8	4.10
Industry Survey (Table 3.22)	3.2	3.2	3.20
Alumni Survey (Table 3.6)	3.1	3.4	3.25
Student Evaluation of (a)-(k) (Table 3.9)			3.52

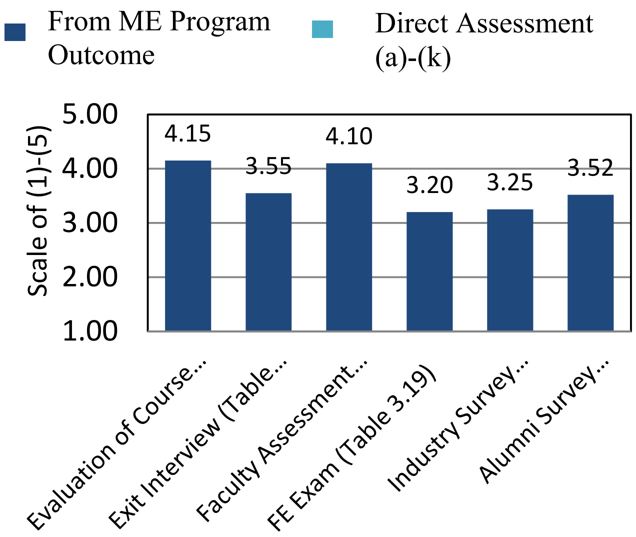


Figure 3.27 Level of Achievement of Criterion3 (j)

F.3.11 Level of Achievements of CRITERION 3(k)

CRITERION 3(k) is evaluated using the ME Educational Outcome 1.d (See Table 3.1) using the methods outlined in Table 3.23. Figure 3.28 shows a diagram summarizing the assessment structure for evaluating Criterion 3(k).

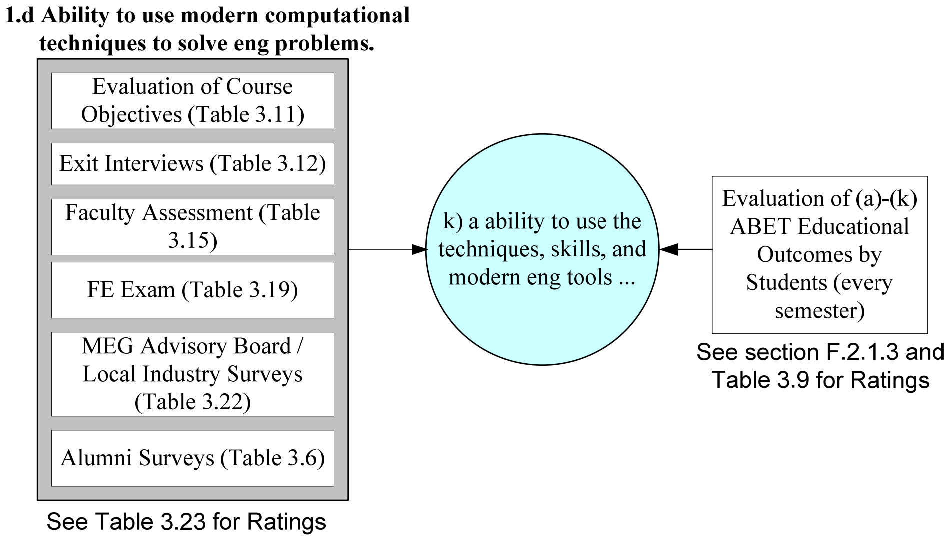


Figure 3.28 Assessment Methods used for the Level of Achievement of Criterion3 (k)

The assessment methods used for evaluating the ME program outcome 1.d are explained in Section F.2 and their results are shown in Table 3.23. Figure 3.29 shows how our constituents ranked this outcome, and generally, we met or exceeded constituents' expectations in this area.

CRITERION 3 (k)	ME Outcome 1.d
Evaluation of Course Objective(Table 3.11)	4.1
Exit Interview (Table 3.12)	4.2
Faculty Assessment (Table 3.15)	3.9
FE Exam (Table 3.19)	4.2
Industry Survey (Table 3.22)	4
Alumni Survey (Table 3.6)	4.1
Student Evaluation of (a)-(k) (Table 3.9)	3.87

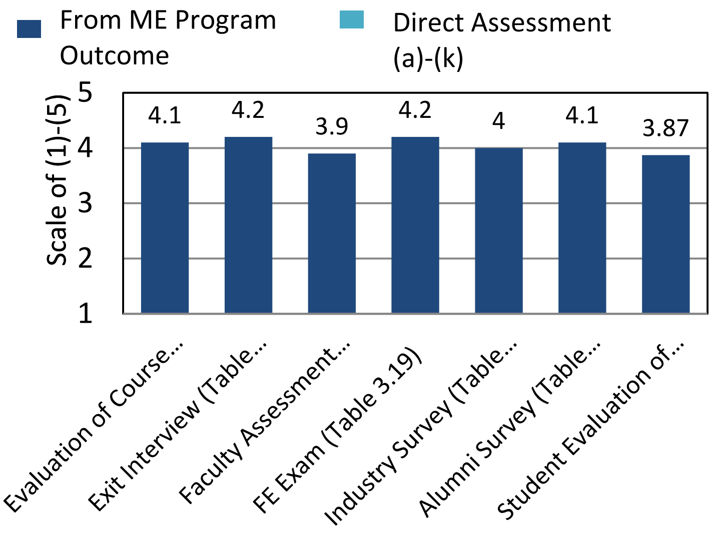


Figure 3.29 Level of Achievement of Criterion3 (k)

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Information Used for Program Improvement

The flowcharts shown in Table 3.5 (Criterion 3, pp. 56) shows how the indirect and direct assessment information that the ME program employs in implemented for program improvements. The information used for program improvement is available as a compilation of surveys and evaluations. The results from these assessment measures were then used by the Curriculum Committee to make recommendations to the faculty on program improvement during department meetings. The most recent data is presented in the sections of CRITERION 2 and 3 as well as Appendix E.

CRITERION 2: As mentioned earlier, we defined educational objectives as the abilities that our alumni possess immediately after graduation and during the first several years following graduation from the program. The following methods are used to evaluate the achievement of these objectives (also see Figure 2.1 on pp.34):

- Each of the objectives is related to set of outcomes. Therefore, data from our outcomes assessment process are used to evaluate objectives.
- Initial and continuing career success of our graduates,
- Contacts with our alumni and corporate constituencies through alumni and industry surveys.

Surveys conducted in 2008 and 2009 are included in Appendix E.1 and E.2. In these surveys, both direct and indirect assessment methods are used. For the direct assessment, both alumni and industry employers assess the educational objectives through associated outcomes. As shown in Figure 2.2 (pp.36) a clear majority of alumni who responded in 2005 and 2008 surveys graduated in the last ten years. For indirect assessment, the objectives are evaluated through the performance in academic knowledge levels (Objective #1) and general engineering skills (Objective #2). For Objective 3, the responses for the following two questions were considered in addition to the direct evaluation:

- *Do you feel that studying at UNLV made you motivated to gain professional registration?*
- *Do you consider that studying at UNLV made you prepared to enter the workforce compared to graduates of other universities?*

CRITERION 3: With respect to CRITERION 3 Educational Outcome, both internal and external measures were developed to assess how our program outcomes were achieved. For CRITERION 3(a)-(k) assessment, the most of evaluations are an indirect way of assessing them through evaluating the ME Educational Outcomes using the mapping shown in Table 3.1 on page 50. The internal assessments are completed by students, and the external assessments are completed by alumni, industry employers, and senior design competition judges. The results from these assessment methods are used by the curriculum committee to make recommendations to the faculty on program improvements.

Table 4.1 and 4.2 show the summary of evaluation results for CRITERION 2 and 3, respectively. For both CRITERION 2 and CRITERION 3, the scale 5(Strongly Agree)-1(Strongly Disagree) is commonly used for decision making in program improvements.

Table 4.1 Assessment Results for CRITERION 2

	Direct Assessment of Educational Outcomes		Indirect Assessment through Academic Knowledge		Indirect Assessment through General Engineering Skills		*Other Questions:* *- Do you feel that studying at UNLV made you motivated to gain professional registration?* *- Do you consider that studying at UNLV made you prepared to enter the workforce compared to graduates of other universities?*	
	Industry Survey	Alumni Survey	Industry Survey	Alumni Survey	Industry Survey	Alumni Survey	Industry Survey	Alumni Survey
Objective 1: Provide mechanical engineering graduates with technical capabilities.	**3.7**	**4**	**3.4**	**3.75**				
Objective 2: Prepare mechanical engineering graduates to have effective work place skills.	**3.6**	**3.85**			**3.6**	**3.7**		
Objective 3: Instilling a sense of responsibility as a professional member of society.	**3.3**	**3.5**					**3.55**	**3.22**

Scale: 5(Strongly Agree)-1(Strongly Disagree) 🟦 **Rating>4.0** 🟧 **Rating<3.5**

Table 4.2 Assessment Results for CRITERION 3

Assessment Methods CRITERION3	**Lab Survey**	**Student Assessment Course Objectives**	**Exit Interview**	**Assessment by Faculty**	**FE Exam Results**	**Senior Design**	**Industry Survey**	**Alumni Survey**	**Student Assessment of (a)-(k)**	
a) an ability to apply knowledge of mathematics, science, and engineering		**4.2**	**4.1**	**3.9**	**3.8**		**3.7**	**3.9**	**3.9**	Fig. 3.8 (pp.83)
b) an ability to design and conduct experiments, as well as to analyze...	**4.1**	**4.2**	**4.1**	**4**	**4.6**		**3.7**	**4.0**	**3.8**	Fig. 3.11 (pp.85)
c) an ability to design a system, component, or process to meet …		**4.2**	**4.4**	**3.9**	**4.0**	**3.6**	**3.7**	**4.1**	**3.7**	Fig. 3.13 (pp.87)
d) an ability to function on multidisciplinary teams		**4.2**	**4.6**	**3.9**		**4.5**	**3.7**	**3.8**	**4.2**	Fig. 3.15 (pp.89)
e) an ability to identify, formulate, and solve engineering problems		**4.2**	**4.4**	**3.9**	**4.0**		**3.5**	**4.1**	**3.9**	Fig. 3.17 (pp.90)
f) an understanding of professional and ethical responsibility		**3.9**	**4.0**	**4.1**	**4.6**		**3.8**	**3.7**	**3.6**	Fig. 3.19 (pp.91)
g) an ability to communicate effectively.		**4.2**	**4.4**	**3.9**		**4.3**	**3.6**	**3.9**	**3.6**	Fig. 3.21 (pp.92)
h) the broad education necessary to understand the impact of engineering solutions …		**4.2**	**3.8**	**4.2**	**5.0**	**4**	**3.2**	**3.4**	**3.7**	Fig. 3.23 (pp.94)
i) a recognition of the need for, and an ability to engage in life-long …		**4.2**	**4.3**	**3.9**			**3.9**	**3.9**	**3.8**	Fig. 3.25 (pp.95)
j) a knowledge of contemporary issues		**4.2**	**3.6**	**4.1**			**3.2**	**3.3**	**3.5**	Fig. 3.27 (pp.96)
k) an ability to use the techniques, skills, and modern engineering…		**4.1**	**4.2**	**3.9**	**4.2**		**4**	**4.1**	**3.9**	Fig. 3.29 (pp.97)

Scale: 5(Strongly Agree)-1(Strongly Disagree)

🟦 **Rating>4.0** 🟧 **Rating<3.5**

In Table 4.1 and Table 4.2, even if any assessment measure that is below 3.0 is considered as indicative of a weakness in the discussion in Criterion 2 and 3, the following areas fall between 3.0 and 3.5:

Educational Objective 3: Instilling a sense of responsibility as a professional member of society.

ABET Criterion 3 (h) *the broad education necessary to understand the impact of engineering solutions…*

ABET Criterion 3 (j) *a knowledge of contemporary issues*

As shown in Table 3.1 (pp.50), the Educational Objective 3 are evaluated partly by the Educational Outcomes related with Criterion 3 (h) and (j), specially the following program outcomes are strongly ties to the ABET Criterion 3 (h) and (j):

3.b Awareness of world affairs and cultures.
3.c Recognition of impacts of engineering on local and global societies.

Like most engineering curricula, it is a rather difficult task to achieve a high mark especially in the outcome 3.b. As shown in Table 3.4 on pp.54, the Multicultural and International components in the UNLV General Education Curriculum are directly related with the outcome 3.b. In addition, some of the ME technical elective courses are also related as shown in Table 3.3 (pp. 52). These are technical elective courses in the field of manufacturing (ME 426, ME 427), nuclear (ME 455, ME 456), and design courses (ME 460, ME 462, ME 497, ME 498), but the levels of relationship with the outcome is low to medium.

The department is fully aware of this weakness, and the following plans are being implemented:

- More active participation in the UNLV Faculty Senate General Education Committee to express the above mentioned concerns to the committee. Prof. Yingtao Jiang of Electrical & Computer Engineering is the college representative for the committee, and the department has been contacting Prof. Jiang to convey our concerns to the committee. The committee website is at http://www.unlv.edu/committees/gec/.
- More emphasis on the contents of "world affair and cultures" in the related technical elective courses shown in Table 3.3.

B. Actions to Improve the Program

Continuous improvement occurs through a variety of avenues. A collection of assessment inputs is distributed to advance program outcomes in multiple ways. The Curriculum Committee is responsible for developing and updating assessment strategies. The committee also closes the loop by proposing program changes and forwarding them to the department faculty for further discussion. Since our last ABET visit in 2004, several actions have been taken to improve the program based on the final statements made in the 2004 ABET review. Table 4.3 summarizes the review and our actions taken to improve the associated program components, and further discussion follows after this summary.

Table 4.3 Summary of 2004 ABET review and actions taken for program improvement

Category	Summary of 2004 ABET Review	Actions taken for improvement after 2004 ABET Review	Results of Implemen-tation	Comments
Criterion 2 Educational Objectives	Inclusion of "preparing for graduate study" in the Program Objective	No Change	Exit Interview (Appendix E.8, Table 3.12-14 (pp.66-69))	It was our view that it is one of long-term objectives which will be determined by the individual student after graduation whether they will pursue graduate study.
Criterion 3 Program Outcome Assessment	Improving queries in miscellaneous surveys and FE exam results for highlighting the potential areas for improvement	New mapping among CRITERION 3(a)-(k), ME educational outcomes, and assessment measures are carefully developed for more quantitative assessment of the potential areas for improvement.	Table 4.2 (pp.100)	N/A
Criterion 4 Continuous Improvement	N/A	Improving Surveys Student Advisory Board	N/A	N/A
Criterion 5 Professional Components	The program needs one year of college level mathematics and science (32 cr.)	Mathematics elective (3 cr.) has been added to make our program requirement total 33 cr. hours of math/science.	FE Exam result in Math (see Figure 3.3(pp.72), Appendix E.9)	This change made our technical electives from 9 cr. to 6 cr.
Criterion 6 Faculty	Mentoring of all students by faculty is needed including freshmen and sophomore.	New mentoring form is developed to require all students to see their mentors every semester	N/A	N/A

Criterion 7 Facilities	Shop Safety	Shop equipment has been inspected, added safety instructions, added signs, and safety eyewear	Exit interview (Appendix E.8)	The College of Engineering recently completed the Mendenhall Innovation & Design Laboratory in the existing machine shop area. The facilities are extensively used by undergraduate student laboratory class and for design projects.
	ME 100L Lab Space	Space problem for ME 100L was resolved. Currently, the lab is located in CBC C-234 with 1,000 sq. ft.	Lab Survey (see Table 3.7(pp.58), Appendix E.4)	The new lab location is in the Classroom Complex where students can access the lab easily and has 1,000 sq. ft., which is ample space for their lab tasks.
Criterion 8 Institutional Support	Hiring Department Machinist	A full-time model designer/machinist, Mr. Kevin Nelson, was hired in 2005.	Lab Survey (see Table 3.7(pp.58), Appendix E.4) Exit Interview (Table 3.13(pp.68))	Mr. Nelson works with both undergraduate and graduate students to design experiments and prototypes. Two new elective 1 cr. courses, ME 130 Intro to Machining and ME 230 CNC Machining, were introduced by Mr. Nelson. Both courses are very popular among students.
	Hiring Laboratory Director	A full-time Laboratory Director, Mr. Jeff Markle, was hired in 2005.	Lab Survey (see Table 3.7) Exit Interview (Appendix E.8, Table 3.12-14(pp.66-69))	Mr. Markle oversees all undergraduate and graduate laboratories with associated faculty mentors. Mr. Markle's regular interaction with faculty mentors and teaching assistants greatly improves the laboratory upgrade and maintenance as seen in our lab survey and graduate exit interviews.

The rest of this section is for an in-depth presentation about each improvement summarized in Table 4.3.

Criterion 2, Program Educational Objectives

Program Educational Objectives remained the same as before even though there was a concern of ignoring "*preparation for graduate study*" in the program objectives. It was our view that it is one of long-term objectives which will be determined by the individual student after graduation whether they will pursue the graduate study. Figure 4.1(pp.99) shows the Exit Interview result for the question related to their plan of graduate study. As shown in Figure 4.1, the majority of our graduates are considering graduate study even though the percentage of actual application at the time of the interview is low. However, this shows that our program emphasizes the importance of graduate study to all students and the actual application will be determined by the individual students.

Another major effort for encouraging our graduates to pursue an advanced degree program is a recently implemented *Integrated BS-MS Program*. The program is designed to provide high-achieving ME undergraduate students with the opportunity to be exposed to graduate courses and to encourage them to continue with graduate degree by reducing the time needed for degree completion. Up to nine credit hours of approved graduate-level course work can be taken as technical electives for the grade of B or better during the senior year and those credit hours will be waived for the graduate degree.

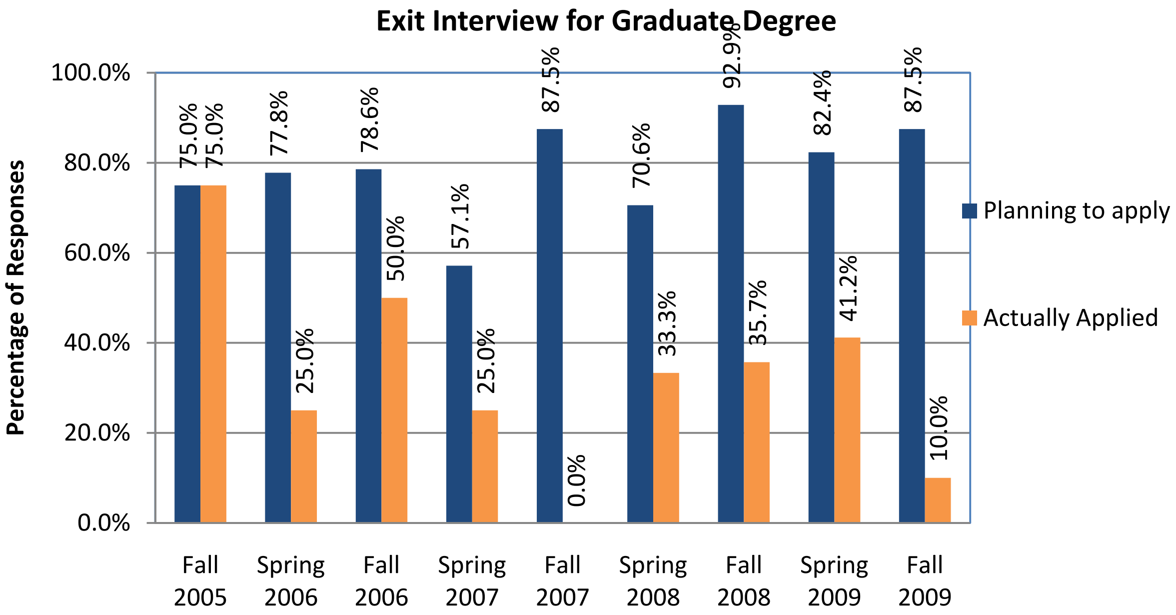


Figure 4.1 Exit Interview Results for Postgraduate Study

<u>Criterion 3, Program Outcomes and Assessment</u>

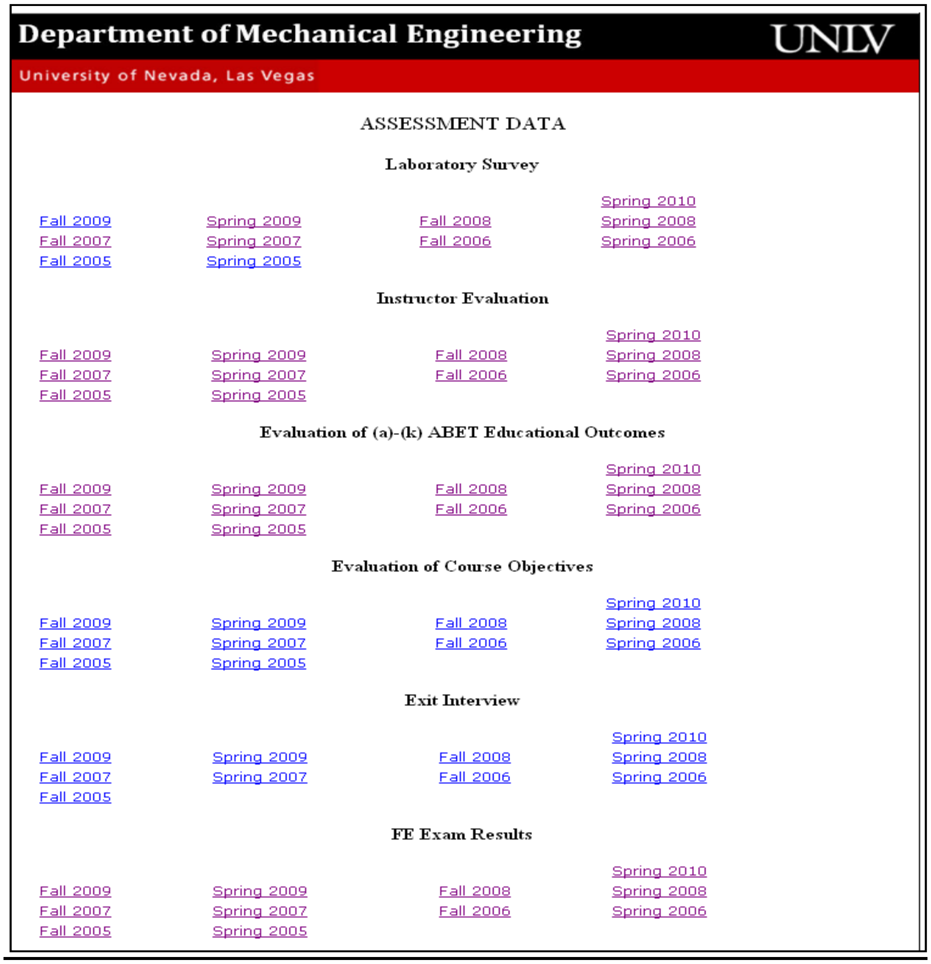
A mapping between CRITERION 3(a)-(k) and our educational outcomes is made, and individual educational outcomes are assessed using both internal and external assessment methods. This mapping is shown in sections F.3.1 through F.3.11 (pp.83-97).

<u>Criterion 4, Continuous Improvememnt</u>

Improvements to Surveys: There are two major external surveys conducted by the department. One is the Alumni Survey and the other is the Industry Survey. From 2008, the web-based SurveyMonkey system has been utilized for these surveys. The following has been identified as possible improvements for the future surveys:

- Correct email addresses for the ME alumni is one issue to be addressed. Approximately, a half of ME alumni email addresses has not been updated after their graduation. In 2008 survey, the department sent out the survey questionnaire in both web-based and regular mail system.
- For the Industry Survey, it was a daunting task to identify the employers of our graduates. The ME Advisory Board members have been informing the contact information of employers as needed. Also, the department has been cooperating with the Alumni Office to get up-to-date employer information for the survey.
- The ME Advisory Board has been discussing the types of questions to be included in the surveys to correctly assess the Educational Objectives and Outcomes.

Management of Data: There has been a significant amount of documentation and data associated with each assessment method. Even if a raw data associated with each method has been archived in the department, there is a need to show the summarized data to the department constituencies for their review and comments. Figure 4.2 shows a screen shot of a link in the department website that stores all summarized assessment data. It should be noted that all direct and indirect assessments have been conducted since the last 2004 ABET visit, and a url link for the site is http://me.unlv.edu/GeneralInfo/ABETData.html.



Department of Mechanical Engineering UNLV

University of Nevada, Las Vegas

ASSESSMENT DATA

Laboratory Survey

			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005	Spring 2005		

Instructor Evaluation

			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005	Spring 2005		

Evaluation of (a)-(k) ABET Educational Outcomes

			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005	Spring 2005		

Evaluation of Course Objectives

			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005	Spring 2005		

Exit Interview

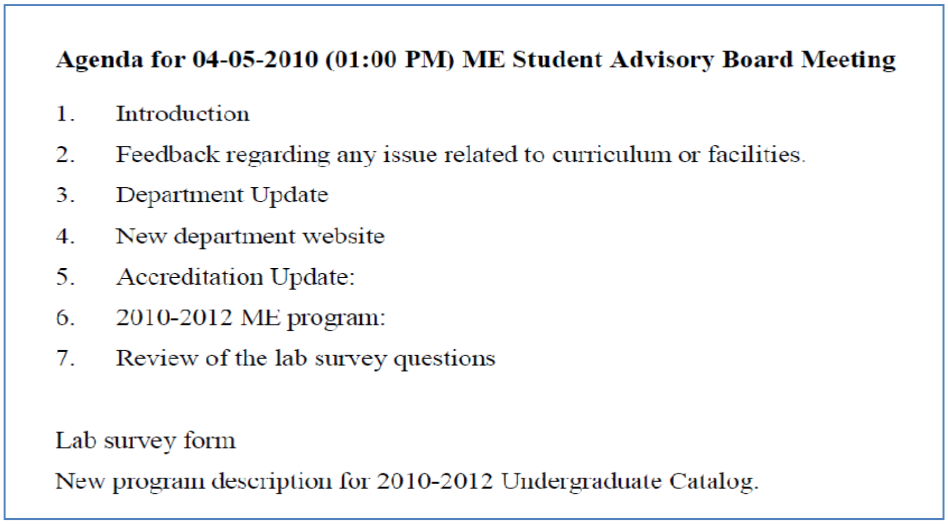
			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005			

FE Exam Results

			Spring 2010
Fall 2009	Spring 2009	Fall 2008	Spring 2008
Fall 2007	Spring 2007	Fall 2006	Spring 2006
Fall 2005	Spring 2005		

Figure 4.2 Screen shot of assessment data posting website at http://me.unlv.edu/GeneralInfo/ABETData.html

ME Student Advisory Board: In addition to the assessment methods discussed previously, the department also obtains the feedback directly from students utilizing the ME Student Advisory Board. The department chair meets with the board members during each semester to brief any department news and changes in curriculum and policy, and hears directly from students about their opinions on the program. The ME Student Advisory Board consists of four members, and each represents freshman, sophomore, junior, and senior groups. The following is the most recent meeting's agenda and a summary of recommendation from the board.

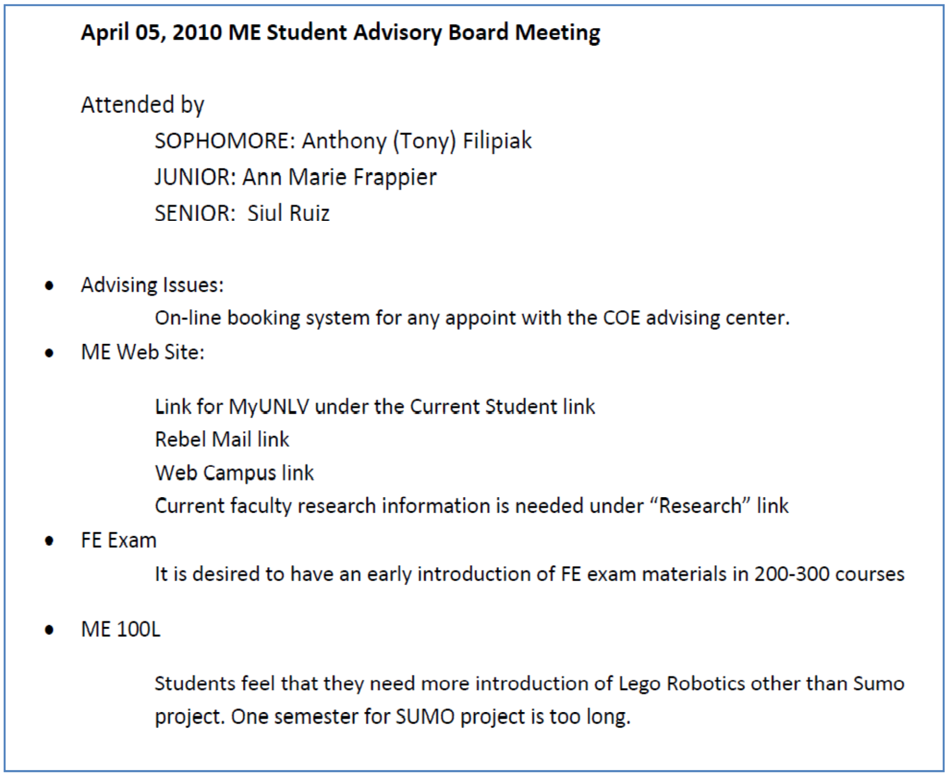


Agenda for 04-05-2010 (01:00 PM) ME Student Advisory Board Meeting

1. Introduction
2. Feedback regarding any issue related to curriculum or facilities.
3. Department Update
4. New department website
5. Accreditation Update:
6. 2010-2012 ME program:
7. Review of the lab survey questions

Lab survey form

New program description for 2010-2012 Undergraduate Catalog.



April 05, 2010 ME Student Advisory Board Meeting

Attended by

SOPHOMORE: Anthony (Tony) Filipiak
JUNIOR: Ann Marie Frappier
SENIOR: Siul Ruiz

- Advising Issues:
  On-line booking system for any appoint with the COE advising center.
- ME Web Site:
  Link for MyUNLV under the Current Student link
  Rebel Mail link
  Web Campus link
  Current faculty research information is needed under "Research" link
- FE Exam
  It is desired to have an early introduction of FE exam materials in 200-300 courses
- ME 100L
  Students feel that they need more introduction of Lego Robotics other than Sumo project. One semester for SUMO project is too long.

Criterion 5, Professional Component or Curriculum

As a result of this concern, one three credit math elective course is added as graduation requirement. Students can make a choice from MATH 432 (Mathematics for Engineers and Scientists II), MATH 488 (Partial Differential Equations), STAT 463 (Applied Statistics for Engineers), or other 400 level mathematics course after the approval of the student's academic advisor. After the change, the program has 33 credit hours of mathematics and basic sciences. To evaluate the improvement of including a mathematics elective in our program, we assess the FE Exam result in mathematics and probability/statistics (AM subjects). Figure 4.3 shows this result from Fall 2006 to Fall 2009. As shown in Figure 4.3, it is difficult to say that we improved students' mathematical/statistics knowledge (except Fall 2009), but we strongly believe that this improvement helps in acquiring other skills and general knowledge in engineering.

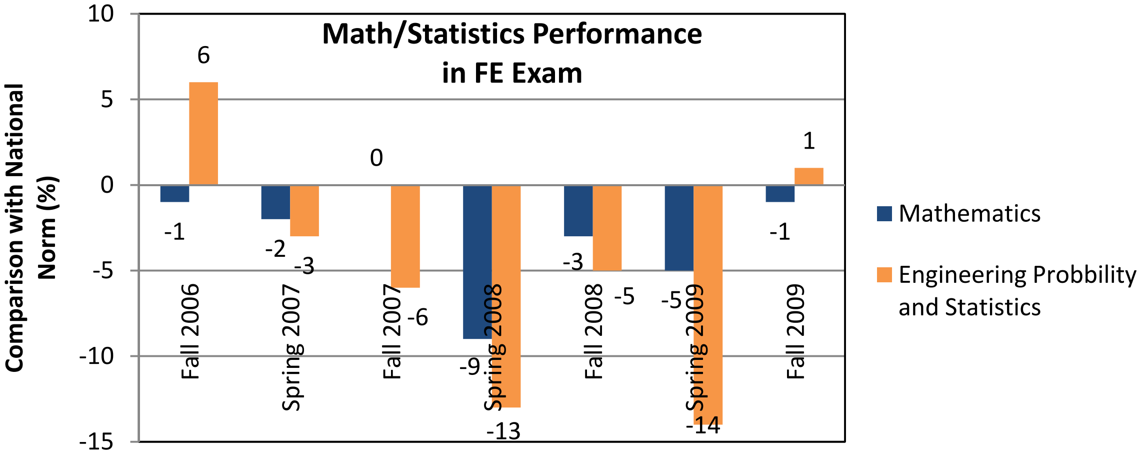


Figure 4.3 Comparison of FE Mathematics/Statistics AM subjects with national norm

Criterion 6, Faculties

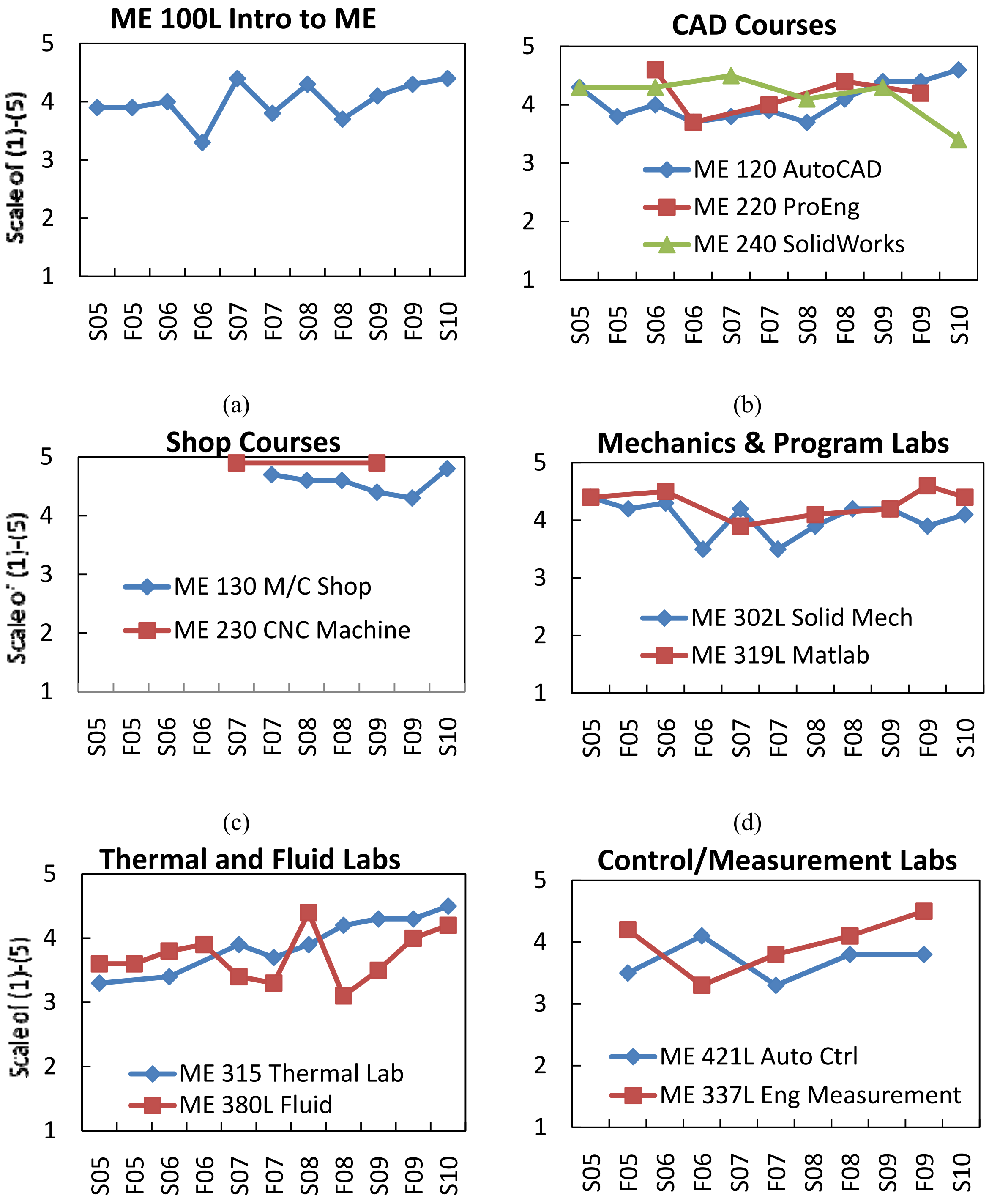
There was a concern in mentoring only junior and senior students in the program. Since 2005, the department has assigned all students including freshmen and sophomores to mentors, and they are required to see their faculty mentors before registering for their classes each semester. The department regularly updates the faculty mentor list, and the College Advising Center requires this faculty mentoring. The mentoring Sign-in Form is shown in Figure 1.1 (b) (pp.15).

Criterion 7, Facilities

All shop equipment has been inspected and safety instructions, signs, and safety eyewear were added. Also, the College of Engineering recently completed Mendenhall Innovation & Design Laboratory in the existing machine shop area, and this facility is extensively used by undergraduate student laboratory classes and senior design students.

Figure 4.4 shows the Lab Survey results plotted *per* laboratory class to show the improvement made in each lab. Please note that all student comments and instructor feedbacks in recent Lab Surveys are in Appendix E.4. Also, student comments for last 5 years are available at the department website at http://me.unlv.edu/GeneralInfo/ABETData.html.

ME 100L laboratory has been moved to a bigger space so that thirty students can comfortably sit and work on their projects. To remediate the space problem for ME 100L, the UNLV Director of Academic & Research Space, had allocated an 800 square foot laboratory for exclusive use by ME 100L in FDH 141in Spring 2005. Currently, the ME 100L is located in the CBC C-234 with more than 1000 sq. ft. of space. Figure 4.4(a) shows the Lab Survey results for ME 100L from Spring 2005 to present. Each scale in Figure 4.4(a) shows the total average value of responses for the six questions (Appendix E.4) asked of students each semester. In addition to ME 100L, all undergraduate laboratory classes are closely monitored through mid-semester laboratory survey as shown in Figure 4.4 (b) to (f). As shown in Figure 4.4, there has been an improvement in laboratory class instruction, and all six areas in the survey have been closely monitored through faculty/TA responses as shown in the sample responses shown in Appendix E.4.



(a) (b)

(c) (d)

(e) (f)

Figure 4.4 Lab Survey Results from Spring 2005 to Spring 2010 (Note that plotted value shows average rating for all six survey questions)

Figure 4.5 shows Lab Survey and Exit Interview results during last five years for Question #5 and #6 which can represent the improvement associated with lab equipment and maintenance. In Figure 4.5, ratings for Question #5 and #6 are averaged in each semester. It should be noted that two data, Exit Interview and Lab Survey, shown in Figure 4.5 have been collected from two different groups of students. One is for all current students and the other is for graduating seniors. The data from graduating students reflect the perceived status of facilities over several years. On the other hand, the data of current student reflect their opinion about the particular lab they were currently enrolled in.

Question 5) The lab equipments are functional. If not, please explain.

Question 6) The lab is well equipped. If not, what do you think is missing?

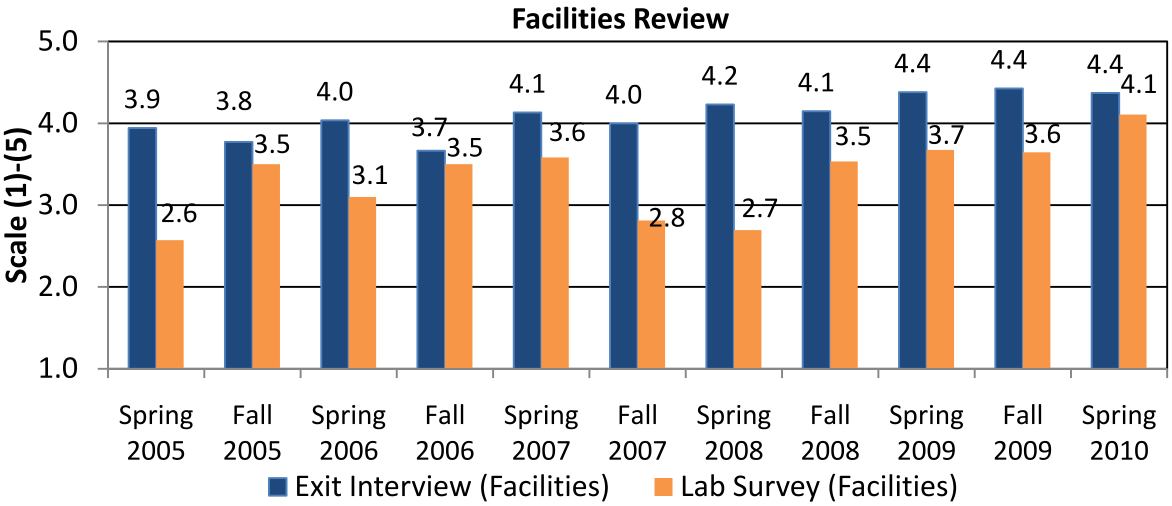


Figure 4.5 Student review of lab facility

As shown in Figure 4.4, there has been a solid improvement in the review of facilities from Spring 2008 lab survey results. Student exit interviews remained above 4.0 since Spring 2006, except for Fall 2006. Several factors contributed to the improvement including:

- Instituting $50 lab fee, which is dedicated to lab maintenance and improvement.
- Creating a long-term plan for lab improvement.
- Having a full-time lab director who coordinates all activities of the department educational labs.

As mentioned previously, Figure 4.4 often provides an excellent tool to identify the source of low cumulative rating for laboratory assessment. This also can lead to identify any teaching assistant who doesn't perform well in class instruction as well as helping students in laboratory classes.

Table 4.4 summarizes the actions taken to improve the lab instruction and curriculum mainly based on the student comments made in the Exit Interview and ME Student Advisory Board. Actual students comments can be viewed at http://me.unlv.edu/GeneralInfo/ABETData.html.

Table 4.4 Actions taken to improve the program based on selected student comments

Student Comments	Suggested Improvement*
"Separation of ME 380L from Civil & Environmental Engineering"	From Spring 2009, ME 380L is separated from Civil & Environmental Eng. Department. As shown in Figure 4.2(e), there is a big and steady improvement in Lab Survey results from Spring 2009.
"ME 240 (SolidWorks) is more useful than ME 120(AutoCAD)"	Currently, it is a student option to pick one CAD course out of AutoCAD, SolidWorks, and ProEng. It is still debatable to eliminate ME 120 (AutoCAD) course, and department started to offer ME 240 every semester including a summer session to satisfy student's demands.
"Early introduction of Matlab course (ME 319L) in the curriculum"	ME 319/319L is offered every semester including a summer session to make it easier for students to take this course before they advance to more engineering courses. The course consists of 1 cr. lecture and 1 cr. laboratory.
"Some complaints for teaching assistants from foreign countries"	We are trying to hire more graduates of US universities as TA's. Currently, more than a half of department fourteen TA's have B.S. degrees in USA.
"Lab equipment renovation in ME 315 and ME 302L"	We are continuously improving the undergraduate laboratories using both department overhead and special fee accounts. ME 315 (Thermo Lab) has experienced a steady improvement over last several years as shown in Figure 4.2 (e).
"Early introduction of the FE exam materials"	Currently, students are advised to take the FE exam two semesters before graduation since they must pass the exam to graduate. If they fail, the second trial must be made before graduation. This current policy is being debated in the department since it is highly probable for students to take the FE exam before they finish technical elective courses which are necessary to cover some of PM section of the FE exam.

*Some are already implemented and the others are on their way.

Table 4.5 shows a department long-term plan for improving undergraduate teaching laboratories. Most of funding comes from a special fee collected from each lab and department overhead account. This long-term plan is quite useful to place priority of spending available funds together with individual lab survey results (Figure 4.3) which shows any deficiency in individual lab instruction.

Table 4.5 Long-term plans for undergraduate laboratory improvement

Laboratory	2 Years	4 Years
ME 100L - Introduction to Mechanical and Aerospace Engineering Laboratory	• Implement a LEGO Mindstorms NXT programming guide to be used as a reference tool by students with no prior programming experience. • Improve the LEGO part selection and sensor selection to allow for robots of greater complexity and functionality to be created.	Create a series of challenges where each student group must design, build, and program a LEGO NXT robot to complete the challenge. The difficulty level would increase with each challenge, culminating in the final challenge and competition held at the end of the semester.

ME 302L - Mechanical Testing Lab	• Implement a camera system in the Tensile testing lab to allow for all students to witness the necking and deformation of the specimen as it is tested to failure. • Purchase a strain based deflectometer to be used in the Three Point Bending lab. A strain based device will tie into the existing data acquisition system which already collects strain gage and load cell data.	• Purchase a strain based 0 - 5,000 lb load cell to be used for compression or tensile testing at loading levels that the current 0 - 50,000 lb load cell can not accurately read due to the noise floor of the current load cell. • Implement a microphone and speaker system to allow the students to hear the explanations and instructions provided by the Teaching Assistants as labs are being introduced and performed.
ME 315 - Thermal Engineering Laboratory	Reclaim space in TBE B113 that was formally student lab space but is currently research space. This would provide for a uniform shaped area in which to lay out the various experiments performed by the students.	Upgrade or replace the manual data collection aspects of certain hardware with computer controlled data acquisition systems.
ME 337L - Engineering Measurements Laboratory	Purchase Six Quanser QNET Mechatronics Sensors Trainer boards (which plug into existing NI ELVIS stations). These units will increase the number of sensors that students are currently exposed to in this course and provide the ability to discuss topics such as sensor calibration, filter design, and sensor limitations.	Purchase the remaining Five Quanser QNET Mechatronics Sensors Trainer boards, which will provide a board for each NI ELVIS station located in this laboratory.
ME 380L - Fluid Dynamics Laboratory	• Repair existing hardware that was formally maintained by the Civil and Environmental Engineering Department. • Rewrite the lab experiments so that they are relevant to the material be taught in the lecture course.	Identify and purchase lab equipment that either is a direct replacement of current equipment or allows for complex fluid dynamic topics to be investigated by the students.
ME 421L - Automatic Controls Laboratory	• Purchase an additional Six Quanser QNET HVAC Trainer boards to provide a board for every NI ELVIS station located in this laboratory. • Rewrite the instructions for each lab so that they are uniform and up to date.	Purchase Six Quanser QNET Rotary Inverted Pendulum Trainer boards (which plug into existing NI ELVIS stations). These units will replace the single linear inverted pendulum experiment currently in use and will allow small groups of students access to the hardware instead of the entire class crowding around one experiment.

Criterion 8, Institutional Support

We hired a full-time Model Designer / Machinist, Mr. Kevin Nelson, in 2005. He is supposed to work with faculty members and students in designing experiments and prototypes. This machinist position requires the operation of CNC machine tools and CAD based rapid prototyping machine. In the same year, we also added the Laboratory Director (Mr. Jeff Markle) position which oversees all undergraduate and graduate laboratories with associated faculty mentors. Primary responsibilities of the position cover maintenance and development of undergraduate, graduate, and research laboratories. The duties of the laboratory director include:

- working with faculty members supervising undergraduate labs to upgrade and redesign experiments,
- preparing teaching assistants to conduct their duties,
- interacting with senior design students to help them build their prototypes
- consult graduate students working on setting experiments,
- help faculty develop and operate research laboratories, and
- installing, maintaining, debugging, and performing periodical maintenance and calibration of department equipment, computers, and software.

C. Summary of Improvements

Overall, the ME department has met or exceeded the expectations of our various constituents with respect to the undergraduate program as measured by various assessment methods of the program outcomes. We are continuously striving to upgrade the quality of the curriculum and upgrade educational laboratories. The following is a list of the major program improvements implemented since our last ABET visit:

(1) Integrated BS-MS Program: to provide high-achieving ME undergraduate students with the opportunity to be exposed to graduate courses and to encourage them to continue with graduate degrees.

(2) Mendenhall Innovation & Design Laboratory: The laboratory provides students hands-on activities added to normal coursework. Available to all college students, the lab provides a space for multidisciplinary senior design projects and undergraduate design team participating in national student competitions.

(3) New lab space for ME 100L: The new lab location is in the Classroom Complex where students can access the lab easily and has 1,000 sq. ft., which is ample space for their lab tasks.

(4) Separation of ME 380L with CEE: To maintain consistency between lecture materials and lab instruction, ME 380L is taught by ME teaching assistant and supervised by ME faculty.

(5) Laboratory Supervisor Appointment: Before the change, each undergraduate laboratory class has a faculty supervisor in a rotation basis. This has been changed to the system with a fixed appointment of faculty supervisors for each lab. The fixed system has been working much better since each supervisor can maintain a better continuity in laboratory instruction and facility improvement.

(6) A full-time Laboratory Director: A new laboratory director was hired to oversee all undergraduate and graduate laboratories with associated faculty mentors.

(7) Addition of 3 cr. mathematics elective: After the change, the program has 33 credit hours of mathematics and basic sciences.

(8) Completion of a new Science & Engineering Building (SEB): Some of our space problems have been solved with the completion of the new Science & Engineering Building (SEB)

(9) Faculty Mentoring: There was a concern in mentoring only junior and senior students in the program. Since 2005, the department has assigned all students including freshmen and sophomores to mentors.

(10) Fundamentals of Engineering (FE) Exam: The program change that requires passing the FE exam to graduate motivated students to consider the exam seriously, and to encourage them to take Professional Engineer (PE) exam after graduation. However, it is still in discussion whether we keep this change or not, since this change made some students to take the FE exam one semester earlier, which can increase the possibility of taking the exam without finishing necessary technical elective courses need for the PM subjects.

(11) Senior Design Project Competition: The College has been holding the annual Senior Design Competition sponsored by Mr. Fred and Harriet Cox. This sponsored event has the Dinner & Award Banquet where the best design projects are awarded by three externally invited judges from local industries. This event has motivated students significantly to pursue technology commercialization through their design project, and also increased their presentation skills through this open competition in public.

To maintain the quality of our program, we need to address the following issues:

- Hire additional outstanding faculty for developing a more diverse curriculum.
- Further utilization of the Student Advisory Board
- Continue to maintain and upgrade our educational laboratories
- Continue enhancing our assessment methods

CRITERION 5. CURRICULUM

A. Program Curriculum

A.1 Program Curriculum Overview

In our program, students are prepared for practice as a mechanical engineer through courses in mechanical engineering, electrical engineering, civil engineering, mathematics, science, humanity, social sciences, and arts. Table 5.1 shows the summary of the courses required by the program, and it satisfies the requirements specified in the Criterion 5 Curriculum in the 2010-2011 ABET Guideline. It should also be noted that there is a strong mapping between educational objectives, outcomes, and the curriculum as shown in Table 3.3.

Table 5.1 Summary of Courses Required by the Program

			Credit Hours	
Mathematics & Basic Science	Mathematics	MATH 181, 182, 283, 431, 4XX (math elective), ME 402	21	**Total: 33**
	Physics	PHYS 180/L, 182/L	8	
	Chemistry	CHEM 121	4	
Engineering Science & Design	Mechanical Engineering	ME 100, 100L, 242, 120(or 220 or 240), 301, 302, 302L, 311, 319/L, 314, 315, 320,330,337, 337L, 380, 380L, 421, 421L, 440, 453, 492 Senior Design: ME 497, 498 Technical Electives (6 cr)	57	**Total: 63**
	Civil Engineering	CEE 241	3	
	Electrical & Computer Eng	ECE 290	3	
General Education	English	ENG 101, 102, 231(or 232)	9	**Total: 31-33**
	Constitution	HIST 100 (or PSC 101)	4-6	
	Humanity	PHIL 242 and other approved courses	6	
	Fine Art	Approved fine art	3	
	Social Science	ECON 102, EGG 307, and other approved	9	
				Total: 127-129 credits

A.2 Mathematics and Basic Sciences Component

All graduates must complete six courses (21 hours) in mathematics including:

- Differential and integral calculus (MAT 181, MAT 182),
- Vectors, multivariable calculus, and partial derivatives (MAT 283),
- Mathematics for Engineers and Scientists I (MAT 431),

- Computational Method for Engineers (ME 402) ,
- Math elective (3 cr.)- Choice of
    - MATH 432, Mathematics for Engineers and Scientists II
    - MATH 488, Partial Differential Equations
    - STAT 463, Applied Statistics for Engineers
    - Or any other 400 level courses in math except MATH 466 and 467 (Numerical method)

These courses are selected to ensure that students have basic understanding of the mathematical basis of their engineering courses as well as their computational solutions (ME 402). Every student also completes four credit hours of chemistry (CHE 115) and two courses and two labs in physics (PHY 180, 180L, 182, and 182L) for a total of eight hours. These courses cover the basis of mechanics, fluid mechanics, thermodynamics, and optics. Collectively, the mathematics and basic sciences component of the program represents 33 credit hours which are consistent with Criterion 5 Curriculum, one year of a combination of mathematics and basic science. The followings are brief descriptions of these courses:

Chemistry (4 credits)

- **CHE 121, General Chemistry I.** The course covers fundamental principles of chemistry and their correlation with the properties of the elements. Three hours lecture and three hours laboratory. 4 credits.

Physics (8 credits)

- **PHYS 180**, **Physics for Scientists and Engineers I.** The course covers Lecture in Newtonian mechanics. Rectilinear motion, particle dynamics, work and energy, momentum and collisions, rotational mechanics, oscillations, wave motion, and gravitation. 3 credits.
- **PHY 180L**, **Physics for Scientists and Engineers Lab I.** The course covers laboratory exercises in Newtonian mechanics. Rectilinear motion, particle dynamics, work and energy, momentum and collisions, rotational mechanics, oscillations, wave motion, and gravitation. 1 credit.
- **PHY 182, Physics for Scientists and Engineers III.** The course covers fluid mechanics, thermodynamics, and optics. Sound, temperature and thermometry, heat, gases, intermolecular forces, kinetic theory, entropy, nature of light, geometrical optics, physical optics including diffraction and interference, introduction to modern developments. 3 credits.
- **PHY 182L Physics for Scientists and Engineers Lab III.** The course covers laboratory exercises in fluid mechanics, thermodynamics, and optics. Sound, temperature and thermometry, heat, gases, intermolecular forces, kinetic theory, entropy, nature of light, geometrical optics, physical optics including diffraction and interference, introduction to modern developments. 1 credit.

Mathematics (21 credits)

- **MATH 181, Calculus I.** The course covers Differentiation and integration of algebraic and transcendental functions, with applications. 4 credits.
- **MATH 182, Calculus II.** The course covers further applications and techniques of integration including integration by parts, sequences and series, polynomial approximations. 4 credits.
- **MATH 283, Intermediate Calculus.** The course covers vectors; differentiation and integration of vector valued functions; multivariable calculus; partial derivatives; multiple integrals and applications; line, surface and volume integrals; Green's theorem; divergence theorem; and Stoke's theorem. 4 credits.
- **MATH 431, Mathematics for Engineers and Scientists I.** The course covers first order linear and non-linear differential equations, second and higher order differential equations with constant

coefficients, Laplace transforms and applications, Gaussian elimination and eigenvalue problems, solutions of systems of differential equations. 3 credits.

- **ME 402, Computational Methods for Engineers.** The course covers Applied numerical analysis for linear and nonlinear engineering problems. Systems of linear equations, nonlinear equations, and eigen value problems. Approximate numerical integration and differentiation. Development of numerical methods for initial and boundary value problems of ordinary differential equations. Introduction to the numerical solution of partial differential equations. 3 credits.
- **MATH 4xx, Mathematics Elective** from the approved list, 3 credits

While our students are not required to take a course in statistics, they are introduced to statistics concepts in:

- **Introduction to Mechanical and Aerospace Engineering, ME 100**. Three weeks (6 classes) are devoted to quantitative analysis, interpolation, data sets containing uncertainties, and statistical methods. Students apply the concepts on example measurement data sets such as results from materials testing, and process control time series data. Students learn to perform best fit and regression analyses using spreadsheet and mathematics software.
- **Engineering Measurements, ME 337**. This course covers statistical topics including probability, statistical method, and uncertainty analysis: Treatment of measurement data using statistics; probability theory; finite statistics; curve fitting of measurement data and goodness of fit. They also cover uncertainty analysis using design stage and multiple measurement analysis; propagation of individual uncertainties to final measurement results using Taylor series.
- **ME 402, Computational Methods for Engineers.** Basic concepts in statistics such as means, standard deviation, standard error, variance, coefficient of variation, correlation coefficient, normal distributions, are introduced. Students are required to understand and calculate corresponding parameters.

Also, our students can take STAT 463, Applied Statistics for Engineers, as their Mathematics Elective course.

A.3 Engineering Topics

The program has a total of 63 credit hours of engineering topics, consisting of engineering sciences and engineering design. The engineering sciences have their roots in mathematics and basic sciences but extend knowledge towards engineering application. Engineering design is the process of devising a system, component, or process to meet desired needs. It is an iterative decision making process, in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

The following is the list of courses covering engineering topics in the program:

- Introduction to mechanical and aerospace engineering (ME 100)*
- Statics (CEE 241),
- Engineering dynamics (ME 242),
- Electrical circuits (ECE 290),
- Materials (ME 301),
- Mechanics of materials (ME 302),
- Engineering thermodynamics (ME 311),
- Heat transfer (ME 314),
- Mechanisms and dynamics of machines (ME 320),
- Analysis of Dynamic Systems (ME 330),

- Instrumentation and engineering measurements (ME 337)*,
- Fluid mechanics (ME 380),
- Mechanical design (ME 440)**
- Automatic controls (ME 421)*,
- FE exam preparation (ME 492),
- Mechanical vibration (ME 453), and
- Senior design project (ME 497 and ME 498)**
- Technical electives (6 credit hours)*

The following are laboratory classes covering the Engineering Science and Design components in the program:

- Introduction to mechanical and aerospace engineering lab (ME 100L) *
- CAD techniques (ME 120, ME 220, or ME 240),
- Introduction to programming for mechanical engineers (ME 319/L),
- Engineering measurements lab (ME 337L),
- Automatic controls lab (ME 421L),
- Mechanical Testing Laboratory (ME 302L),
- Thermal Engineering Laboratory (ME 315), and
- Fluid Dynamics Laboratory (ME 380L)

Collectively, the Engineering Sciences and Design component of the program represents 63 credit hours. It should be noted that the courses marked with '**' represent strong design component in the courses, and '*' is for the limited amount of design in the courses. For example, most of the technical elective courses have a limited design component in them as shown in the following table. The major thrust of the design component is to introduce students to design concepts and tools. It also presents students with advanced analysis techniques to help and optimize the design. The Design and Analysis component starts with ME 100 and ME 100L, which initiates students to the introduction of the engineering design process through the Lego robots design and programming. It ends with the senior design sequence course (ME 497 and ME 498), which are our capstone design courses.

Students are required to take six credits of engineering electives. Students must select and complete six credits from the approved list shown below. At least 1.5 design credits must also be completed.

ME Electives (2008-2010 Catalog)

		Design Credit	Credit Hours
Thermal-sciences			
ME 400	Intermediate Fluid Mechanics	1	3
ME 415	Design of Thermal Systems	1	3
ME 418	Air Conditioning Engineering Systems	2	3
ME 419	Advanced HVAC and Energy Conservation Systems	1	3
ME 455	Fundamentals of Nuclear Engineering	1	3
ME 456	Radioactive Waste Management	0	3
Mechanical Design and Manufacturing			
ME 345	Safety Engineering I	1/2	3
ME 426	Manufacturing Processes	1	3

ME 427 Manufacturing Systems	1	3
ME 430 Corrosion Engineering	0	3
ME 441 Advanced Mechanical Engineering Design	2	3
ME 443 Design Techniques in Mechanical Engineering	1	3
ME 450 Physical Metallurgy	1	3
ME 461 Introduction to Composite Materials	1	3
ME 470 Experimental Mechanics of Materials	1	3
CEE 478 Applied Finite Element Analysis	0	3
Robotics and Automation		
ME 425 Robotics	1	3
ME 426 Manufacturing Processes	1	3
ME 427 Manufacturing Systems	1	3
ME 429 Computer Control of Machines and Processes	1	3
ME 442 Advanced Mechanism Design	2	3
Mechanical and Environmental Systems		
ME 360 Safety Engineering I	1/2	3
ME 415 Design of Thermal Systems	2	3
ME 418 Air Conditioning Engineering Systems	1	3
ME 419 Advanced HVAC and Energy Conservation Systems	1	3
ME 434 Noise Control	1	3
CEE 452 Air Pollution Control Fundamentals	1 1/2	3
CEE 465 Fire Protection Engineering	2	3
Nuclear/Hazardous Waste Management		
ME 360 Safety Engineering I	1/2	3
ME 415 Design of Thermal Systems	2	3
ME 430 Corrosion Engineering	0	3
ME 450 Physical Metallurgy	1	3
ME 455 Fundamental of Nuclear Engineering	0	3
ME 456 Radioactive Waste Management	0	3
HPS 250 Interaction of Radiation with Matter	0	3
Aerospace Engineering		
ME 401 Gas Dynamics I	0	3
ME 402 Aerodynamics	1	3
ME 461 Introduction to Composite Materials	1	3
ME 470 Experimental Mechanics of Materials	1	3
Bioengineering		
ME 416 Introduction to Biomechanical Engineering	1	3
BIO 350 Comparative Vertebrate Anatomy	0	3
BIO 473 Advanced Topics in Cell and Molecular Biology	0	3
BIO 480 Introduction to Biological Modeling	0	3
KIN 346 Biomechanics	0	3
KIN 492 Clinical Exercise Physiology	0	3

A.4 General Education Core Component

The UNLV General Education Program is designed to help every student develop a broad intellectual background, gain familiarity with a variety of fields of knowledge, and acquire practical skills necessary for analyzing the culture and the world. Upon completion of the General Education core curriculum, students will be able to think critically and independently and so possess a foundation for life-long learning, professional success, and personal development.

Learning Outcomes of the General Education Core Curriculum

1. English Composition: Students will demonstrate effective written communication.
2. World Literature: Students will interpret and compare world literatures.
3. Constitutions: Students will interpret the U.S. and Nevada Constitutions in broad contexts.
4. Mathematics: Students will demonstrate quantitative reasoning skill.
5. Multicultural: Students will analyze contemporary cultures within the United States.
6. International: Students will demonstrate proficiency in a foreign language or explain how international cultures, societies, or political economics relate to complex, modern world systems.
7. Distribution Requirements:
    a. Humanities and Fine Arts: Students will critically analyze the relationships of aesthetics, ideas, cultural practices and values to historical and contemporary cultures.
    b. Social Sciences: Students will use the methods and models of the social sciences to analyze individual and group behaviors. Students will evaluate how policies affect individual and group behaviors.

To achieve these outcomes all students have to take courses in the following areas:

- English (9 credits),
- US and Nevada constitutional requirements (4-6 credits)
- Social sciences (9 credits)
- Fine arts (3 credits)
- Humanities (6 credits)

ME students are required to take ECON 102 (Microeconomics) and EGG 307 (Engineering Economics) as a part of the Social Sciences requirement. They also take PHI 242 (Ethics for Engineers) as a part of the Humanities requirement. Students must complete three-credit multi-cultural requirement and three-credit international requirement that simultaneously fulfill other general educational core requirements.

Collectively, the General Education Core component of the program represents 31-33 credit hours.

A.5 Culminating Design Experiences

Engineering design is distributed through the curriculum with culminating experiences in ME 497 and ME 498, the capstone design courses. The combination of breadth and multidisciplinary design work with other major engineering students can prepare students for their professional career and further study in the graduate college. ME 100 provides the beginning student a meaningful introduction to the discipline and the profession of mechanical engineering. It introduces students to the functions of an engineer, definition, tools, and problem solving techniques involving personal and team approaches and the engineering design process. The freshman design experience and the capstone design courses are of particular importance to the program. More detailed information about the engineering design component of the program is presented below.

Freshman Design Courses (ME 100 and ME 100L)

ME 100 provides beginning students a meaningful introduction to the discipline and the profession of mechanical engineering. By the end of the course, students should be familiar with the following:

Basic engineering calculations. Converting quantities from one set of units to another such as SI and US Customary and apply basic algebraic and geometrical concepts to solve simple technical problems.

Engineering Method. Approaching a technical problem employing the basic steps of the engineering method starting with an understanding of the problem and ending with a verification and check of results.

- Engineering Design. Awareness of the value of the engineering design process to develop effective engineering systems to meet a desired need. Engineering design process entails: basic knowledge, application of knowledge, and critical analysis
    - Information collection: Library and patent search
    - Idea generation: Multiple conceptual designs are required
    - Decision making: Based on evaluations and testing
    - Programming: Flow charts, branching, sensor-based decisions
    - Implementation: Merging all components and software into a functioning and competitive product
- Overview of Disciplines within Mechanical Engineering. Knowledge of the many facets of engineering such as statics, materials, fluids, vibrations, controls, kinematics, etc. as a result of especially designed seminars by various expert members of the faculty and laboratory experiences.

The companion lab (ME 100L) introduces student teams to hands-on practice of design and programming concepts using Lego Mindstorm kits to create various robotic vehicles. The lab ends with a competition between all design teams at the end of the semester.

ME 100L Lego Robot Competition (Fall 2008)

Capstone Design Courses (ME 497 and ME 498)

The ABET Criteria for Accrediting Engineering Programs specifies that, "*students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political*."

Two semester sequence, ME 497/498 Senior Design I and II courses for a total of 4 credit hours are mandatory for every ME student. In Senior Design I, the students achieve the following:

- Pick a project.
- Form teams with other students. Multi-disciplinary teams are highly encouraged at this stage.
- Seek a technical advisor from the department. Students are encouraged to select an additional industry advisor if needed.
- Formulate the problem and conduct a preliminary market study to recognize the needs (Who are the real customers? Who will buy the product? Is it profitable to develop the product? Is it feasible to develop the product?)
- Definition of the problem (problem statement, what this design is intended to accomplish – customers' requirements and design specifications, clearly outline the overall function that needs to be accomplished and provide sub-function descriptions);
- Gathering of information (history of the problem, any similar designs?)
- Design conceptualization (decompose the designs (3-5) into subsystems; start drawings - sketch) Compare several conceptual design alternatives using design matrix.
- Evaluate the 3-5 conceptual designs and choose the best design by feasibility, technology readiness, and decision matrix that includes technical requirements, costs, easy to produce, and product safety and liability, etc.
- Decompose design into components; Perform stress/strain/deformation analyses on the components of your design.
- Modify design based upon performance, cost, design for manufacture, and design for assembly.
- Produce layout drawings, assembly drawings, and some detailed drawings with dimensions and tolerances.
- Prepare weekly briefings that should be approved by their technical advisor and course coordinator.
- Present three oral progress reports throughout the semester.
- In formulating the problem, the students are required to consider economic, social and environmental design constraints if any. Depending on the project, the students also analyze safety issues associated with the project.

In the follow-up Senior Design II course, the students achieve the following:

- Order parts
- Modify the design of Senior Deign I if needed, document all the modifications made in ME498 for the design, provide engineering analysis to support the modifications;
- Prototype assembly and cost analysis

- Guidelines for product testing are developed (stating the goals of performance evaluation, testing methods, tools for measurement, and your plan to hear customers' comments)
- Test the prototype
- Assess results of testing
- Prepare weekly briefings that should be approved by their technical advisor and course coordinator.
- Present three oral progress reports throughout the semester.
- Make final oral, written and poster presentations. The report usually contains a discussion of safety, ethics, and other societal and environmental issues related to the project. The poster presentation is open to public.
- Three judges from the industry evaluate these projects as part of the senior design competition described under CRITERION3, Section F.2.6.

Students are expected to use appropriate engineering standards whenever they are relevant to their projects.

Senior Design Competition (Fall 2009)

Students working for Senior Design in Mendenhall Design Center

A brief summary of the design content in the required courses of the ME curriculum is presented below:

- **Introduction to Mechanical and Aerospace Engineering Lab, ME 100L.** This lab is in its entirety devoted to design. Students learn hands-on design for a specific objective (build a robotic vehicle that accomplishes an assigned objective). Students work in small teams. ME 100Lab Design Project components: Team work, project planning and execution, robotic vehicle construction and testing, robot programming and testing, reports, presentations; demonstrate team success in a final competition.
- **Mechanics of Materials, ME 302.** All students will participate in a group design project. Students select a project that must be approved by the instructor. Each group performs a preliminary design that includes: consideration of at least 3 different alternative solutions, analysis of strength and/or stiffness to determine safe dimensions and materials, estimate of cost to build a prototype, decision making process, and recommended design. Each group must make a formal progress presentation to the instructor about 3/4 through the design process. The instructor will have practicing engineers witness these presentations. The instructor and

practicing engineers will make recommendations to the group on how to complete their projects to get the best possible design and to get the best learning experience.

- **Mechanical Testing Lab, ME 302L.** All students will participate in a group project. The project group and topic are to be selected by each student by the sixth week of the semester. All topics must be approved by the Teaching Assistant. The groups must have between 2 and 4 members. Performing group lab projects related to class or extracurricular projects such as the HPV, high mileage vehicle, concrete canoe, or steel bridge is encouraged. The project should be a simple experiment that can be performed in 1-2 hours. The preparation, design of the experiment, gathering of materials, and selection of test fixtures will take longer. Students must submit a brief description of experimental plan to the TA for approval before conducting the experiment. The plan should clearly state the materials to be used, the fixtures needed, the test procedure, and the plan for analyzing the data. Lab projects must make use of the principles learned in ME 302 and must involve material testing using knowledge obtained in ME 302L. Projects are graded based on 200 points maximum for the written report, and 50 points maximum for the presentation.
- **Thermal Engineering Laboratory, ME 315.** As part of the lab assignments, and near the end of the course, students are asked to design either a component for an existing experiment or design a completely new experiment. Generally this is related to some hands-on experience they have had in the laboratory. Students are formed into groups of typically 3-4 people, and one design is required of each group. For example, students perform an energy balance on a heat exchanger as one of their experiments. The apparatus is small and is such that custom heat exchange units can be mounted in the general fixture. The student groups are asked to design a heat exchanger test unit of a particular type to fit the fixture. This involves both the mechanical and manufacturing design as well as the thermal design aspects to allow the determination of the heat exchanger effectiveness, or some other relevant quantities.
- **Dynamics of Machines, ME 320.** Projects account for 45% of the total grade. Projects are team-effort. Teams will be formed alphabetically unless there is a strong reason not to do so. Projects start with brief set of specifications of a machine followed by a lengthy discussion in class. Each group prepares a preliminary report, which includes all calculations and one or more sketch(s) explaining all components of their design. Preliminary report will be graded. After students receive the graded preliminary report, we will have another in-class discussion. Students prepare the final project that should be submitted at the specified deadline. Final project should address all design concerns listed in the graded preliminary reports. It should conform to the project format specified below. Students will get the Writing Center staff to review the projects before final submission. Engineering center staff will sign on the cover sheet to include that they reviewed it. No project without such indication will be accepted. Each student grades other team members as well as himself/herself, on a scale of 0 to 10, in three categories: technical abilities, team spirit, and promptness. Final project grade will be combination of preliminary report (30%), final report (60%), and self-evaluations (10%).
- **Fluid Dynamics Laboratory, ME 380L.** Each lab project starts with a brief lecture and discussion led by the TA. Projects include static fluid, the effect of the Reynolds number, flow rate and pressure measurements, determination of friction, water channel, and, designing pump. Projects are team-effort. Usually 3 or 4 students form a team. As part of a team, students will develop and run their own lab experiment utilizing the resources of the laboratory under the supervision of the TA. Students are required to prepare and submit their independent lab reports.
- **Automatic Controls, ME 421.** One third of the course (1 credit) is devoted to the design of controllers for automatic control systems. Students are required to successfully complete a design project as a condition for passing the course. Each project is assigned individually. Project assignments comprise: plant modeling, root locus and Bode plots, compensator design,

actuator specifications, and modeling of known nonlinearities. In a final report at the end of the semester-long design project, each student documents the results and the performance of several actuator choices in the control system. Details of the controls design project are posted at: http://me.unlv.edu/Undergraduate/coursenotes/control/design.pdf

- **Automatic Control Laboratory, ME 421L.** A total of 7 lab sessions (more than half of the semester) is devoted to controller design. Students cover time domain feedback system design (seven different experiments: DC Motor speed and position, hanging and upright pendulum, flow control by valve and pump, and temperature control) in seven labs.
- **Mechanical Engineering Design, ME 440.** Projects account for 35% of the total grade. Projects are team-effort. A design experience survey is conducted for all students to determine their level of proficiency with analytic skills, CAD skills, and fabrication skills. Teams are formed with an effort to distribute and balance the skill level of each team. There are two design projects each semester. The first one is simpler and is focused on analysis that corresponds with textbook material from the first half of the semester. The second project is the design of a more complex machine. In addition to the design reports, each group must design and fabricate a mechanism using the 3-D rapid prototype system in the machine shop.
- **Senior Design Project I and II, ME 497 and ME 498.** Students have to work in groups of two or more students. Individual projects are not allowed. Multi-disciplinary teams are strongly encouraged. Joint sessions are provided to senior design students of the three engineering departments (Mechanical Engineering, Electrical and Computer Engineering, and Civil and Environmental Engineering) at the beginning of each semester. We have already witnessed increasing number of our students who form multi-disciplinary groups with their counterparts in Electrical and Computer Engineering as well as Business Management. Students have to do a preliminary market study to justify the demand for their project in ME 497. Students are required to build and test prototypes in ME 498. A rigid list of deadline deliverables through the two semesters is included to ensure that students meet their final goals. All ME 498 students make oral and poster presentations to judges from industry at the end of each semester. In addition to their regular final presentations to their technical advisors and course instructor, they need to also display/demonstrate their prototypes to the judges. Their work is measured and ranked by judges with a pre-determined point system.

A brief summary of the design content in the elective courses of the ME curriculum is presented below:

- **Design of Thermal Systems**, **ME 415.** In the initial portions of this course students delve into the various aspects of design of process-type systems. While doing this they study choices of various fluid flow, heat transfer, and power system equipment, answering the questions: which of several choices of equipment (e.g. pumps) are most appropriate for a given application; what is the performance of these choices and how is it represented over a range of operating parameters; and what are the costs of these choices? Additional work focuses on the development and use of a simple cost-fitting functions to represent a range of sizes or other parameters pertinent to the designer. Also of interest is the application of historical data of this type, with introduction to how these costs are updated. Energy costs are also sought in the same format. This is followed by an introduction to process simulators (Gatecycle is available) and their application. Finally, simple optimization concepts are introduced in the final sections of this initial part of the course. For the last half of the class (approximately) group projects are assigned and pursued. The last time the course was offered there were five students involved, and all worked on the design of a combined cycle power plant to achieve certain performance goals. As part of the assignment, it was required to define a design that minimized cost of power subject to certain constraints in the design.

- **Air Conditioning Engineering Systems, ME 418**. This course has one credit of design. Students in this course are initially exposed to the methods of design of piping and selection of pumps after some preliminaries about how to calculate heating/cooling load calculations. Methods to estimate also infiltration loads were presented. A final design project that is assigned to each student is made in the form of a residential layout plan. The plan is scaled somewhat so that the objectives of the design are more realistic, i.e. the size of the house is increased so that a small chiller/boiler system can be used for it. The student is asked to calculate the cooling and heating loads and select a fan coil system to serve the cooling /heating needs in the various portions of the house. Deliverables of the design include:
    1. Select the fan coil units and support with some specs sheets.
    2. Select the piping system
    3. Select the pump, support with specification sheets
    4. Show a layout using appropriate CAD software as to how the piping system is laid out.
    5. Estimate average costs for the different components by contacting local contractors and HVAC technical sales people in the area.
    6. Present a written report with supporting documents at the end of the semester.
- **Advanced HVAC and Energy Conservation Systems, ME 419**. This course has one credit of design. Students in this course the students are initially exposed to the fundamentals of fan operations and the pressure drops in ducts amongst other things. As part of the design project, individual plans of residential houses are given to each student. The students are each asked to design a duct system for each of the houses. A multiplier is given to calculate the amount of CFM (cubic feet per minute) that is estimated to be delivered to each room. A final design project is required to cover the following:
    1. Layout the location of the AHU (Air Handling Unit) and line drawings of the ducts using the balanced capacity method.
    2. Select the duct dimensions and the size of fan needed subjected to not more than 0.5 inches water static pressure.
    3. Place all selected quantities using CAD software and overlaid on the house plan. Obtain estimates of the costs of the duct system installation and the cost of the fan by interacting with the local HVAC industry.
    4. Provide a written report at the end of the semester including detailed calculations of what has been completed.
- **Design of Manufacturing Systems, ME 427.** This class is designed to apply knowledge obtained from the Manufacturing Systems course to analyze the actual production activities of a local manufacturing company which is identified at the beginning of each semester. Studies will be focused on each step of the production flow, WIP control, material requirement, capacity, shop floor, and production quality control, etc. Students are required to design a different production flow structure by following Lean Manufacturing principles, or modify existing production flow pattern to improve production efficiency and to reduce production waste. A final report and presentation are required at the end of the project.
- **Computer Control of Machines and Processes, ME 429.** In this course students learn how to design discrete controllers based on the discrete model obtained from the dynamic equations of motion. Three main design criteria are used for controller design (1) desired input and output response (2) desired input and error relationship (3) desired disturbance rejection.
- **Advanced Mechanical Engineering Design, ME 441.** This course is a continuation of ME 440 (Mechanical Engineering Design). The covered material includes design of mechanical elements such as helical gears, springs, bearings, etc. Some mechanics of materials topics such as impact will also be covered. The course will introduce students briefly to the use of finite element analysis in mechanical design through the use of commercial software package, ALGOR. The course mainly deals with giving students hands-on design experience in real-life problems through a series of projects. The course will stress collaborative learning through group projects, which will be the major basis for evaluation. Projects account for 90% of the total grade.

- **Advanced Mechanism Design, ME 442.** Several topics will be addressed throughout the course including: cam design, synthesis of mechanisms, analysis of spatial mechanisms, and dynamics of engines. These concepts will be demonstrated through a series of projects that will show the basic process of designing and analyzing machines. Students will gain familiarity with using Mathcad, a computational tool in analyzing mechanisms. Additionally, students will use Working Model, a mechanical systems analysis tool. Projects account for 90% of the total grade.
- **Design Techniques in Mechanical Engineering, ME 443.** This course helps students understand the basic theory of finite element analysis, develop finite element equations for different systems, apply the knowledge gained to commercial finite element software, ALGOR, to solve real-life design problems. Students are required to do one project in the second half of the semester. Projects are team-effort. Teams will be formed alphabetically unless there is a strong reason not to do so. Projects start with brief set of specifications of a machine followed by a lengthy discussion in class. Each student grades other team members as well as himself/herself, on a scale of 0 to 10, in three categories: technical abilities, team spirit, and promptness. Projects account for 20% of the total grade.
- **Fundamentals of Nuclear Engineering, ME 455**. contains design content related to the design of nuclear reactors and radionuclide power sources. The design problems are rotated, but one example included the design of a small nuclear reactor to provide electricity to a remote lighthouse. The lighthouse that was modeled was actually powered by a decay source. The design project was open-ended, the students each prepared their own solution to the problem. The course also includes an analysis of the design of a reactor from the formation of the fuel to the configuration of a critical mass of enriched uranium.
- **High School Mentoring for Engineering Design, ME 460.** This is a unique course being offered to students that are interested in mentoring local high schools in the engineering design process. The UNLV Howard R. Hughes College of Engineering is hosting a regional 'FIRST Robotics Design Competition' for the sixth time on April 1-3, 2010. Ten Clark County high schools are registered to compete in 2010. The competitions involve the design and fabrication of a robotic vehicle that must perform tasks while working with and/or against competing robots. Each high school team receives a design kit and will have 6 weeks to design and build their robot. The teams are not limited to using materials and components supplied with the kits. The UNLV Mechanical Engineering Department is offering this course to help support the high school teams from southern Nevada. UNLV engineering students must meet with the high school students on a regular basis throughout this six-week period and help them in one or more of the following ways: get specialty parts designed and fabricated, make sound decisions about design options (Understand the design process), understand specific engineering design/analysis subjects: statics, machine design, robotics, materials, etc., prepare schedules and milestones for the 6-week period (Overall time management strategy), find resources: parts suppliers (donations and/or purchases), raw materials (steel, plastic, aluminum, etc.), machining or other fabrication services, etc., make plans for the competition day (suggest spare parts to bring, back-up plans, repair techniques, etc.).
- **Introduction to Composite Materials, ME 461.** This course provides a comprehensive introduction to composite materials that covers: materials, manufacturing methods, testing methods, analysis, and design. Students learn how to select the appropriate matrix and reinforcing materials for a particular application. They learn about different manufacturing and materials testing methods. They learn analysis methods for particle reinforced materials, unidirectional lamina materials, and multi-directional laminates. The students work together in groups on a semester-long design project. They must recommend a solution for a given design problem that includes: selection of materials and manufacturing process, recommended testing program, and analysis for strength and/or stiffness of their composite component.

- **Vehicle Design Projects, ME 462.** Students design and build a vehicle for entry into a national or regional collegiate competition such as Mini-Baja or Human Powered Vehicle. Design topics may include structural analysis, composite materials, aerodynamics, engine performance, occupant safety, drive train, suspension systems, project management, team building, technical report writing, and oral presentations.
- **Experimental Mechanics of Materials, ME 470.** This is primarily a laboratory class. Students fabricate and test a variety of different materials to determine elastic and strength properties needed for design of components. Students learn sample preparation techniques, standardized materials characterization methods, technical report writing, and experimental design. Students work in groups all semester. Laboratory reports are written in groups. All students must participate in a semester-long project. They must propose a materials characterization or component test experiment, design the experiment, perform it and write a report. Many of these projects are related and support other design projects that students are working on in other classes such as senior design.

A.6 Cooperative Education

While the students in our program are encouraged to participate in internships and cooperative education, participation is not a requirement for graduation. The following table shows the five-year cumulative graduate exit interview results from 2005 to 2009. The results indicate that the majority of our graduate has the cooperative education experiences during their undergraduate education.

Table 5.2 Cumulative Summary of Exit Interview for Post-Graduate Survey from Spring 2005 to Spring 2010 (All units are in percentage (%))

Semester **Post-Graduate Survey**	Sp 2005	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010	Cumulative Average
1. Are you currently employed or do you have an employment offer?	71.4	75.0	100.0	76.9	16.7	62.5	61.1	78.6	68.4	70.0	63.6	68.1
2. Is your employment related to Mechanical Engineering?	83.3	75.0	60.0	58.3	50.0	80.0	100.0	76.9	75.0	66.7	62.5	72.5
3. Did you have an internship while your were student at UNLV?	71.4	100.0	90.0	85.7	50.0	87.5	83.3	73.3	65.0	80.0	72.7	78.6
3.a. Was your internship with a local firm/organization?	60.0	0.0	66.7	63.6	100.0	85.7	92.9	91.7	91.7	80.0	75.0	73.2
3.b Was it related to your field of study?			87.5	81.8	100.0			66.7	92.3	100.0	75.0	88.0
3.c. Was your internship with a research project within the department?	60.0	100.0	44.4	54.5	0.0	14.3	33.3	22.2	23.1	40.0	25.0	39.2
3.d. Is your employment a result of an internship?	50.0	100.0	30.0	27.3	33.3	66.7	25.0	50.0	41.2	11.1	22.0	43.5
4. Are you planning to pursue a graduate degree?	100.	75.0	77.8	78.6	57.1	87.5	70.6	92.9	82.4	87.5	78.0	80.9
5. If so, have you applied?	60.0	75.0	25.0	50.0	25.0	0.0	33.3	35.7	41.2	10.0	30.0	35.5

A.7 Additional Materials Available for Review during the Visit

The following materials will be available for review during the visit:

> Course Binders: Each course will have a separate binder that includes a syllabus, sample student work, textbooks, and any handouts. Also, electronic form of the course materials will be available for review.
>
> Assessment Binders: A separate binder will be available for data obtained for the assessment processes discussed in Criterion 3.
>
> Program Documents: Program flyer, Teaching evaluation sheet, Flow chart, and current catalog.
>
> On-line Materials: University website, College website, Mechanical Engineering website including ABET preparation website.

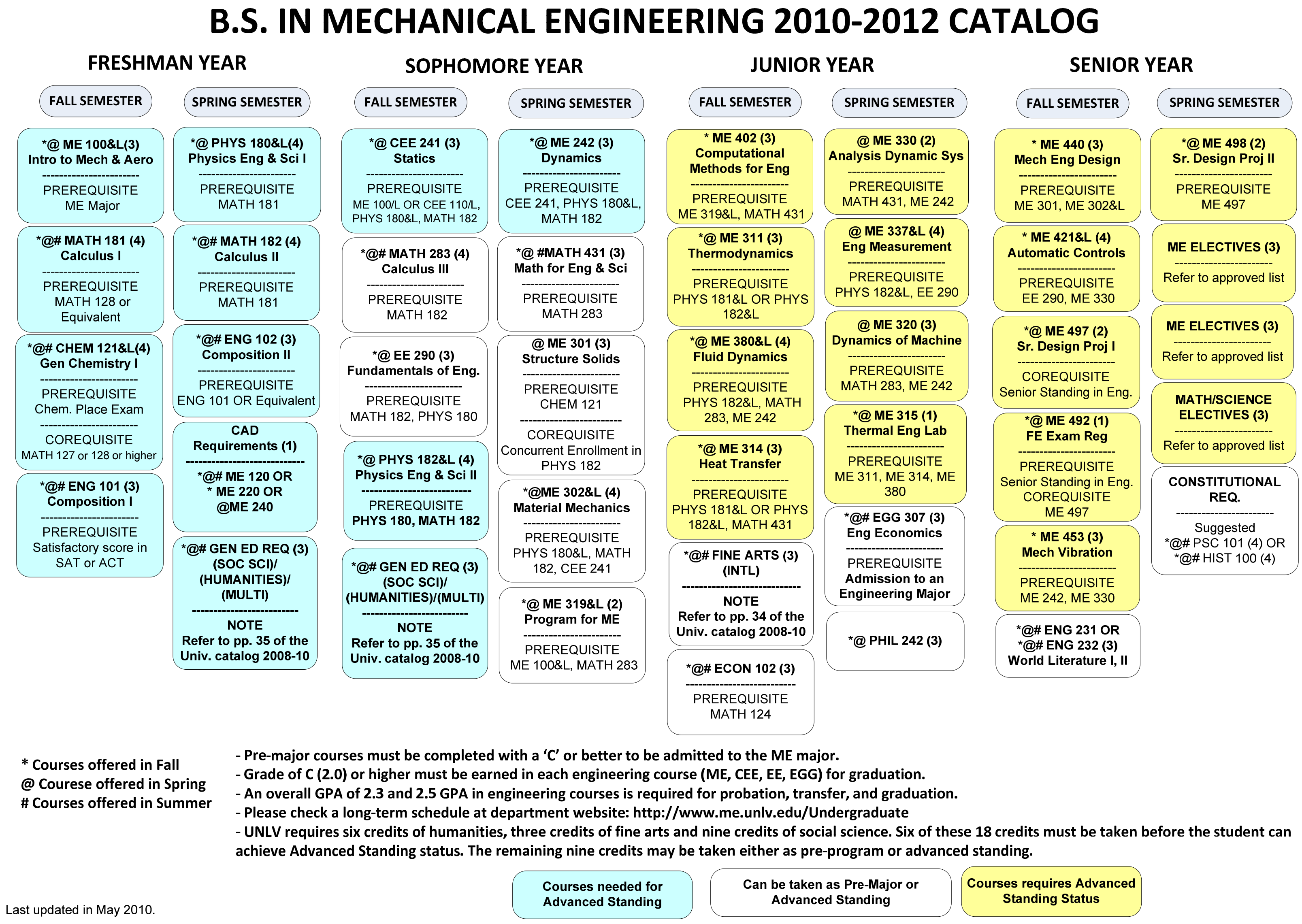
B. Prerequisite Flow Chart

Figure 5.1 is a flowchart which shows us prerequisites for all classes in the ME program. All prerequisites are listed in under the course name. This flow chart also can be found in http://me.unlv.edu/current/course_flowchart.html.

C. Course Syllabi

In Appendix A, include a syllabus for each course used to satisfy the mathematics, science, and discipline-specific requirements. Each syllabus includes a table showing its relationship to the Criterion 3, Educational Outcomes. The format of the syllabus is consistent and it includes the following information:

- Department, course number, and title of course
- Designation as a Required or Elective course
- Course (catalog) description
- Prerequisites
- Textbook(s) and/or other required material
- Course learning outcomes
- Topics covered
- Class/laboratory schedule, i.e., number of sessions each week and duration of each session
- Contribution of course to meeting the requirements of Criterion 5
- Relationship of course to Program Outcomes
- Person(s) who prepared this description and date of preparation



B.S. IN MECHANICAL ENGINEERING 2010-2012 CATALOG

FRESHMAN YEAR

FALL SEMESTER

***@ ME 100&L(3)**
Intro to Mech & Aero
PREREQUISITE
ME Major

***@# MATH 181 (4)**
Calculus I
PREREQUISITE
MATH 128 or Equivalent

***@# CHEM 121&L(4)**
Gen Chemistry I
PREREQUISITE
Chem. Place Exam
COREQUISITE
MATH 127 or 128 or higher

***@# ENG 101 (3)**
Composition I
PREREQUISITE
Satisfactory score in SAT or ACT

SPRING SEMESTER

***@ PHYS 180&L(4)**
Physics Eng & Sci I
PREREQUISITE
MATH 181

***@# MATH 182 (4)**
Calculus II
PREREQUISITE
MATH 181

***@# ENG 102 (3)**
Composition II
PREREQUISITE
ENG 101 OR Equivalent

CAD
Requirements (1)
***@# ME 120 OR**
*** ME 220 OR**
@ME 240

***@# GEN ED REQ (3)**
(SOC SCI)/
(HUMANITIES)/
(MULTI)
NOTE
Refer to pp. 35 of the Univ. catalog 2008-10

SOPHOMORE YEAR

FALL SEMESTER

***@ CEE 241 (3)**
Statics
PREREQUISITE
ME 100/L OR CEE 110/L, PHYS 180&L, MATH 182

***@# MATH 283 (4)**
Calculus III
PREREQUISITE
MATH 182

***@ EE 290 (3)**
Fundamentals of Eng.
PREREQUISITE
MATH 182, PHYS 180

***@ PHYS 182&L (4)**
Physics Eng & Sci II
PREREQUISITE
PHYS 180, MATH 182

***@# GEN ED REQ (3)**
(SOC SCI)/
(HUMANITIES)/(MULTI)
NOTE
Refer to pp. 35 of the Univ. catalog 2008-10

SPRING SEMESTER

***@ ME 242 (3)**
Dynamics
PREREQUISITE
CEE 241, PHYS 180&L, MATH 182

***@ #MATH 431 (3)**
Math for Eng & Sci
PREREQUISITE
MATH 283

@ ME 301 (3)
Structure Solids
PREREQUISITE
CHEM 121
COREQUISITE
Concurrent Enrollment in PHYS 182

***@ME 302&L (4)**
Material Mechanics
PREREQUISITE
PHYS 180&L, MATH 182, CEE 241

***@ ME 319&L (2)**
Program for ME
PREREQUISITE
ME 100&L, MATH 283

JUNIOR YEAR

FALL SEMESTER

*** ME 402 (3)**
Computational Methods for Eng
PREREQUISITE
ME 319&L, MATH 431

***@ ME 311 (3)**
Thermodynamics
PREREQUISITE
PHYS 181&L OR PHYS 182&L

***@ ME 380&L (4)**
Fluid Dynamics
PREREQUISITE
PHYS 182&L, MATH 283, ME 242

***@ ME 314 (3)**
Heat Transfer
PREREQUISITE
PHYS 181&L OR PHYS 182&L, MATH 431

***@# FINE ARTS (3)**
(INTL)
NOTE
Refer to pp. 34 of the Univ. catalog 2008-10

***@# ECON 102 (3)**
PREREQUISITE
MATH 124

SPRING SEMESTER

@ ME 330 (2)
Analysis Dynamic Sys
PREREQUISITE
MATH 431, ME 242

@ ME 337&L (4)
Eng Measurement
PREREQUISITE
PHYS 182&L, EE 290

@ ME 320 (3)
Dynamics of Machine
PREREQUISITE
MATH 283, ME 242

***@ ME 315 (1)**
Thermal Eng Lab
PREREQUISITE
ME 311, ME 314, ME 380

***@# EGG 307 (3)**
Eng Economics
PREREQUISITE
Admission to an Engineering Major

***@ PHIL 242 (3)**

SENIOR YEAR

FALL SEMESTER

*** ME 440 (3)**
Mech Eng Design
PREREQUISITE
ME 301, ME 302&L

*** ME 421&L (4)**
Automatic Controls
PREREQUISITE
EE 290, ME 330

***@ ME 497 (2)**
Sr. Design Proj I
COREQUISITE
Senior Standing in Eng.

***@ ME 492 (1)**
FE Exam Reg
PREREQUISITE
Senior Standing in Eng.
COREQUISITE
ME 497

*** ME 453 (3)**
Mech Vibration
PREREQUISITE
ME 242, ME 330

***@# ENG 231 OR**
***@# ENG 232 (3)**
World Literature I, II

SPRING SEMESTER

***@ ME 498 (2)**
Sr. Design Proj II
PREREQUISITE
ME 497

ME ELECTIVES (3)
Refer to approved list

ME ELECTIVES (3)
Refer to approved list

MATH/SCIENCE ELECTIVES (3)
Refer to approved list

CONSTITUTIONAL REQ.
Suggested
*@# PSC 101 (4) OR
*@# HIST 100 (4)

*** Courses offered in Fall**
@ Courease offered in Spring
 # Courses offered in Summer

- **Pre-major courses must be completed with a 'C' or better to be admitted to the ME major.**
- **Grade of C (2.0) or higher must be earned in each engineering course (ME, CEE, EE, EGG) for graduation.**
- **An overall GPA of 2.3 and 2.5 GPA in engineering courses is required for probation, transfer, and graduation.**
- **Please check a long-term schedule at department website: http://www.me.unlv.edu/Undergraduate**
- **UNLV requires six credits of humanities, three credits of fine arts and nine credits of social science. Six of these 18 credits must be taken before the student can achieve Advanced Standing status. The remaining nine credits may be taken either as pre-program or advanced standing.**

🟦	**Courses needed for Advanced Standing**
⬜	**Can be taken as Pre-Major or Advanced Standing**
🟨	**Courses requires Advanced Standing Status**

Last updated in May 2010.

Figure 5.1 Course Flowchart

Table 5-3 Curriculum

Bachelor of Science-Mechanical Engineering

Year; Semester	Course (Department, Number, Title)	Category (Credit Hours)			
		Math & Basic Sciences	Engineering Topics *Check if Contains Significant Design (✓)*	General Education	Other
Freshman Fall Semester	ME 100/L Introduction to Mechanical & Aerospace Engineering/Lab		3		
	MATH 181 Calculus I	4			
	CHEM 121 General Chemistry I	4			
	ENG 101 Composition I			3	
Freshman Spring Semester	PHYS 180/L Physics for Scientists & Engineers I	4			
	MATH 182 Calculus II	4			
	ENG 102 Composition II			3	
	CAD Requirement ME 120, 220, or 240		1		
	Social Science or Humanity			3	
Sophomore Fall Semester	CEE 241 Statics		3		
	MATH 283 Calculus III	4			
	ECE 290 Fundamentals of Engineering		3		
	PHYS 182/L Physics for Scientists & Engineers III	4			
	Social Science or Humanity			3	
Sophomore Spring Semester	ME 242 Dynamics		3		
	MATH 431 Mathematics for Engineers & Scientists	3			
	ME 301 Structure and Properties of Solids		3		
	ME 302/L Material Mechanics		4		
	ME 319/L Intro Program for Mechanical Eng		2		
Junior Fall Semester	ME 402 Computational Methods for Engineers	3			
	ME 311 Thermodynamics I		3		
	ME 380/L Fluid Dynamics for Mechanical Engineers		4		
	ME 314 Intro to Heat Transfer		3		
	Fine Arts class from the approved list			3	
	Social Science (ECON 102 Principles of Microeconomics)			3	
Junior Spring Semester	ME 330 Analysis of Dynamic Systems		2		
	ME 337/L Engineering Measurements/Lab		4		
	ME 320 Dynamics of Machines		3		
	ME 315 Thermal Engineering Lab		1		
	EGG 307 Engineering Economics			3	

	Humanity (PHIL 242 Ethics for Eng & Scientists)			3	
Senior Fall Semester	ME 440 Mechanical Engineering Design		3(√)		
	ME 421/L Automatic Controls		4		
	ME 497 Senior Design Project I		2(√)		
	ME 492 FE Exam Preparation		1		
	ME 453 Mechanical Vibrations		3		
	ENG 231(or 232) World Literature I or II			3	
Senior Spring Semester	ME 498: Senior Design Project II		2(√)		
	ME technical elective I[7]		3		
	ME technical elective II[1]		3		
	MATH 4XX (Math elective)	3			
	Constitutional Requirement (PSC 101/HIST 100: Introduction to American Politics/ Historical Issues)			4-6	
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		33	63	31-33	
OVERALL TOTAL FOR DEGREE	127-129				
PERCENT OF TOTAL		26.0%	49.6%		
Totals must satisfy one set	Minimum semester credit hours	32 hrs	48 hrs		
	Minimum percentage	25%	37.5 %		

Instructional material and student work verifying course compliance with ABET criteria for the categories indicated above will be prepared during the campus visit.

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[7] Most of technical elective courses contain engineering design credits

Table 5-4. Course and Section Size Summary

Bachelor of Science-Mechanical Engineering

	Course No.	Title	Responsible Faculty Member	No. of Sections Offered (Semester)	Avg. Section Enrollment (Semester)			
						Lecture[1]	Lab[1]	Other[1]
Required Courses that are Taught Every Semester	ME 100	Introduction to Mechanical and Aerospace Engineering	Georg Mauer	2-Lecture (Fall 09)	64 11 (Dist. Edu)	100%		
	ME 100L	Introduction to Mechanical and Aerospace Engineering Laboratory	Georg Mauer	4-Lab (Fall 09)	16.8		100%	
	ME 120	Introduction to AUTOCAD	Zhiyong Wang	1-Lab (Fall 09)	30		100%	
	ME 242	Dynamics	Georg Mauer	1-Lecture (Fall 09)	40	100%		
	ME 302	Materials Mechanics	Brendan O'Toole	1-Lecture (Fall 09)	26	100%		
	ME 302L	Mechanical Testing Laboratory	Brendan O'Toole	2-Lab (Fall 09)	12.5		100%	
	ME 311	Engineering Thermodynamics I	Robert Boehm	1-Lecture (Fall 09)	56	100%		
	ME 314	Introduction to Heat Transfer	Samir Moujaes	1-Lecture (Fall 09)	11	100%		
	ME 315	Thermal Engineering Laboratory	Yitung Chen	2-Lab (Fall 09)	9		100%	
	ME 319/L	Introduction to Programming for Mechanical Engineers	Woosoon Yim	1-Lecture (Fall 09) 1-Lab (Fall 09)	12 12	50%	50%	
	ME 380	Fluid Dynamics for Mechanical Engineers	Yitung Chen	1-Lecture (Fall 09)	12	100%		
	ME 380L	Fluid Dynamics Laboratory	Hui Zhao	1-Lab (Fall 09)	12		100%	
	ME497	Senior Design Project I	Zhiyong Wang	1-Lecture (Fall 09)	24	100%		
	ME498	Senior Design Project II	Zhiyong Wang	1-Lecture (Fall 09)	12	100%		
Required Courses that are Taught Every Other	ME 301	Structure and Properties of Solids	Dan Cook	1-Lecture (Spring 09)	21	100%		
	ME320	Dynamics of Machines	Mohamed Trabia	1-Lecture (Spring 09)	40	100%		
	ME 330	Analysis of Dynamic Systems	Woosoon Yim	1-Lecture (Spring 09)	45	100%		
	ME 337	Engineering Measurements	Woosoon Yim	1-Lecture (Spring 09)	10	100%		
	ME 337L	Engineering Measurements Laboratory	Woosoon Yim	3-Lab (Spring 09)	3		100%	
	ME 402	Computational Methods for Engineers	Darrell Pepper	1-Lecture (Fall 09)	40	100%		
	ME 421	Automatic Controls	Georg Mauer	1-Lecture (Fall 09)	54	100%		
	ME 421L	Automatic Controls Laboratory	Georg Mauer	3-Lab (Fall 09)	17.7		100%	
	ME 440	Mechanical Engineering Design	Mohamed Trabia	1-Lecture (Fall 09)	45	100%		
	ME 453	Mechanical Vibrations	Douglas Reynolds	1-Lecture (Fall 09)	47	100%		

Other Undergraduate Courses	ME 130	Machine Shop Practices	Kevin Nelson	1-Lab (Fall 09)	10		100%	
	ME 230	Principles of CNC	Kevin Nelson	1-Lab (Spring 09)	4		100%	
	ME 220	3D Modeling with Pro Engineering	Zhiyong Wang	1-Lecture (Fall 09)	10		100%	
	ME 240	3D Modeling with Solidworks	Zhiyong Wang	1-Lecture (Spring 09)	15		100%	
	ME 400	Intermediate Fluid Mechanics	Yitung Chen	1-Lecture (Fall 08)	7	100%		
	ME 415	Design of Thermal Systems	Robert Boehm	1-Lecture (Spring 09)	14	100%		
	ME 416	Intro to Biomechanical Engineering	Hui Zhao	1-Lecture (Spring 09)	3	100%		
	ME 417	Introduction to Fuel Cell	Yitung Chen	1-Lecture (Spring 09)	11	100%		
	ME 418	Air Conditioning Engineering Systems	Samir Moujaes	1-Lecture (Spring 09)	6	100%		
	ME 419	Adv. HVAC and Energy Conservation Systems	Samir Moujaes	1-Lecture (Fall 09)	2	100%		
	ME 425	Robotics	Woosoon Yim	1-Lecture (Fall 09)	13	100%		
	ME 426	Manufacturing Processes	Zhiyong Wang	1-Lecture (Spring 09)	4	100%		
	ME 427	Manufacturing Systems	Zhiyong Wang	1-Lecture (Fall 08)	11	100%		
	ME 429	Computer Control of Machines & Processes	Woosoon Yim	1-Lecture (Fall 07)	5	100%		
	ME 434	Noise Control	Douglas Reynolds	1-Lecture (Spring 09)	9	100%		
	ME 443	Design Techniques in Mechanical Engineering	Mohamed Trabia	1-Lecture (**)		100%		
	ME 441	Advanced Mechanical Engineering Design	Mohamed Trabia	1-Lecture (**)		100%		
	ME 446	Composite Materials	Brendan O'Toole	1-Lecture (Spring 09)	8	100%		
	ME 455	Fundamentals of Nuclear Engineering	William Culbreth	1-Lecture (Fall 09)	7	100%		
	ME 460	High School Mentoring for Engineering Design	Brendan O'Toole	1-Lecture (Spring 09)	2	100%		
	ME 462	Vehicle Design Projects	Brendan O'Toole	1-Lecture (Spring 09)	5	100%		
	ME 470	Experimental Mechanics of Materials	Brendan O'Toole	1-Lecture (??)	5	100%		
	ME 480	Gas Dynamics	William Culbreth	1-Lecture (Spring 09)	8	100%		
	ME 482	Aerodynamics	William Culbreth	1-Lecture (Fall 08)	11	100%		
	ME 492	FE Exam Preparation	Zhiyong Wang	1-Lecture (Fall 09)	13			
	ME 495	Fire Protection Engineering	Amy Cheng[2]	1-Lecture (Spring 09)	9	100%		
	ME 495	Metal Cutting	Vellore Venkatesh	1-Lecture (Fall 09)	10	100%		

[1] Percentage for each type of class for each course [2] Part-time instructor

CRITERION 6. FACULTY

A. Leadership Responsibilities

As with other programs in the College of Engineering, the Mechanical Engineering Department is led by a Chair. One of the Chair's primary responsibilities is to nurture young faculty and to provide an environment in which all faculty can thrive professionally. This implies responsibilities associated with resources and scheduling that impact faculty time. Responsibilities include budget, fundraising, advising students, class scheduling, retention, promotion/tenure, faculty hire, laboratory renovation (undergraduate), and the other issues related to faculty and students. The Chair is also a member of college's executive committee, and also attends the ADS (Administrative Development Seminar) every month organized by the Provost Office.

The administrative structure of the department is shown below in Figure 6-1. The department is chaired by Dr. Woosoon Yim. He is assisted by Dr. Brendan O'Toole, the Graduate Coordinator and Dr. Georg Mauer, the Undergraduate Coordinator, and various committees. The department office is maintained by one full-time staff member, Ms. Joan Conway. Mr. Kevin Nelson is in charge of the department machine shop as a Model Designer and Machinist, and all department laboratories, especially undergraduate teaching laboratories, are managed by Mr. Jefferey Markle, Laboratory Director.

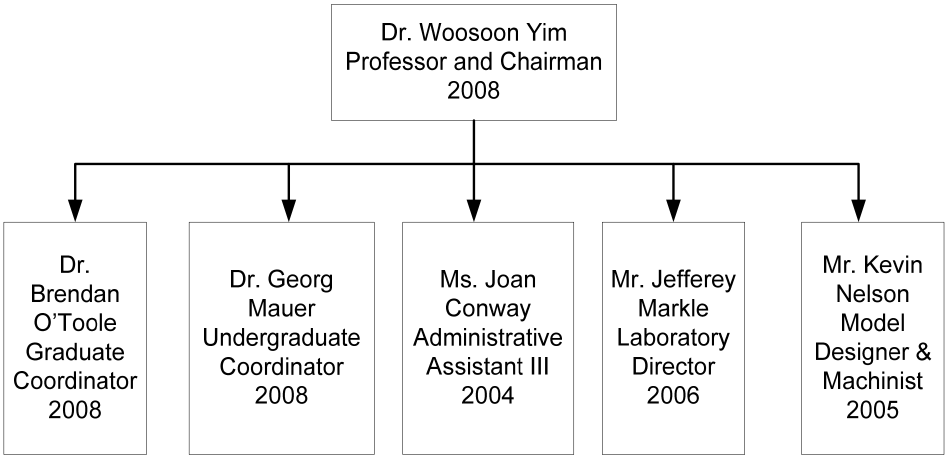

Figure 6-1 Administrative Structure of Mechanical Engineering Department

B. Authority and Responsibility of Faculty

All curriculum changes typically begin with faculty and are then reviewed at the department, college, and university level. These multiple levels of review provide well-defined courses in terms of technical content and needs by the curriculum. All course creation and change forms are available from the website of the faculty senate curriculum committee (http://www.unlv.edu/committees/curriculum/), and must elaborate the learning outcomes and assessment methods. The Department designates one faculty member for the college curriculum committee to represent the department, and the committee chair represents the college for the university committee. A department administrative structure including different committee memberships is shown in the department website at http://me.unlv.edu/info/dept_admin.html.

The review at the department level typically address resources and suitability in the curricular fit with respect to the program outcomes and assessment results. College-level review addresses any curricular overlap with other programs in the college that may exist. The university-level curriculum review is accomplished by the faculty senate curriculum committee. This committee primarily focuses on issues of content overlap between colleges, and clarity of course descriptions and course assessment methods.

All courses in the program have a designated course coordinator. This coordinator is responsible for maintaining the ABET Course Syllabus. This coordinator is also responsible for any course modifications and textbook choices as well as reviewing the student's comments in the end of semester course evaluation. The course coordinator is a key in assessing and suggesting any improvement in the course.

C. Faculty Composition

Faculty composition, size, credentials, experience, and workload are shown in Table 6-1 and 6-2.

D. Faculty Competencies

In terms of undergraduate instructional areas, faculty can be divided into four major areas as can be seen in Figure 6-2. The distribution of faculty in these four areas is adequate to meet curricular needs. Several faculty members teach courses in more than one instructional area, which results in exposing students to different ideas and teaching styles.

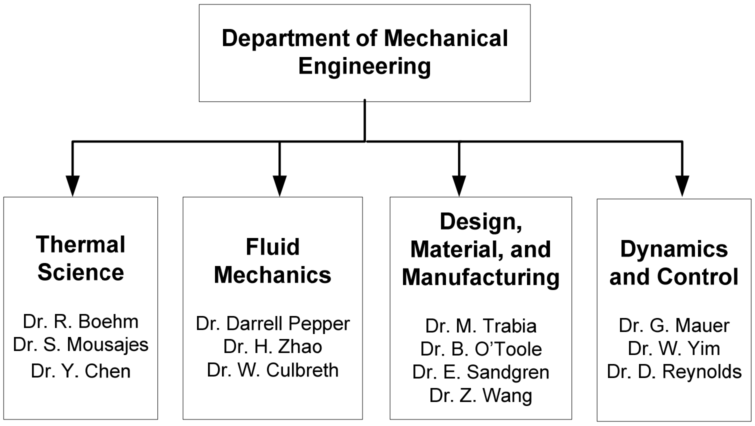

Figure 6-2. Areas of Instruction in the Department

Our faculty members undergo continuous professional development process through several methods including:

1. Involvement in professional societies, primarily ASME (American Society Of Mechanical Engineers), ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers), and AIAA (American Institute of Aeronautics and Astronautics).
2. Participation in funded and unfunded research projects. The level of this activity is demonstrated by continuous growth in research awards and research expenditures.

Faculty members are also active in publishing the results of their research activities in technical journals and conferences.

3. Three faculty members are licensed professional engineers.
4. Faculty members participate in consulting, on a limited basis, with local and national companies in their respective fields of specialization.
5. Several faculty members are active in innovating mechanical engineering curriculum. Table 6.1 lists some of the recent publications of ME faculty in this area.
6. Several faculty members are active in obtaining funding to support various curricular development projects. Table 6.2 lists some of the recent funded grants of ME faculty in this area.

While ME faculty members are active in research, they also interact with students in variety of venues outside and inside classroom. Faculty serves as advisors for several engineering societies, e.g. ASME, ASHRAE, and ANS (American Nuclear Society). The Student Advisory Board communicates concerns of students to the department regularly. Faculty is also active performing service within the department, college, university, and professional societies.

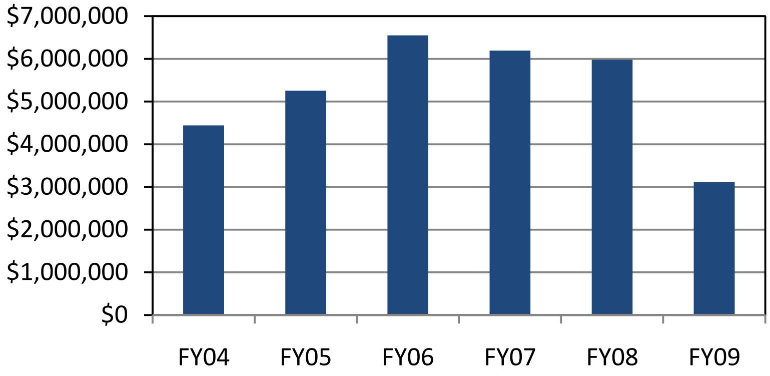

Figure 6-3 Sponsored Research Activity Research Expenditure Data for Mechanical Engineering Program

Table 6.1 List of Engineering Education Publications of ME Faculty

Year	Author and Title of Publication
Pre-2006	• J. O'Toole, Ed., "Preparing Engineers for a Global Workplace", Proceedings of the Annual Meeting and Conference of the American Society for Engineering Education Pacific Southwest Section, Las Vegas, NV, March 1999. • R. Boehm, "Direct Contact Heat Transfer," Chapter 19 in HANDBOOK OF HEAT TRANSFER (edited by A. Bejan and A. Kraus), John Wiley and Sons Publishers, 2003. • R. Boehm, "Conduction Heat Transfer," Section 4.1 in THE CRC HANDBOOK OF MECHANICAL ENGINEERING, SECOND EDITION (F. Kreith and Y. Goswami, eds), 2005.
2006	• D. P. Cook and R. Wysocki: "Materials Science and Fabrication Techniques in the Entertainment Industry: A Collaboration Between Fine Arts and Engineering", Proceedings of IMECE06, ASME, 2006. • Pepper, D. W. and J. C. Heinrich (2006): The Finite Element Method: Basic Concepts and Applications, Taylor and Francis, New York, NY, 2nd Ed

2007	• D. P. Cook, ``Thermal Tug-O-War: A Competitive, Hands-on Approach to Learning Basic Heat Exchanger Design", 2007 ASME IMECE, Seattle, Washington, November, 2007. • D. P. Cook, R. Robinson and M. Genova, ``Comparison of Analytical, Numerical, and Experimental Results for A Simplified CPU/Heatsink Model", 2007 ASME IMECE, Seattle, Washington, November, 2007. • M. Trabia and K. Nelson, "Incorporating Rapid Prototyping Machine in Teaching Mechanical Engineering Design," 2007 ASME International Mechanical Engineering Congress and Exposition, Seattle, Washington, November 2007. • College-wide Senior Design Competition: A Motivating Approach", Proceedings of the National Capstone Design Course Conference, Boulder, Co, June, 2007
2008	• D. P. Cook and R. Wysocki: ``Creativity in Engineering: Entertainment Engineering and Design", Design Principles and Practices: An International Journal, Vol. 2, pp. 87-98, 2008.
2009	• Y. Chen, "Computational Partial Differential Equations using MATLAB," ISBN: 978-1-4200-8904-2, 2009 by Taylor & Francis Group, LLC. • Pepper, D. W. and D. B. Carrington (2009): Modeling Indoor Air Pollution, Imperial College Press, London, UK.

Table 6.2 List of Engineering Education Funding of ME Faculty

Year	Investigators, Title, and Sponsor
Pre-2007	N/A
2008	*Automation Bootcamp, NASA, $160,00, PI: Daniel Cook* *NSF REU Supplement Funding RI, $18,00, PI: Woosoon Yim*
2009	*Hands-on Automation and Controls Laboratory Development, NASA, $14,500: Daniel Cook* *NSF REU Supplement Funding RI, $12,000, PI: Woosoon Yim*

E. Faculty Size

During the year 2009-2010, the Department of Mechanical Engineering had thirteen faculty members as shown in Table 6.3 including Dr. William Culbreth who is an Associate Dean of the College of Engineering and teaches one course each semester. The department has nine full professors, two associate professors, and two assistant professors. Dr. E. Sandgren is a new member of the department from July 1, 2010. He just finished the College of Engineering Deanship, however he is not listed in this section or in the corresponding appendices as he has not taught ME courses or participated in other departmental activities. With twelve FTE faculties, we have currently 26-to-1 student-to-faculty ratio. The current student-to-faculty ratio increased due to the reduction of our faculty number and the increase of undergraduate enrollment, and additional faculty hiring will be needed to maintain the quality of the program.

F. Faculty Information

In Appendix B, there is an abbreviated resume for each program faculty member with the rank of instructor or above, and contains the following information:

- Name and academic rank
- Degrees with fields, institution, and date
- Number of years of service on this faculty, including date of original appointment and dates of advancement in rank
- Other related experience, i.e., teaching, industrial, etc.
- Consulting, patents, etc.
- States in which professionally licensed or certified, if applicable
- Principal publications of the last five years
- Scientific and professional societies of which a member
- Honors and awards
- Institutional and professional service in the last five years
- Percentage of time available for research or scholarly activities
- Percentage of time committed to the program

G. Faculty Development

The UNLV administration, College Dean, and the Department of Mechanical Engineering provide faculty and staff with opportunities to develop their skills and learn new ones, especially in the area of developing innovative teaching and learning strategies and appropriate use of technology in classrooms. Faculty are encouraged to attend regional and national engineering educational seminars. The college also organized a two-day engineering education workshop in 2001.

As UNLV moves closer to becoming a Research I institution, it has made a commitment to foster the highest quality of teaching and learning possible. The University Teaching and Learning Center (TLC) was established a few years ago to help achieve this goal. The focus of TLC is on both the fostering of pedagogy and the integration of technological advances into the teaching and learning arena. In addition to the customary faculty development activities --- professional development workshops, individual faculty consultations, and customized unit-based program, the TLC has engaged in numerous university-wide initiatives. First and foremost among them is the Scholarship of Teaching & Learning (SoTL) Initiative through which UNLV has become a member of the AAHE/Carnegie Foundations' Campus Program in its Research University Cluster (RuCASTLE). A refereed, academic publication, Creative College Teaching Journal, has been developed by faculty for faculty. Also as part of SoTL, the TLC has partnered with a number of faculty groups on teaching/learning-focused Planning Initiative Awards granted by the President's office. Collaborating with other university organizations, the TLC has facilitated professional development for academic advisors, for faculty of the first year experience course, and for faculty of the Education Outreach program. It has also established, in cooperation with the Graduate College, a special program for graduate students: The Graduate Student Development Program in College Teaching.

Table 6-3. Faculty Workload Summary (2009-2010)

Bachelor of Science-Mechanical Engineering

Faculty Member	FT or PT[3]	Classes Taught (Course No./Section/Credit Hrs.) Term and Year[1]		Total Activity Distribution[2]		
		Fall 2008	Spring 2009	Teaching	Research/ Scholarly Activity	Other (service)
Robert Boehm	FT	EGG 150/450 (001) (3cr), ME 711(001)(3 cr.) Lab Supervision: ME 315(001,002)(1cr)	ME 314 (001)(3cr), ME 415 (001)(3cr)	40%	50%	10% (Director of Center for Energy Research (CER))
Yitung Chen	FT	ME 380(001)(3cr), ME 400(001)(3cr) Lab Supervision: ME 380L(001,002)(1cr)	ME 311 (001)(3cr), ME 495 (002)(3cr) Lab Supervision: ME 315(001,002)(1cr)	40%	50%	10%
William Culbreth	FT	ME 482(001)(3cr)	ME 480(001)(3cr)	20%	30%	50% (Associated Dean, College of Engineering)
Daniel Cook**	FT	EED 200/210 (001)(1cr) ME 100 (001)(2cr) Lab Supervision: ME 100L (001,002) (1 cr.)	EED 200/210(001)(1cr) ME 301(001)(3cr)	40%	50%	10% A half time is assigned to Entertainment Engineering & Design (EED) Program
Georg Mauer	FT	ME 100(202,203) (2 cr. Dist. Ed.), ME 242(001) (3 cr.), ME 421(001)(3cr), Lab Supervision: ME421L(001,002,003) (1cr)	ME 100(001)(3cr), ME 100(201)(2cr. Dist. Ed.), ME 242(001)(3cr) Lab Supervision: ME 100L(001,002,003)(1cr)	40%	50%	10% ME Undergraduate Coordinator
Samir Moujaes	FT	ME 311 (001)(3cr), ME 419 (001)(3cr)	ME 418(001)(3cr) ME 706(001)(3cr)	40%	50%	10%
Brendan O'Toole	FT	ME 242(002) (3cr), ME 741(001) (3cr) Lab Supervision: ME 302L(001, 002, 003) (1cr)	ME 460(001)(3cr) ME 462(001)(3cr) Lab Supervision: ME 302L(001, 002, 003) (1cr)	30%	50%	20% ME Graduate Coordinator
Darrell Pepper	FT	ME 402(001)(3cr) ME 700(001)(3cr)	ME 380(001)(3cr) ME 704(001)(3cr)	40%	50%	10% Director of Nevada Center for Advanced Computational Methods (NCACM)

Douglas Reynolds	FT	ME 453(001)(3cr) ME 726(001)(3cr)	ME 434(001)(3cr) ME 720(001)(3cr)	40%	50%	10% Director, Center for Mechanical & Environment Systems Technology (CMEST)
Eric Sandgren***	FT	N/A	N/A	40%	50%	10% Former Dean of Engineering
Mohamed Trabia[4]	FT	N/A	N/A	0%	0%	100% (Academic Affairs Fellow (Provost Office))
Zhiyong Wang	FT	ME 301(001) (3 cr), ME 427(001)(3cr), ME 498(001)(2cr) Lab Supervision: ME 120 (001) (1 cr), ME 220(001)(1 cr)	ME 320(001)(3cr) ME 426(001)(3cr) ME 497(001)(2cr) Lab Supervision: ME 120(001)(1cr), ME 240(001)(1cr)	40%	50%	10%
Woosoon Yim	FT	ME 337(001)(3 cr), ME 492(001)(1cr) Lab Supervision: ME 337L(001,002,003,004) (1 cr)	ME 330(001)(2cr) ME 492(001)(1cr) Lab Supervision: ME319/L(001)(2cr) ME 337L(001,002,003)(1cr)	20%	30%	50% Department Chair
Hui Zhao	FT	N/A	ME 416(001)(3cr)	40%	50%	10% New faculty hired in Jan. 2008
Kevin Nelson[5]	PT	ME 130 (1cr)	ME 130 (1cr) ME 230(1cr)	N/A	N/A	Professional Staff with an extra teaching load
Vellore Venkatesh[6]	PT	ME 302(001) (3cr), ME440(001)(3cr)	ME 302(001)(3cr) ME 446(001)(3cr) ME 495(003)(3cr)	N/A	N/A	Visiting faculty
Brian Lansberger	PT	ME 497(001)(2cr)	ME 498(001)(2cr)	N/A	N/A	Research faculty with an extra teaching load
Suresh Sadineni	PT	None	ME 337(001)(3cr)	N/A	N/A	Research faculty with an extra teaching load
Amy Cheng	PT	None	ME 495(001)(3cr)	N/A	N/A	Part-time instructor

[1] Data from 2008-2009 academic year (academic year preceding the visit).

[2] Activity distribution in percent of effort.

[3] FT = Full Time Faculty PT = Part Time Faculty

[4] Full-time faculty but reassigned to the Provost Office in 2009-2010. Prof. Trabia is an Associate Dean effective from July 1, 2010.

[5] Professional staff member of ME department (Machinist)

[6] Visiting faculty whose duty is to teach courses for Dr. Mohamed Trabia reassigned to the Provost Office

** Prof. Cook is no longer with the department effective from July 1, 2010

*** Prof. Sandgren is a full-time ME faculty effective from July 1, 2010, but his full-time teaching starts from Jan. 2011.

Table 6-4. Faculty Analysis

Bachelor of Science-Mechanical Engineering

Name	Rank	Type of Academic Appointment TT, T, NTT[2]	FT or PT	Highest Degree and Field	Institution from which Highest Degree Earned & Year	Years of Experience			Professional Registration/ Certification	Level of Activity (high, med, low, none) in: [1]		
						Govt./Industry Practice	Total Faculty	This Institution		Professional Society	Research	Consulting /Summer Work in Industry
Robert Boehm	Prof.	T	FT	PhD-Mech Eng	University of California , Berkeley (1968)	4	41	19	PE Mechanical, California	ASME (High) Am. Solar Energy Soc.	High	Low
Yitung Chen	Prof.	T	FT	PhD-Mech Eng	University of Utah (1991)	2	16	16	EIT, Utah	ASME (Medium), ANS (Medium), AIChE	High	Low
William Culbreth	Assoc. Prof.	T	FT	PhD-Mech Eng	University of California , Santa Barbara (1981)	4	29	25	PE Mechanical, Nevada	ASME (Low) ANS (Medium)	Medium	None
Daniel Cook	Assist. Prof.	TT	FT	PhD-Material Science	University of California , Berkeley (1993)	6	10	5	-		Medium	Low
Georg Mauer	Prof.	T	FT	PhD-Mech Eng	Technical University of Berlin (1977)	-	32	23	EIT, Washington	ANS (Low), ASEE (Medium)	Medium	Low
Samir Moujaes	Prof.	T	FT	PhD-Mech Eng	University of Pittsburgh (1980)	4	26	26	PE Mechanical, Nevada	ASHRAE (High)	Medium	Low

Brendan O'Toole	Assoc. Prof.	T	FT	PhD-Mech Eng	University of Delaware (1992)	-	17	17	EIT, Delaware	ASME (Medium), SAE (Medium), SAMPE(Medium)	High	Low
Darrell Pepper	Prof.	T	FT	PhD-Mech Eng	University of Missouri-Rolla (1973)	20	21	17	EIT, Missouri	ASME (High), AIAA (High)	High	Low
Douglas Reynolds	Prof.	T	FT	PhD-Mech Eng	Purdue University (1972)	5	35	25	-	ASHRAE (High)	High	Medium
Mohamed Trabia[4]	Prof.	T	FT	PhD-Mech Eng	Arizona State University (1987)	-	22	22	-	ASME (Medium)	High	Low
Zhiyong Wang	Assoc. Prof.	T	FT	PhD-Mech Eng	Harbin University of Science and Technology (1991)	-	15	11	-	ASME(Medium), SME (Medium),	Low	Low
Woosoon Yim	Prof.	T	FT	PhD-Mech Eng	University of Wisconsin-Madison (1987)	-	22	22		ASME (High) INCOSE(Me	Medium	None
Hui Zhao	Assist. Prof.	TT	FT	PhD-Mech Eng	University of Pennsylvania (2008)	-	1	1		ASME(???)	Medium	None
Vellore Venkatesh	Visiting Prof.	NTT	FT	PhD-Manufacturing	University of Paris , Paris 6, (1963)	5	44	1		SME (Medium), CIRP(Mediu	Low	Low

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[1] The level of activity reflects an average over the year prior to visit plus the two previous years.

[2] TT = Tenure Track T = Tenured NTT = Non Tenure Track

CRITERION 7. FACILITIES

A. Space

A.1 Offices (Administrative, Faculty, Clerical, Teaching Assistants)

The office space available to the Mechanical Engineering Department has recently improved, due to the construction of the new Science & Engineering Building (SEB) connected to the existing Thomas Beam Engineering (TBE) Complex. Currently, the department office is located in TBE A-211B and all other faculty offices are located in both TBE and SEB. However, all teaching laboratories are located in TBE complex only. All department teaching assistants have their office in either TBE or SEB.

A.2 Classrooms

All Mechanical Engineering courses are taught in lecture facilities in the Thomas Beam Engineering (TBE) Complex and other locations throughout the campus. All classroom assignment is done through university's Academic Scheduling Department under the Office of the Registrar, and they assign classrooms based on the department's request for special needs and the enrollment in each course. Most of classrooms on campus are equipped with multi-media features for lecturing, and the equipment includes a PC, LCD projector, Doc-Cam, connection to notebook computer, and internet connection. All of this multi-media equipment is provided and maintained by the Office of Information Technology (OIT). The OIT also provides multimedia distribution services for AV equipment that faculty can reserve. The AV services may be used to complement standard classrooms or for special events.

A.3 Laboratories

The following laboratory description includes only teaching related laboratories in Mechanical Engineering. All undergraduate teaching laboratories are equipped with LCD projectors for faculty and teaching assistant to give a lecture effectively in the laboratory environment. The following is the description of undergraduate teaching laboratories in the department:

Lab Name:	**ME 100L - Introduction to Mechanical and Aerospace Engineering Laboratory**
Location:	CBC
Description:	Introduction to techniques and their practice used in the design process: sketching, dimensioning, brainstorming, decision trees, decision matrices, P.C. software packages, experimentation.
Laboratory Practice	Students learn hands-on design for a specific objective (build a robotic vehicle that accomplishes an assigned objective). Students work in small teams. ME 100Lab Design Project components: Team work, project planning and execution, robotic vehicle construction and testing, robot programming and testing, reports, presentations; demonstrate team success in a final competition.

Credit(s):	1
Associated Course:	ME 100 - Introduction to Mechanical and Aerospace Engineering
Prerequisite Course(s):	None
Student Capacity: (per section)	20
Floor Space:	1000 sq. ft.
Hardware:	Dell Computer Workstations Lego Mindstorms NXT Educational Kits
Software:	Microsoft Office, Lego Mindstorms NXT Software, Mathsoft MathCAD, Lego Digital Designer
Engineering Topics:	Design Process; Robotics; Sensors; Programming

ME 100L located in CBC 234

Lab Name:	**ME 302L - Mechanical Testing Lab**
Location:	TBE B-150
Description:	Strain gage attachment and calibration, tensile testing of metals and non-metals, elastic constants, beam deflection and failure, torsion testing, column stability, and bolted connection testing. Provide hands on experimental experience in characterizing mechanical properties of materials.
Laboratory Practice:	• Laboratory safety procedures • Uncertainty analysis of data (error propagation) • Statistical analysis of data • Laboratory report writing skills • Tensile Testing Procedures for finding: Young’s Modulus, yield strength and strain, ultimate strength and strain, and failure strength and strain of metallic materials • Procedure for determining Poisson’s ratio of materials • Flexure testing procedures for determining Young’s modulus • Torsion testing procedures for determining shear modulus • Flexure test procedures for determining beam deflections

	• Column compression procedures for investigating buckling behavior Students will also perform a group project where they will propose and conduct their own laboratory experiment.
Credit(s):	1
Associated Course:	ME 302 - Materials Mechanics
Student Capacity: (per section)	15
Floor Space:	384 sq. ft. (16' x 24')
Hardware:	Dell Computer Workstations Tinius-Olsen Universal Testing Machine Epsilon Technology Model 3542-0200-030-ST Extensometer Vishay Model P3 Strain Indicator and Recorder TQ Education STR1/STR1A Structures Test Frame and Digital Force Display TQ Education STR2000 Automatic Data Acquisition Unit TQ Education STR12 Buckling of Struts TQ Education STR Torsion of Circular Sections
Software:	Microsoft Office, Vishay StrainSmart Data Systems, TQ Structures,
Engineering Topics:	Statistical & Uncertainty Analysis: Students are shown basic statistical and uncertainty analysis techniques which will be employed in later laboratory experiments. Tensile Testing: Students perform multiple tensile tests on common metallic materials (steel, aluminum, and brass) to obtain experimental data from which they extract the engineering properties (modulus of elasticity, yield strength & strain, and failure strength & strain) of the materials tested. Poisson's Ratio: Student experimentally determine the value of Poisson’s Ratio for three different materials (steel, copper, and aluminum) by performing bending experiments on a flat bar and measuring the axial and transverse strain Torsion of Circular Sections: Students experimentally explore the relationships between several different variables (applied torque, angular deflection, length of rod, polar moment of inertia, and shear modulus) in an experiment that applies torsional load to a circular cross-section rod (steel and brass) of length L. Bending and the Modulus of Elasticity: Students use the bending equations to calculate bending stress and the modulus of elasticity of three metal beam specimens (steel, copper, and aluminum) outfitted with strain gages. Strain Gage Application: Students learn the procedures for bonding and soldering strain gages to test specimens and practice the techniques learned by preparing a tensile test specimen to be used by students in the following semester's course. Deflection of Beams: Students load a twelve inch rectangular aluminum beam, outfitted with strain gages, in three point bending to obtain deflection and strain data which is used to perform a side-by-side comparison of experimental and theoretical results. Column Deflection and Critical (Euler) Buckling Loads: Students establish a linear relationship between the buckling load and the strength of the strut for different end

conditions and then compare the experimentally obtained buckling load with the theoretical buckling load of the strut.

Group Project: Students (working in small groups) plan and perform their own experiment based on one of the methods/techniques learned in the previous labs.

ME 302L located in TBE B150

Lab Name:	**ME 315 - Thermal Engineering Laboratory**
Location:	TBE B-113
Description:	Laboratory studies related to heat transfer, thermodynamics, energy conversion, and HVAC applications.
Laboratory Practice:	As part of the lab assignments, and near the end of the course, students are asked to design either a component for an existing experiment or design a completely new experiment. Generally this is related to some hands-on experience they have had in the laboratory. Students are formed into groups of typically 3-4 people, and one design is required of each group.
Credit(s):	1
Associated Course:	None
Prerequisite Course(s):	ME 311 - Engineering Thermodynamics I ME 314 - Introduction to Heat Transfer ME 380 - Fluid Dynamics for Mechanical Engineers
Student Capacity: (per section)	15
Floor Space:	198 sq. ft. (18' x 11')
Hardware:	Gateway Computer Workstations P.A. Hilton R633 Refrigeration Cycle Demonstration Unit Armfield HT30X Heat Exchanger Service Unit with Shell & Tube Heat Exchanger DCC Corporation Hot Spot Thermocouple Welder Ohaus SPE402 Scout Pro 400g Scale Pasco Scientific TD-8561 Thermal Conductivity Apparatus Pasco Scientific TD-8553/8554A/8555 Thermal Radiation System Omega OM-2041 4 CH Thermocouple Data Logger Omega HH506RA 2 CH Thermocouple Data Logger

Omega HHM31 Digital Multi-Meter
Omega OS562 Infrared Thermometer
CO2 Tank for Joule-Thompson experiment
Chromalox ROPH-104 1000 W Hot Plate
Copper Ball – 50 mm diameter
Nalgene 4150-2000 Dewer
Turbine Technologies Model RC-101 Rankine Cycler
GDJ Model PT-100/130/150 PowerTek Single Cylinder Multi-Fuel Engine Dynamometer

Software: Microsoft Office, National Instruments LabVIEW, IOTech Personal DAQ

Engineering Topics: Temperature Measurement; Radiation Surface Property Determination; Rankine Cycle
Heat Exchanger Evaluation; Evaluation of Combustion Engine Efficiency; Vapor Compression Refrigeration Study; Determining Thermal Conductivity of Construction Materials; Joule-Thompson Effect

Lab Name: **ME 319L - Introduction to Programming for Mechanical Engineers**

Location: TBE B-367

Description: Introduction to computer languages and computer hardware, MATLAB programming environment, MATLAB data types, MATLAB graphics, Functions, Inputs / Outputs, text processing function library, Plotting functions, Reading and writing data files, and Case Studies using different MATLAB Toolboxes.

Objective(s): To provide proficiency in Matlab programming for all mechanical engineering students.

Credit(s): 2

Associated Course: ME 319 - Introduction to Programming for Mechanical Engineers

Prerequisite Course(s):
ME 100 - Introduction to Mechanical and Aerospace Engineering
ME 100L - Introduction to Mechanical and Aerospace Engineering Laboratory
MATH 283 - Calculus III

Student Capacity: (per section) 32

Hardware: Computer Workstations

Software: Microsoft Office, MathWorks MATLAB/Simulink

Lab Name: **ME 337L - Engineering Measurements Laboratory**

Location: TBE B-121

Description: The ME 337 Lab is designed to give the engineering student introductory-level hands-on experience with measurement equipment and data acquisition software that scientists, engineers, and/or technicians may encounter in their respective careers.

Objective(s):

- Measurement process planning including selection of correct transducers and signal conditioning units commonly encountered in mechanical engineering:

- Basic hardware set up of PC based data acquisition and control system and software programming skill in LabVIEW
- Handling and characterization of typical dynamic signals encountered in mechanical engineering in discrete form (DFT, FFT, sampling rate, frequency resolution, dynamic bandwidth

Credit(s): 1

Associated Course: ME 337 - Engineering Measurements

Student Capacity: (per section) 20

Floor Space: 651 sq. ft. (31' x 21') Note: shared space with ME 421L

Hardware:
Dell Computer Workstations
National Instruments ELVIS Stations
IET Model RCS-500 Resistance-Capacitance Substituter Boxes
Passive Components (resistors, capacitors & inductors)
US Digital Model S1-500-250-I-B-D Optical Shaft Encoders
DC Servo Motors

Software: Microsoft Office, National Instruments LabVIEW,

Engineering Topics: Introduction to LabVIEW Programming; Introduction to Data Acquisition; Analog to Digital Conversion; Fourier Series and FFT; Dynamic Parameter Measurement of First Order Systems; Dynamic Parameter Measurement of Second Order Systems; Operational Amplifier High-pass, Low-pass, and Band-pass Filter Characteristics; Applied mechanical engineering measurements

ME 337L in TBE B121

Lab Name: **ME 380L - Fluid Dynamics Laboratory**

Location: TBE B-150

Description: Laboratory and computer-based experiments on the dynamics of fluids including pressure in pipes, fluid properties, compressible flows, inviscid flow simulations, boundary layer measurements, usage of wind tunnels, and applications of

	computational fluid dynamics.
Objective(s):	- Measure the viscosity, force, flow rate and friction through experiments. - Understand the physical meaning of each measured parameter such as Re number. - Analyze the data, identify and estimate errors and know how to reduce the errors. - Present the results in scientific written reports.
Credit(s):	1
Associated Course:	ME 380 - Fluid Dynamics for Mechanical Engineers
Student Capacity: (per section)	15
Floor Space:	405 sq. ft. (15' x 27')
Hardware:	water tunnel; PUMPLAB; viscometer; hydrostatic pressure; venturi meter; manometer; flow meter.
Engineering Topics:	experiments on both the statics and dynamics of fluids including pressure, friction, and flow rate in pipes, fluid properties, incompressible flows and pump curves, usage of water tunnel

Lab Name:	**ME 421L - Automatic Controls Laboratory**
Location:	TBE B-121
Description:	Control system identification. Controller design, experimentation, computer simulation, and analysis of position and speed control systems. Control system performance optimization.
Objective(s):	To accompany the controls course, providing mechanical engineering seniors with practical experiences in feedback systems design, operation & digital simulation.
Credit(s):	1
Associated Course:	ME 421 - Automatic Controls
Student Capacity: (per section)	20
Floor Space:	651 sq. ft. (31' x 21') Note: shared space with ME 337L
Hardware:	Dell Computer Workstations National Instruments ELVIS Stations Quanser QNET DC Motor Control Module for NI ELVIS Quanser QNET HVAC Trainer Module for NI ELVIS Quanser IP02 Linear Motion Servo Plant with Pendulum TQ Education CE117 Process Trainer (Flow, Level, Pressure & Temperature)
Software:	Microsoft Office, National Instruments LabVIEW, MathWorks MATLAB, Quanser WinCon, Visual Solutions VisSim
Engineering Topics:	Computer Based Dynamic System Analysis; DC Motor Speed Control & Position Control System Identification; Pendulum Gantry Control; Upright Pendulum Control; Flow Control using Valve or Pump; Level Control

Mendenhall Innovation & Design Laboratory (MIDL)

The Mendenhall Innovation Program is a resource available to Engineering Faculty and their Undergraduate Students for the purpose of enriching student experience in the commercialization of technology through exposure to independent “hands-on” activities which are added to normal coursework to simulate the product conception, product design and product production processes required to successfully commercialize technical innovation.

The Program is underwritten by a $1 million gift from Dr. and Mrs. Robert Mendenhall, and it consists of several components:

1. Financial and technical support of the FIRST Robotics competition
2. Financial and technical support of the required Senior Design course (underwritten to a large extent by a $1 million gift from Mr. and Mrs. Fred Cox)
3. Promotion of a Minor in Technology Commercialization
4. Sponsorship of a Lecture Series on Technical Innovation
5. Operation of the Mendenhall Innovation and Design Laboratory

The MIDL comprises about 5,000 sq. ft. of working area. About 2,500 sq. ft. is dedicated to a completely refurbished and newly equipped set of 3 machine shops. The shops contain new industrial-grade equipment, and are also used in support of required Mechanical Engineering courses in Manufacturing. Contiguous to the Shops area is an additional 2,500 sq. ft. of space for general fabrication and project work, including an electronic testing and fabrication area, a computer-based design area and space for undergraduate teams participating in national student competitions. The Shops area is available to students during normal working hours, and the project area is available until about 10 p.m. on weekdays and during daylight hours on weekends

B. Resources and Support

B.1 Computing resources, hardware and software used for instruction

Computing Resources for Students

Table 7.1 shows the computing resources that are currently available in our instructional laboratories and classes. There is one instructional computer room (TBE B-367) with 32 networked computers and printers. Also, students have an access to the general computer room located in TBE A-311. The students are provided easy access to any computing hardware or software they need to achieve the program’s outcomes.

The computers in the instructional labs are loaded with the following software packages to support the program’s outcomes: MS Office, Matlab/Simulink with Toolboxes, MATHCAD, COMSOL, AutoCAD, Pro-E, SolidWorks. Also, the department has a license for LabVIEW for instruction in ME 337L Engineering Measurement Lab.

The computing resources are reviewed by faculties and the laboratory director, and the department chair makes a final decision for the upgrade of both hardware and software. Also, there is one permanent computer technician stationed in the college from the Office of Information Technology (OIT) to support instruction related software and hardware maintenance in the College of Engineering.

Table 7.1 List of Software Licenses of ME Course Instruction

LabVIEW license renewal	$ 6,000
Matlab License renewal (Department is responsible for Toolbox only)	$ 3,000
AutoCad (shared with other departments)	$ 2,500
COMSOL license renewal	$ 2,000
Pro-E license renewal	$ 3,000
SolidWorks license renewal	$ 5,500
Total:	**$ 22,000**

Faculty Workstations

Initiated in 2005, the Academic Affairs Computer Replacement Program's primary goal is to ensure faculty and staff computers, in academic departments at UNLV, meet standards. Computers are refreshed on a 5-year cycle. Currently, a number of faculties use their laptop computers for classroom instruction as well as their regular work. Both Windows PCs and Macs are available, with a variety of peripherals. Standard software such as MS Office, ADOBE Acrobat, Lotus Note, security program, and other utility programs are installed by the Office of Information Technology (OIT), and other programs with the department license are managed by the department laboratory director as well as computer technicians working for the college.

The networking of computers is a critical component of the day-to-day operation of the university. All technical supports for the networking as well as the WebCampus support for course instruction are provided by the OIT.

Department Web Site

The Mechanical Engineering Website is located at http://me.unlv.edu. The web site is a valuable resource for current students and provides useful information for prospective students. From the home page the following main tabs are provided: Mission Statement, Educational Objectives, Faculty/Staff, Newsletter, ME Advisory Board, and other general information about the department are listed under General Information. Faculty web page can be accessed through Faculty/Staff and offers information on faculty offices and email addresses. The links to the instructional labs provides the students with a description of the lab and syllabus. The link to the student clubs provides information about the different student clubs and their contact information.

B.2 Laboratory equipment planning, acquisition, and maintenance processes and their adequacy.

Laboratory Plan for Computing Facilities

The computer hardware is updated as needed usually every five years. The software is updated as its license expires, and all software licenses for course instruction are maintained by a computer facilities supervisor of OIT. Funding for new computers and for software licenses are provided by through numerous resources including the department's special-fee/overhead accounts, student technology fee allocated to the college and university. As a result, the students have access to up-to-date hardware and software needed to successfully complete the program. Table 7.1 lists the cost for maintaining licensed software that was used in various ME courses in 2009.

Laboratory Equipment Plan

All department laboratory courses have faculty supervisors assigned to each laboratory. This faculty member is responsible for the equipment in the lab, for any changes in equipment, and for the maintenance of the equipment. The department laboratory director also works with these faculty supervisors regarding new equipment that is needed and how this equipment will be obtained. The department chair, together with faculty supervisors, meet to set purchase priorities and to allocate equipment funds.

Maintenance of equipment is the responsibility of the department laboratory director. The lab director is responsible for maintaining the instrumentation and equipment in all instructional laboratories. For all computers, the Office of Information Technology (OIT) can be contacted for hardware and software maintenance. In general, the lab supervisor will identify a repair or maintenance needs to the laboratory director for repair, if needed. The lab director will work closely with the faculty supervisor to fix any identified problems.

Funding for new equipment and upgrades is provided by through numerous resources including the department’s special-fee account and overhead account. Since these funding sources are small, most of the purchases are for replacement equipment or small items that are used to enhance the lab experience for the students. For major equipment purchases, the college shares the cost of the equipment. Table 7.2 lists the major upgrades of ME educational laboratory facilities from 2004 to 2009. The Mechanical Engineering department has state-of-the-art facilities that are instrumental in carrying out the mission of the program, and the laboratory equipment is adequate to ensure student success.

Table 7.2 List of Major Upgrades of ME Educational Laboratory Facilities from 2004 to 2009

Course	Item Description	Cost	Date of Purchase
ME 100L	Dell OPTIPLEX GX620 Computers (6 units at 849.48 each)	$5,096.88	April 2006
	LEGO MINDSTORMS NXT Education Base Set (16 units at $250.00 each)	$4,000.00	August 2007
	Dell Optiplex 745 Computers (3 units at $1,151.10 each)	$3,453.30	August 2007
	NEC VT700 3LCD Projector, mounting hardware and projection screen	$1,588.49	February 2008
	LEGO MINDSTORMS NXT Education Base Set (4 units at $260.00 each)	$1,040.00	June 2008
	LEGO MINDSTORMS NXT Education Base Set (4 units at $270.00 each)	$1,080.00	January 2009
	Tennsco Five-Tier Lockers with Hasp Handle, 45" x 66" x 18" (2 units at $613.80 each)	$1,227.60	December 2009
ME302L	TecQuipment STR12 Buckling of Struts	$3,821.00	March 2005
	TecQuipment STR1 Structures Test Frame	$1,674.00	March 2005
	TecQuipment STR1A Digital Force Display	$992.00	March 2005
	TecQuipment STR2000 Automatic Data Acquisition Unit	$2,641.00	March 2005
	TecQuipment STR6 Torsion of Circular Sections	$4,012.88	April 2006
	Transducers, Inc. Model 43 Tension/Compression Load Cell -	$2,000.00	April 2006

	50,000 lb		
	Vishay Model P3 Strain Indicator and Recorder - Four Channel	$1,800	April 2006
	Gateway E-4500S Computers (2 units at $1,032.00 each)	$2,064.00	June 2006
	Sharp XR20S DLP Projector and Mounting Hardware	$1,327.45	July 2006
	Epsilon Technology Corp Model 3542-0200-030-ST Axial Extensometer	$1,748.00	November 2009
ME 315	Armfield HT30X Heat Exchanger Service Unit	$9,501.00	June 2004
	Turbine Technologies RankineCycler	$20,340.00	July 2005
	PA Hilton R633 Refrigeration Cycle Demonstration Unit	$19,156.00	April 2007
	Omega HH506RA Dual Input, High Accuracy Thermocouple Dataloggers (2 units at $187.00 each)	$374.00	August 2007
	Omega OM-2041-USB Portable Handheld Data Logger-4 channel	$792.00	January 2008
	Omega HHM31 Digital Multimeter w/Thermocouple (3 units at $137.00 each)	$411.00	January 2008
	Pasco Model TD-8561 Thermal Conductivity Apparatus and Model TD-8556A Steam Generator	$664.00	January 2008
	Pasco Model TD-8554A Thermal Radiation (Leslie's) Cube, Model TD-8553 Thermal Radiation Sensor and Model TD-8555 Stefan-Boltzmann Lamp	$672.00	January 2008
	GDJ PowerTek Single Cylinder Engine Dynamometer, with following options: multi-fuel (gas, propane & natural gas) and remote operation	$23,450.00	May 2008
	NEC VT700 3LCD Projector, mounting hardware and projection screen	$1,240.22	August 2008
	Ohaus OHSP-402 Scout Pro 0.01 g Balance (400 g)	$508.00	September 2009
ME 337L	National Instruments ELVIS Educational Design and Prototyping Platform (7 units at $2,660.00 each)	$18,620.00	April 2006
	Dell OPTIPLEX GX620 Computers (9 units at 849.48 each)	$7,645.32	April 2006
	National Instruments ELVIS Educational Design and Prototyping Platform (2 units at $2,660.00 each)	$5,320.00	June 2006
	National Instruments ELVIS Educational Design and Prototyping Platform (2 units at $1,999.00 each)	$3,998.00	June 2007
	Sharp XR10XL Projector, mounting hardware/projection screen	$1,361.09	July 2007
	Dell Optiplex 745 Computers (2 units at $1,151.10 each)	$3,202.00	August 2007
ME 421L	Quanser Q8 HIL Data Acquisition System and IP02 Linear Motion Servo Plant (Inverted Pendulum)	$10,400.0	June 2004
	Quanser QNET - 010 DC Motor Control (for NI-ELVIS) (5 units at $1,842.75 each)	$9,213.75	September 2006
	Quanser QNET-010 DC Motor Control, NI ELVIS/USB-6251 DAQ Bundle	$4,099.00	March 2007
	Quanser QNET-012 HVAC Trainer, NI ELVIS/USB-6251 DAQ Bundle	$4,099.00	April 2007
	Dell Optiplex 360 Computers (8 units at $992.96 each)	$7,943.68	January 2009
	Quanser QNET - 012 DC HVAC Trainer (for NI-ELVIS) (3 units at $2,227.50 each)	$6,682.50	June 2009
	Tecipment CE117 Process Trainer	$25,684.00	May 2008
	TOTAL	**$221,143.16**	

B.3 Type and number of support personnel available to install, maintain, and manage departmental hardware, software, and networks

Installation and maintenance of basic office software including MS Office, anti-virus program, ftp utilities, etc. are installed and maintained by the Office of Information Technology (OIT) for all computers in the department. Engineering software such as Matlab, Pro-E, SolidWorks, COMSOL are installed and maintained by the OIT technical staff (Mr. Matthew Buk, Computer Facilities Supervisor, Science and Engineering) stationed in the College of Engineering. Currently, only National Instrument's LabVIEW department license used for ME 337L laboratory course is maintained by our laboratory director since the license is for both teaching and research purposes.

B.4 Describe the type and number of support personnel available to install, maintain, and manage laboratory equipment.

The Department has two full-time professional staff positions. One is the laboratory director and the other is the prototype designer/machinist. Installation, maintenance, and management of equipment related to all instructional laboratories is the responsibility of the department laboratory director. For all computers, the Office of Information Technology (OIT) can be contacted for hardware and software maintenance. In general, the faculty members who supervise laboratories will identify a repair or maintenance need and forward it to the laboratory director. The lab director will work closely with the faculty supervisor to fix any identified problems. With increasing needs for fabricating a prototype in the senior design project, a full-time department machinist supports the students' needs to use machine tools and a prototyping machine.

C. Major Instructional and Laboratory Equipment

Appendix C includes a list of major instructional and laboratory equipment. Each instructional laboratory is listed separately.

CRITERION 8. SUPPORT

A. Program Budget Process and Sources of Financial Support

The Department of Mechanical Engineering general fund (5001) is funded by the state of Nevada. It covers salaries of faculty and staff, wages of student workers, office and shop supplies, and faculty support. The majority of the annual general fund expenses, 97%, is allocated to salaries, wages, and benefits for faculty and staff. The remaining 3% is spent on wages of student workers, office and shop supplies, and faculty support. Department expenses and capital expansion are supplemented by other resources including the department overhead fund (50EA), MEG special fee fund (50JH), gift fund (501W), and lab service fund (5012). Technology fees provide a steady source of income for software licenses and lab maintenance. Gifts are not part of the annual budget. They, however, allow some flexibility in addressing some of the needs of the department. The lab service fund uses income generated by the limited use of our facilities by local industries to maintain and upgrade labs. The department faculty members discuss lab needs regularly in department meetings to reach agreement on major expenses.

Teaching Assistant (TA) salaries come out of the budget of the UNLV graduate college. The monthly rate and benefits are determined by the university. Ph.D. students receive higher stipends than M.S. students. Most of the TA's compensate their salaries by working on funded research projects during summer months. The College of Engineering allocates each department a number of TAs based on several factors including the number of labs taught and the undergraduate enrollment. Table 8.1 shows the number of TA's available for the program for last five years.

Table 8.1 Number of Graduate Teaching Assistants(TA) last five years

Year	2005	2006		2007		2008		2009		2010	
Semester	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
TA Number	15	15	15	15	14	14	14	14	13	13	14

Considering that the department offers 13-15 sections of laboratory classes per semester, the number shown in Table 8.1 is adequate to support laboratory instruction in the program.

Faculty and staff salary increases are established through an annual review process in addition to periodic cost-of-living adjustments. Staff is reviewed by their immediate supervisor. Faculty is evaluated annually by the chairman of the department. Merit raises of faculty are established based on their excellence in teaching, research, and service. The College Faculty Affairs committee reviews the records of the faculty college-wide and sends a recommendation of merit awards to the Dean, who sends the final recommendation to the Provost.

B. Sources of Financial Support

The main component of soft money includes the department overhead fund (50EA) based on the externally funded research fund. As shown in Figure 6-3, the department has maintained the average of $4-5M per year of annual research expenditures in last six years. Based on the university and college policy, 4% of F&A (Facilities and Administrative Cost) distribution is returned back to the department as shown in Table 8.2. Considering that an average F&A rate of

UNLV in last five years is about 46%, approximately 1.8% of the research expenditure shown in Figure 6-3, except equipment and tuition, is returned to the department, and can be used for miscellaneous expenses including faculty & student travel, laboratory improvement, and other items not covered by the state operation money assigned to the program. The following table shows the distribution of F&A funds inside of the college. It should be noted that the college receives 40% of the total F&A money from the Office of Sponsored Programs.

Table 8.2 F&A Distribution in the College of Engineering

	Grant from Individual PI (%)	**PI in Research Center(%)**
College	28	28
Department	4	4
Research Center	0	8
PI	8	0
Total	40	40

C. Adequacy of Budget

The financial resources and institutional support available for the department are currently adequate to achieve our educational and research objectives. The UNLV administration has provided leadership necessary for obtaining support for the ME program from the NSHE (Nevada System of Higher Education) Board of Regents and the State of Nevada Legislature. UNLV's administration provided the University with a well-defined mission. The long-term needs for the department are stated in the Strategic Plan. Short-term needs for the department are addressed by the ME faculty in consultation with the College administrators.

D. Support of Faculty Professional Development

The UNLV administration, College Dean, and the Department of Mechanical Engineering provide faculty and staff with opportunities to develop their skills and learn new ones, especially in the area of developing innovative teaching and learning strategies and appropriate use of technology in classrooms. Faculty is encouraged to attend regional and national engineering educational seminars.

As UNLV moves closer to becoming a Research I institution, it has made a commitment to foster the highest quality of teaching & learning possible. The University Teaching and Learning Center (TLC) was established to help achieve this goal. The focus of TLC is on both the fostering of pedagogy and the integration of technological advances into the teaching and learning arena. In addition to the customary faculty development activities, i.e., professional development workshops, individual faculty consultations, and customized unit-based program, the TLC has engaged in numerous university-wide initiatives. First and foremost among them is the Scholarship of Teaching & Learning (SoTL) Initiative through which UNLV has become a member of the AAHE/Carnegie Foundations' Campus Program in its Research University Cluster (RuCASTLE). A refereed, academic publication, Creative College Teaching Journal, has been developed by faculty for faculty. Also as part of SoTL, the TLC has partnered with a number of faculty groups on teaching/learning-focused Planning Initiative Awards granted by the President's office. Collaborating with other university organizations, the TLC has facilitated professional development for academic advisors, for faculty of the first year experience course, and for faculty of the Education Outreach program. It has also established, in cooperation with the Graduate College, a special program for graduate students: The Graduate Student Development Program in College Teaching.

The University Libraries state-of-the-art facility, the Lied Library, was dedicated in January 2001. It is a 302,000 square feet five story facility containing 317 desktop computer workstations for student and faculty use, as well as 18 laptop computers available for check-out, and 800 data drops and opportunities to connect laptops to the library's campus network. Acquisitions of engineering-related materials are made through the Engineering Librarian. Faculty members are encouraged to suggest or recommend materials to be purchased for the collection. Graduate and undergraduate student suggestions are also welcomed. All requests for purchases are approved by the Engineering Librarian and forwarded to the library's Material Ordering and Receiving Department to be ordered from the appropriate vendor. Those who have made a book suggestion are notified by e-mail when their requested item arrives.

The Kaltenborn Endowment supplements the Libraries standard acquisition budget for the College of Engineering. The endowment has a capital base in excess of $500,000 and yields approximately $30,000 annually for new acquisitions. This amount is divided evenly among the College's academic units.

E. Support of Facilities and Equipment

The Department has two full-time state funded professional staff positions. One is the laboratory director and the other is a Model Designer/Machinist. Installation, maintenance, and management of equipment related to all instructional laboratories are the responsibility of the department laboratory director. A full-time Model Designer/Machinist works with faculty in designing experiments and prototypes. The machinist operates machine tools especially computer-driven machine tools. The machinist interacts with senior design students and graduate students to help them build their prototypes. For all computer hardware and general office software, the Office of Information Technology (OIT) can be contacted for installation and maintenance.

Funding for new equipment and upgrades is provided by through numerous resources including the department's special-fee account (50JH) and overhead account (50EA). Since these funding sources are small, most of the purchases are for replacement equipment or small items that are used to enhance the lab experience for the students. For major equipment purchases, the college shares the cost of the equipment.

F. Adequacy of Support Personnel and Institutional Services

The University supports the ME curriculum through different organizations that address various infrastructure issues. These organizations include Campus Computing Services in addition to the college's own computer technicians, College Advising Center, Facilities Management, and Alumni Center. The financial resources and institutional support available for the department are currently adequate to achieve our educational and research objectives. The UNLV administration has provided leadership necessary for obtaining support for the ME program from the NSHE Board of Regents and The State of Nevada Legislature. UNLV's administration provided the

University with a well-defined mission. The long-term needs for the department are stated in the Strategic Plan, which is reviewed on a regular basis to assess progress and modifications. Short-term needs for the department are addressed by the ME faculty in consultation with the College administrators.

CRITERION 9. PROGRAM CRITERIA

According to ABET's "2009-2010 Criteria for Accrediting Engineering Programs," Mechanical Engineering Programs must demonstrate

Curriculum

> *The program must demonstrate that graduates have the ability to: apply principles of engineering, basic science, and mathematics (including multivariate calculus and differential equations) to model, analyze, design, and realize physical systems, components or processes; and work professionally in both thermal and mechanical systems areas.*

Faculty

> *The program must demonstrate that faculty members responsible for the upper-level professional program are maintaining currency in their specialty area.*

The Mechanical Engineering program satisfies the above requirements for mechanical engineering. The data supporting this conclusion is presented in CRITERION 5 Curriculum on page 114 and CRITERION 6 Faculty on page 135.

APPENDIX A. COURSE SYLLABI

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 100: Introduction to Mechanical and Aerospace Engineering (2 credit): Required Course

Course Description (2008-2010 Catalog):

Introduction to mechanical and aerospace engineering profession. Engineering problems and calculations and creativity in the design process. Ethics and professionalism in engineering design. Laboratory and machine shop demonstrations.

Prerequisite Course: Mechanical Engineering major

Prerequisite by Topic:

1. College Algebra.
2. Trigonometry

Textbook: A.R. Eide, R.D. Jenison, L.H. Mashaw, L.L. Northup, *Introduction to Engineering Design and Problem Solving,* 4th Edition, McGraw Hill

Other Reference Material: N/A

Course Coordinator: Georg F. Mauer, Professor

Course learning outcomes:

a. **Basic engineering calculations**. Convert quantities from one set of units to another such as SI and US Customary and apply basic algebraic and geometrical concepts to solve simple technical problems.
b. **Engineering Method.** Approach a technical problem employing the basic steps of the engineering method starting with an understanding of the problem and ending with a verification and check of results.
c. **Engineering Design.** Be aware of the value of the engineering design process to develop effective engineering systems to meet a desired need. Build, test, and evaluate completed designs in the laboratory.
d. **Overview of Disciplines with Mechanical Engineering.** Be knowledgeable of the many facets of mechanical engineering such as fluids, vibrations, controls, kinematics, etc as a result of especially designed seminars by various expert members of the faculty and laboratory experiences.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.c**	**1.d**	**1.e**	**1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**M**	**H**	**H**	**H**	**H**		**H**	**M**	**H**		**M**	**H**

(L)ow (M)edium (H)igh

Topics Covered:

1. Introduction and Engineering History. 4 classes.
2. The design process - 6 classes.
3. Steps in the design process: Problem solving, problem definition, solution idea generation, refinement and analysis, decision and implementation, case studies. 2 classes.
4. Engineering analysis. 3 classes.
5. Mathematical Modeling and Engineering Software Applications. 3 classes.

6. Dimensions and Units. 2 classes
7. Team Design Reports and Oral Presentations. 4 classes
8. Ethics. 2 classes
9. Exams. 2 classes

Laboratory Projects: None

Computer Usage:

Use of Mathcad as a tool for modeling and problem solving. MS Excel and Mathcad for engineering graphics.

Class/Laboratory Schedule: 50 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives

Two written exams, home-works, Team Project report and Presentation of ME 100 Lab Design, and final exam

Class/Laboratory Schedule: MW 1:00-1:50 PM (Spring and Fall Semester)

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	2 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By:	**Date:**
Georg Mauer	September 10, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 100L: Introduction to Engineering Design Lab (1 credit): Required Course

Course Description (2008-2010 Catalog):

Introduction to techniques and their practice used in the design process: sketching, dimensioning, brainstorming, decision trees, decision matrices, P.C. software packages, experimentation.

Prerequisite Course: Corequisite ME 100

Prerequisite by Topic: Introduction to Mechanical Engineering

Textbook:

A.R. Eide, R.D. Jenison, L.H. Mashaw, L.L. Northup, *Introduction to Engineering Design and Problem Solving,* 4th Edition, McGraw Hill

Other Reference Material: N/A

Course Coordinator: Georg F. Mauer, Professor

Course learning outcomes:

a. **Basic engineering calculations**. Convert quantities from one set of units to another such as SI and US Customary and apply basic algebraic and geometrical concepts to solve simple technical problems.
b. **Engineering Design.** Design and optimize the overall performance of an autonomous robotic vehicle, using a supplied kit of components. Apply the engineering design method to develop an effective product that meets the stated performance specifications. Learn to organize your design project, divide tasks and cooperate in a team.
c. **Programming an Embedded Controller.** Describe your analysis, design, and experimental results in a final team report. Present the results orally before the entire class.

d. **Demonstrate a Complete and Functioning Product.** Using sets of specified parts, assemble the product you designed in a team effort. Demonstrate the completed product in a formal presentation and competition at the end of the semester.
e. **Final Project Report.** Describe your analysis, design, and experimental results in a final team report. Present the results orally before the entire class.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**H**	**H**	**H**	**H**		**H**	**M**	**M**			

(L)ow (M)edium (H)igh

Topics Covered:

CLASS	Assignment
1	Define a set of Design specifications
2	Identify need: Describe problem and possible approach
3	Begin Literature Search
4	Technical drawings I
5	Technical drawings II
6	Technical drawings III, Complete overall design
7	Present completed vehicle. Demonstrate all functions:
8 - 12	Programming and Testing
13	Complete Literature search
14	Robot Competition: Final Report and Presentation of completed Robot.

Laboratory Projects: yes

Class/Laboratory Schedule: class meets 1 time per week, 180 minutes per session

Assessment of Student Progress toward Course Objectives

Weekly Lab reports, plus one Team Final Report, Plus one Oral Team Presentation

Class/Laboratory Schedule: multiple lab sections (Fall Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By: Georg Mauer

Date: September 11, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 120: Introduction to AutoCAD (1 credit): Required Course

Course Description (2008-2010 Catalog):

Introduction to two-dimensional renderings with AUTOCAD, basic customization features such as menu modification and the addition of command aliases. Credits 1

Prerequisite Course:

Textbook:"**The AutoCAD 2008 Tutor for Engineering Graphics**" By, Alan J. Kalamej

Other Reference Material: N/A

Course Coordinator: Z.Y. Wang, Associate Professor

Course learning outcomes:

(a) To understand various parts of AutoCAD's interface and comfortably draw basic 2D and 3D drawings, and rendering features.
(b) Understand use of tools like Object Snap, Layers etc that make drawing easier and faster.
(c) Familiarize Engineering Drawing (Auto CAD) from application perspective while working with project.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical ….					Goal 2: Prepare the mechanical engineering graduates to have ..				Goal 3: Instilling a sense of responsibility as a professional…			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
L	**M**	**L**	**H**	**M**	**H**			**M**	**L**			

(L)ow (M)edium (H)igh

Topics Covered:

- Getting started with AutoCAD
- Modifying Commands
- Geometric Constructions
- Dimensioning
- Layouts and Plotting
- Text, Fields and Tables
- Object Grips, changing Properties of Objects
- Shape Description, Multiview Projection
- Section Views
- Auxiliary Views
- Analyzing 2D Drawings
- Blocks
- Attributes
- Solid Modeling Fundamentals, Editing Solids
- Creating 2D Drawings from Solid Models
- Rendering

Laboratory Projects: assigned weekly

Class/Laboratory Schedule: 7.00 – 9.45 P.M., Friday

Assessment of Student Progress toward Course Objectives

In-class assignments and homework are assigned weekly, and projects are given in the 10th week. All work are graded by instructor.

Class/Laboratory Schedule: MW 10:00-10:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credit

Prepared By: Z.Y. Wang

Date: October 2, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 130: Machine Shop Practices (1 credit): Elective Course

Course Description (2008-2010 Catalog):

Introduction to basic machining processes. Safety practices. Cutting theory. Use of lathe, milling machines, and other devices.

Prerequisite Course: None

Prerequisite by Topic:

- N/A

Textbook: None

Other Reference Material: N/A

Course Coordinator: Kevin Nelson, Professional Staff

Course learning outcomes:

(a) To familiarize the student with basic shop safety, metal fabrication and machine shop equipment.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**

(L)ow (M)edium (H)igh

Topics Covered:

1. Shop Safety
2. Basic wood fabrication, tools, and techniques
3. Basic Metal fabrication, tools, and techniques
4. Drilling and drill presses
5. Milling, endmills, and milling machines
6. Turning, lathe tools and lathes
7. TIG and MIG welding

Laboratory Projects:

1. Mill project
2. Lathe project

Class/Laboratory Schedule: 75 minutes laboratory, one session per week

Assessment of Student Progress toward Course Objectives

Attendance, two projects, and final exam

Class/Laboratory Schedule: T 3:00-4:15 PM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By:	**Date:**
Kevin Nelson	October 2, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 220: ME 220 - 3D Modeling with Pro Engineer (1 credit): Required Course

Course Description (2008-2010 Catalog): Parametric, feature-based solid modeling with ProEngineer software package. Credits 1
Prerequisite Course: None
Textbook:" Pro/ENGINEER Wildfire Tutorial and Multimedia CD by Dr. Roger Toogood
Other Reference Material: N/A
Course Coordinator: Z.Y. Wang, Associate Professor
Course learning outcomes: The main objective of the course is learning the 3-Dimensional modeling of mechanical systems using Pro/Engineer software. The course includes generating solid models, assemblies and drawings of different systems using Pro/E Wildfire 3.0
Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
L	**M**	**L**	**H**	**M**	**H**			**M**	**L**			

(L)ow (M)edium (H)igh

Topics Covered:
1) Introduction to Pro/Engineer Wildfire-3 User Interface, View Controls & Model Structure;
2) Pro/E Sketcher and few practice examples
3) Solid Modeling Part-1, (Extrude, Revolve, Sweep, Blend & Chamfer features);
4) Solid Modeling Part-2, (Hole, shell, Rib, Draft, Mirror, Pattern features);
5) Creating Datum Planes, Datum Axis & Datum Point), Modifying features, Model analysis, Modeling Utilities;
6) Creating Assembly in Pro/E, Assembly Constraints;
7) Assembly Operations, Assembly Drawings;

Laboratory Projects: In-class assignments and homework are assigned weekly, and projects are given in the 10th week.
Class/Laboratory Schedule: W 7:00-10:00 PM (Fall Semester)
Assessment of Student Progress toward Course Objectives
In-class assignments are conducted every class and are consist of the material being covered that day. Attendance is mandatory to obtain a grade for in-class assignments.
Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credit

Prepared By:	**Date:**
Z.Y. Wang	October 2, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 230: Principles of CNC (1 credit): Elective Course

Course Description (2008-2010 Catalog):

Includes the programming, setup, and use of Computer Numerically Controlled (CNC) machines. Students will learn the "G-code" programming language in addition to descriptions of the tools, equipment, and procedures special to this type of machines.

Prerequisite Course: ME 130
Prerequisite by Topic:

- Machine shop practices

Textbook: None
Other Reference Material: Operations and programming manuals for provided machines
Course Coordinator: Kevin Nelson, Professional Staff
Course learning outcomes:

1) Turn on and operate the machines manually.
2) Perform basic setup procedures including fixturing, zeroing, and tool offsets.
3) Create, transfer, edit, and troubleshoot programs written for each machine.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M			**L**	**L**								

(L)ow (M)edium (H)igh

Topics Covered:

1. CNC mill controls
2. CNC mill programming and file transfer
3. CNC mill fixturing and setup
4. CNC lathe controls
5. CNC lathe programming and file transfer
6. CNC lathe fixturing and setupSystem response (transient)

Laboratory Projects:

1. Mill project
2. Lathe project
3. Final project

Class/Laboratory Schedule: 75 minutes laboratory, one session per week
Assessment of Student Progress toward Course Objectives
Two mid-term projects, and final project
Class/Laboratory Schedule: R 8:30-9:45 AM (Spring Semester)
Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	1 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Kevin Nelson	October 2, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 240: Three-Dimensional Modeling with SolidWorks (1 credit): Required Course

Course Description (2008-2010 Catalog):

Parametric, feature-based solid modeling with Solidworks software package. Credits 1

Prerequisite Course: None

Textbook:" D. C. Planchard and M. P. Planchard, *Engineering Design with SolidWork*

Other Reference Material: N/A

Course Coordinator: Z.Y. Wang, Associate Professor

Course learning outcomes: basics of SolidWorks 3-D modeling software, from simple extrusions to 2-D engineering drawings and finite element analysis using COSMOSExpress.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
L	**M**	**L**	**H**	**M**	**H**			**M**	**L**			

(L)ow (M)edium (H)igh

Topics Covered:

- Intro to SolidWorks, Features, Drawings
- Extruded Parts, Cuts
- Revolves, Fillet & Chamfer
- *Project Assignments*
- Lofts
- Suppressing/Hiding Features
- Hole Wizard, Patterns, Mirror
- Editing Materials and Colors, Assemblies
- Engineering Drawings
- Sheet metal
- FEA using COSMOSExpress

Laboratory Projects: In-class assignments and homework are assigned weekly, and projects are given in the 10th week. It can be submitted via email (if file is under 10 MB) or on a USB drive. Late assignments will not be accepted. All work is graded by instructor.

Class/Laboratory Schedule: MW 10:00-10:50 AM (Spring Semester)

Assessment of Student Progress toward Course Objectives

In-class assignments are conducted every class and are consist of the material being covered that day. Attendance is mandatory to obtain a grade for in-class assignments.

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	1 credit
(c)	General Education:	0 credit
(d)	Others:	0 credit

Prepared By: Z.Y. Wang

Date: October 2, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 242: Dynamics (3 credit): Required Course

Course Description (2008-2010 Catalog):

Problem course in engineering dynamics, emphasizing the engineering applications of rigid body motion and mechanisms. Kinematics, energy, momentum, and impulse momentum methods utilized. **Prerequisite Course:** CEE 241, PHYS 180-180L, and MATH 182

Prerequisite by Topic:

- Statics
- Physics
- Calculus

Textbook: " Engineering Mechanics, Dynamics " 6th Edition, by Meriam and Kraige, J. Wiley

Other Reference Material: N/A

Course Coordinator: Georg F. Mauer, Professor

Course learning outcomes:

1. Develop an understanding of the fundamental principles governing the motion of objects and the interaction between forces acting on objects and their ensuing motion.
2. Develop the ability to formulate realistic dynamic models of physical systems and to analyze and predict the behavior of these systems using the established models.
3. Practice numerical and symbolic analysis of kinematics and dynamics using state of the art software tools.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective …				Goal 3: Instilling a sense of responsibility as a professional member …			
1.a	**1.c**	**1.d**	**1.e**	**1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**M**		**H**	**H**	**L**			**M**	**M**			

(L)ow (M)edium (H)igh

Topics Covered:

1. Kinematics of particles. (6 classes)
2. Kinetics of particles including the application of Newton's second law. (4 classes)
3. Energy and momentum methods for the kinetics of particles (4 classes)
4. Systems of particles (2 classes)
5. Kinematics of rigid bodies. (5 classes)
6. Plane motion of rigid bodies: forces and accelerations. (4 classes)
7. Plane motion of rigid bodies: energy and momentum methods. (2 classes)
8. Exams (3 classes)

Laboratory Projects: None

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives: Three written exams, home-works, and final exam

Class/Laboratory Schedule: MW 1:00-2:15 PM (Spring and Fall Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:
Georg Mauer

Date:
September 10, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 301: Structure and Properties of Solids (3 credit): Required Course

Course Description (2008-2010 Catalog):

Electronics structure and bonding in solids, crystalline and noncrystalline solids, defects and their relation to properties, phase transformations, diffusion in solids, and corrosion.

Prerequisite Course: CHEM 121, PHYS 182

Prerequisite by Topic:

- General Chemistry I – Fundamental principles of chemistry and their correlation with the properties of the elements.
- Physics for Scientists and Engineers III – Lectures in fluid mechanics, thermodynamics, optics, sound, temperature, thermometry, heat, gases, intermolecular forces, kinetic theory, entropy, light.

Textbook: Foundations of Materials Science and Engineering, Smith and Hashemi, 4th ed., McGraw Hill

Other Reference Material: N/A

Course Coordinator: Daniel Cook, Assistant Professor

Course learning outcomes:

(a) Describe the electronic structure of atoms, the bonding types in the three main material groups, and how this effects their macroscopic properties such as strength, ductility, thermal and electrical conductivity.
(b) Describe the major crystalline systems in metals and ceramics.
(c) Calculate the free energy of formation of nuclei from homogeneous and heterogeneous solidification.
(d) Identify and describe the various crystalline imperfections commonly found in solids.
(e) Determine the diffusion properties of atoms in a solid solution due to concentration and temperature gradients.
(f) Identify common metallic failure modes such as ductile, brittle, fatigue, creep, and corrosion failure.
(g) Use phase diagrams to determine the microstructure of metals and ceramics.
(h) Select or design appropriate processing methods to produce materials with specified combinations of properties.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**L**						**M**		**M**	**M**	

(L)ow (M)edium (H)igh

Topics Covered:

1. Atomic Structure and Bonding
2. Crystal and Amorphous Structure in Materials
3. Solidification and Crystalline Imperfections
4. Thermally Activated Processes and Diffusion in Solids
5. Mechanical Properties of Metals
6. Phase Diagrams
7. Engineering Alloys
8. Polymeric Materials
9. Ceramics
10. Corrosion

Laboratory Projects: None

Class/Laboratory Schedule: **75 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Two written exams, home-works, quizzes, and final exam

Class/Laboratory Schedule: MW 1:00-2:15 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Daniel Cook	October 11, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 302: Materials Mechanics (3 credit): Required Course

Course Description (2008-2010 Catalog):

Study of the response of isotropic elastic solids to load, stress and strain of a point, elasticity, thin walled pressure vessels, torsion, bending, deflection of beams, column failure, and connections.

Prerequisite Course: CEE 241, MATH 182, PHYS 180, PHYS 180L

Prerequisite by Topic:

- Statics
- Calculus II
- Physics for Scientists and Engineers I
- Physics for Scientists and Engineers Lab I

Textbook: "Mechanics of Materials", Beer, Johnston, DeWolf, and Mazurek, 5th Edition, McGraw Hill.

Other Reference Material: N/A

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

a. Learn the vocabulary necessary to understand the text and related material.
b. Improve free-body drawing skills to interpret applied loads and solve for reactions.
c. Learn basic material properties and response to applied loads.
d. Learn how to solve mechanics problems.
e. Improve engineering design skills.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**L**	**M**		**H**	**L**		**H**	**L**				**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Axial Loads: Normal Stress & Components of Stress
2. Safety Factors
3. Stress-Strain Curves
4. Statically indeterminate problems
5. Poisson's Ratio
6. Torsion and power
7. Bending Stresses
8. Load, Shear, and Bending Moment Diagrams in Beams
9. Transverse Shear in Beams
10. Thin walled pressure vessels
11. Combined Loading: Mohr's Circle, Principle Stresses, Failure theories
12. Beam Deflection
13. Column Stability, Buckling

Laboratory Projects: There is a separate 1 credit lab course that students take at the same time.

Class/Laboratory Schedule: **75 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Three written exams, home-work assignments, one group project, and final exam

Class/Laboratory Schedule: TR 11:30 AM - 12:45 PM (Fall and Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Brendan O'Toole	October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 302L : Materials Mechanics Lab (1 credit): Required Course

Course Description (2008-2010 Catalog):

Strain gage attachment and calibration, tensile testing of metals and non-metals, elastic constants, beam deflection and failure, torsion testing, column stability, and bolted connection testing.

Prerequisite Course: None

Corequisite: ME 302

Corequisite by Topic: Mechanics of Materials

Textbook: None

Other Reference Material: On-Line Lab manual

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

The primary objective for this course is to provide hands on experimental experience in characterizing mechanical properties of materials. Learning Outcomes will be:

(a) Laboratory safety procedures and report writing skills
(b) Uncertainty analysis of data (error propagation) and Statistical analysis of data
(c) Specific standard test procedures for determining elastic and strength properties of materials for the following load conditions: axial, torsion, bending, and buckling.
(d) Planning and executing an original experimental project in a group.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective …				Goal 3: Instilling a sense of responsibility as a professional member …			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**L**		**L**	**L**		**H**	**L**				**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Lab Safety
2. Statistical and Uncertainty Analysis
3. Tensile Testing
4. Poisson's Ratio
5. Torsion
6. Flexural Modulus
7. Strain Gage Application
8. Beam Deflection
9. Group Projects
10. Column Loading

Laboratory Projects: This is a 1 credit lab course with predefined lab experiments and an original student designed group experimental project.

Class/Laboratory Schedule: 170 minutes one session per week

Assessment of Student Progress toward Course Objectives

Seven lab reports, one homework assignment, four quizzes, attendance/participation, and one group design report

Class/Laboratory Schedule: R 1:00 – 2:50 PM (Fall and Spring Semester) or
F 1:00 – 2:50 PM (Fall and Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By: Brendan O'Toole

Date: October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 311: Engineering Thermodynamics I (3 credits): Required

Course Description (2008-2010 Catalog):

Engineering applications of thermodynamics including the first and second laws, behavior of condensable and non-condensable substances, analysis of open and closed systems, equations of state, power and refrigeration cycles.

Prerequisite Course: Prerequisites PHYS 181, 181L or PHYS 182, 182L

Prerequisite by Topic:

- fluid mechanics, thermodynamics, temperature and thermometry, heat, gases
- Differential equations

Textbook: Thermodynamics: An Engineering Approach, 6th edition, Y. Cengel, M. Boles, McGraw Hill

Other Reference Material: N/A

Course Coordinator: Samir Moujaes, Ph.D., P.E.

Course Learning Outcomes:

a. Be able to identify which substances typically used in engineering systems can be analyzed with ideal gas assumptions and which require the use of liquid/vapors tables. The student should show competency applying both of these concepts and the appropriate properties in the solution of problems.
b. Recognize the differences between thermodynamic processes cycles and, and be able to perform basic analyses of both.
c. Comprehend the differences between work, heat, internal, energy, potential energy, and kinetic energy as they apply to typical engineering systems. As part of this understanding the distinction between concepts of path functions (inexact differentials) and point functions (exact differentials) should be clear.
d. Be able to express and apply the First Law of Thermodynamics (Conservation of Energy) for closed systems and open systems of the steady-state steady-flow (ss-sf) and uniform-state and uniform-flow (us-uf) types. Understand the concept of conservation of mass as it applies to flow systems. Realize the basis and application of the property enthalpy.
e. Have a basic understanding of the Second Law of Thermodynamics and how it applies to cycles. Particularly appreciate the implications and applications of the Carnot Cycle idealization as an upper bound to actual operation.
f. Understand the applications of the Second Law of Thermodynamics and how it applies to processes. Recognize the influence of heat transfer and irreversibilities on the entropy change. Be able to apply this law to situations that involve ideal gases or liquid/vapor substances.
g. Be able to analyze basic Rankine (seam power), Brayton (gas turbines and jet engines), and Vapor-Compression (refrigeration) cycles to determine component and overall performance.
h. Develop an understanding of the basic ideas of psychrometrics (air/water vapor mixtures) and apply them to elementary concepts related to heating, ventilating, and air conditioning (HVAC) systems. Be aware of the simplicity afforded by the Psychrometric Chart in solving practical problems, as well as realize its limitations.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M		**L**		**L**	**L**			**M**			**M**	

(L)ow (M)edium (H)igh

Topics Covered:

1. definitions of basic properties of a system
2. general energy transfer and analysis
3. properties of pure substances
4. energy analysis of closed systems
5. mass and energy of control volumes
6. second law of thermodynamics
7. entropy
8. gas powered cycles
9. vapor and combined cycles
10. refrigeration cycles
11. gas-vapor mixtures

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Two written exams, home-works and final exam

Class/Laboratory Schedule: MW 1:00-2:15 (Fa09)

Contribution of Course for meeting Professional Component:

7. Mathematics and basic sciences: 0 credit
8. Engineering Topics (Design/Science): 3 credit
9. General Education: 0 credit
10. Others: 0 credits

Prepared By: **Date:**

Samir Moujaes October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 314: Introduction to Heat Transfer (3 credits): Required

Course Description (2008-2010 Catalog):

Engineering applications of heat transfer. Conduction, convection, and radiation. Introduction to heat exchangers.

Prerequisite Course: PHYS 181, 181L or PHYS 182, 182L, MATH 431

Prerequisite by Topic:

- Physics
- Differential equations

Textbook: Introduction to Heat Transfer, Fifth Edition by Incropera et al., J. Wiley.

Other Reference Material: N/A

Course Coordinator: Robert Boehm, Professor

Course Objectives:

1. Introduction to conduction analysis with emphasis on numerical approaches
2. Understand the way to calculate convective heat transfer using correlations
3. Learn both the LMTD and effectiveness-NTU methods of heat exchanger analysis
4. Introduce thermal radiation exchange ideas with an emphasis on the diffuse/gray model

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**L**	**L**	**L**	**H**								

(L)ow (M)edium (H)igh

Topics Covered:

1. 1-D steady state, lumped capacitance transient, and numerical steady state and transient conduction analyses
2. Implications of the boundary concept and major emphasis on finding the heat transfer coefficient from empirical correlations
3. Analysis of heat exchangers using both the LMTD and effectiveness-NTU approaches
4. Introduction to thermal radiation property evaluations and heat transfer analysis using the diffuse-gray model.

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Two or three (varies) midterm exams, quizzes (varies), homework and final exam.

Class/Laboratory Schedule: MW 10:00-11:15 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credits
(b)	Engineering Topics (Design/Science):	3 credits
(c)	General Education:	0 credits
(d)	Others:	0 credits

Prepared By:	**Date:**
Robert Boehm	October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 315: Thermal Engineering Laboratory (1 credit): Required Course

Course Description (2008-2010 Catalog):

Laboratory studies related to heat transfer, thermodynamics, energy conversion, and HVAC applications.

Prerequisite Course: ME 311, ME 314, ME 380

Prerequisite by Topic:

- Engineering Thermodynamics I
- Introduction to Heat Transfer
- Fluid Dynamics for Mechanical Engineers

Textbook: (1) H. W. Coleman and W.G. Steele, "Experimentation and Uncertainty Analysis for Engineers," 1989, John Wiley & Sons, Inc. (Recommended) (2) Frank P. Incropera, David P. DeWitt, Theodore L. Bergman, and Adrienne S. Lavine, "Fundamentals of Heat and Mass Transfer," 6th. Edition, 2007, John Wiley & Sons, Inc. (or equivalent reference) (3) Moran and Shapiro, "Fundamentals of Engineering Thermodynamics," 6th Edition, 2008, John Wiley & Sons, Inc. (or equivalent reference) (4) Robert W. Fox, Philip J. Pritchard, Alan T. McDonald, "Introduction to Fluid Mechanics," 7th Edition, 2009, John Wiley & Sons, Inc. (or equivalent reference)

Other Reference Material: Laboratory handouts on each experimental and numerical exercise

Course Coordinator: Yi-Tung Chen, Professor

Course learning outcomes:

a) Understand safety is always the first priority in the laboratory.
b) Understand the properties or variables of what we measure and why we need to measure.
c) Understand why discrepancies always exist between experimental and analytical results.
d) Collect data from experiments and perform error analysis
e) Able to identify the possible errors happened to experimental measurements.
f) Apply the fundamental engineering knowledge learned from heat transfer, thermodynamics, and fluid mechanics classes to improve the experimental measurement.
g) Learn experimental techniques necessary to study problems in heat transfer and thermodynamics.
h) Learn how to make single and dual junction thermocouples and use it to measure temperature.
i) Lear how to determine thermistor resistance using the Volt-ohm meter (VOM) and use it to measure temperature.
j) Learn how to use infrared detector to measure temperature.
k) Learn how to show a block diagram of the vapor compression refrigeration cycle indicating the state points from the experimental data.
l) Learn how to draw T-s and P-h diagrams of the ideal vapor compression refrigeration cycle shown with the temperature and pressure identified from the experimental data.
m) Learn how to put the actual operating states on the actual refrigerant P-h diagram and connect the states.
n) Find the internal coefficient of performance for the actual internal cycle and find the external coefficient of performance for the cycle.
o) Determine an overall energy balance for the vapor compression refrigeration cycle system from the externally measured data (the power into the compressor, the heat removed from the water in the evaporator, and the heat added to the water in the condenser).
p) Measure the thermal conductivity for the different materials by using the Fourier's conduction law.
q) Able to find the overall-heat-transfer-coefficient-area product (UA) by using either the LMTD or □-NYU approach from the heat exchanger experimental data.
r) Determine the performance information for a heat exchanger mounted in the heat exchanger testing rig.
s) Able to compare the theoretical and experimental results from the Joule-Thomson throttling process.

t) Learn how to apply the finite difference method to analyze the temperature distribution in a fin-type heat rejection unit on the electronic device.
u) Compare analytical solution with numerical solution and identify the discrepancy reasons between two results.
v) Learn how to write good formal laboratory report from the experimental results.
w) Lean the value of honesty and lifelong learning from performing the experimental works.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**L**	**H**	**H**	**H**			**M**	**H**		**L**	

(L)ow (M)edium (H)igh

Topics Covered:

1. Laboratory safety
2. What do we measure? And why?
3. Discrepancies exist between analytical and experimental results
4. Why are calibrations of instruments needed?
5. Data collection and error analysis such as uncertainty analysis, mean value, standard deviation, confidence interval, propagation of uncertainty.
6. How to improve the experimental measurement such as applying good insulator for heat loss etc.
7. How to write good laboratory report
8. Measure temperatures using glass thermometers, thermocouples, thermistors, and infrared detector
9. Vapor compression refrigeration cycle, P-h diagram, and the coefficient of performance
10. Measurement of thermal conductivities on different materials
11. Shell-and-tube heat exchanger, LMTD, and □-NYU approaches to find UA
12. Joule-Thomson throttling
13. Introduction of numerical analysis

Laboratory Projects: (1) Temperature measurement (2) Vapor Compression Refrigeration (3) Thermal Conductivity Measurement (4) Heat Exchanger Evaluation (5) Joule-Thomson Throttling (6) Numerical analysis of heat transfer

Class/Laboratory Schedule: 90 minutes introduction and general information of thermal engineering laboratory, 170 minutes of experimental exercise in every other week, 90 minutes introduction of numerical analysis on heat transfer problem

Assessment of Student Progress toward Course Objectives

Five experimental and one numerical exercises, total of six formal laboratory reports

Class/Laboratory Schedule: F 1:00-3:50 PM and 4:00-6:50 PM (Fall Semester)

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	1 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: **Date:**

Yi-Tung Chen October 1, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 319/319L: Introduction to Programming for Mechanical Engineers (2 credit)

Course Description (2008-2010 Catalog):

Introduction to computer languages and computer hardware, MATLAB programming environment, MATLAB data types, MATLAB graphics, Functions, Inputs / Outputs, text processing function library, Plotting functions, Reading and writing data files, and Case Studies using different MATLAB Toolboxes.

Prerequisite Course: ME100, ME100L,Math 283

Prerequisite (Corequisite) by Topic:

- Introduction to Mechanical Engineering
- Calculus III

Textbook:

MATLAB, AN INTRODUCTION WITH APPLICATIONS, Amos Gilat, WILEY, 3rd Edition. ISBN 978-0-470-10877-2

Other Reference Material: N/A

Course Coordinator: Woosoon Yim, Professor

Course learning outcomes:

1. Perform mathematical operations using arrays and matrices in MATLAB.
2. Create script and user defined function files.
3. Handle data using MATLAB by importing/exporting them from/to different formats (.mat, .doc, .xls).
4. Generate two dimensional plots and perform the essential plotting commands.
5. Write programming codes with conditional statements and loops to solve most engineering problems.
6. Build and simulate basic SIMULINK models.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**L**	**H**	**H**	**M**		**L**					

(L)ow (M)edium (H)igh

Topics Covered:

1. Starting with MATLAB
2. Creating Arrays
3. Mathematical Operations with Arrays
4. Script Files
5. Two Dimensional Plots
6. Functions and Function Files
7. Programming in MATLAB
8. Polynomials, Curve Fitting, A Interpolation
9. Three Dimensional Plots
10. Applications in Numerical Analysis
11. Simulink applications

Laboratory Projects: **1 credit laboratory**

The ME 319 Lab is designed to give the engineering student introductory-level experience with MATLAB (2007b) using various engineering problems in system dynamics.

Assessment of Student Progress toward Course Objectives: Homework: 40% Midterm: 20% Final Exam: 40%

Class/Laboratory Schedule: 50 minutes lecture and 3 hr lab per week

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences: 0 credit
(b) Engineering Topics (Design/Science): 2 credit
(c) General Education: 0 credit
(d) Others: 0 credits

Person who prepared this description:

Woosoon Yim, Professor October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 320: Dynamics of Mechanics (3 credits): Required Course

Course Description (2008-2010 Catalog):

Algebraic and graphical methods for synthesis of cam, gear, and linkage mechanisms; methods of planar motion analysis; characteristics of plane motion, and kinematics.

Prerequisite by Topic:

- Dynamics
- Differential equation

Textbook: "Design of Machinery" 4th edition, Robert L. Norton, McGraw-Hill.

Other Reference Material:

Personal handouts, available on the course web site (http://me.unlv.edu/~mbt/320/320.html)

Course Coordinator: Mohamed Trabia, Professor

Course learning outcomes:

1. Identify a machine.
2. Suggest suitable dimensions to ensure that this machine achieves certain objective.
3. Analyze displacement velocity, acceleration, and forces of machines.
4. Design simple machines starting from an abstract specification list.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**	**H**	**H**	**M**			**M**				

(L)ow (M)edium (H)igh

Topics Covered:

1. Knowledge of the basic terminology used in machines.
2. Introducing basic mechanical systems.
3. Design (synthesis) of simple machines to achieve a desired objective.
4. Ability to analyze displacement velocity, acceleration, and forces of machines.
5. Ability to use commercial software to achieve the above objectives.

Laboratory Projects: None

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives

Three written exams, homework, three projects, and final exam

Class/Laboratory Schedule: MW 10:00-10:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Mohamed Trabia	June 21, 2010

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 330: Analysis of Dynamic Systems (2 credit): Required Course

Course Description (2008-2010 Catalog):

Mathematical modeling and analysis of dynamic systems with mechanical, electrical, and fluid elements. Topics include: time and frequency domain solution, state space modeling and solutions, linearization, numerical solution using Matlab.

Prerequisite Course: MATH 431, ME 242

Prerequisite by Topic:

- Dynamics
- Differential equation

Textbook: Modeling & Analysis of Dynamic System by Close et al, 3rd ed., Wiley

Other Reference Material: N/A

Course Coordinator: Woosoon Yim, Professor

Course learning outcomes:

1. Model the dynamic system in either input/output equation or state space representation.
2. Linearize the nonlinear elements in the dynamic system about operating conditions.
3. Understand the transient and steady state response of dynamic systems and the effects of the system parameters changes on the responses.
4. Simulate the dynamic response using Matlab and Simulink.

Relationship of Course to Mechanical Engineering Program Outcomes:

Educational Objective1: Provide mechanical engineering graduates with technical capabilities.					**Educational Objective 2:** Prepare the mechanical engineering graduates to have effective workplace skills.				**Educational Objective 3:** Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**L**	**H**	**H**	**L**			**M**				

(L)ow (M)edium (H)igh

Topics Covered:

1. Laplace transformation
2. Dynamic system modeling (mechanical, electrical, fluid)
3. Linearization
4. System response (transient)
5. System response (steady state)
6. Frequency response of dynamic system
7. I/O equation and transfer function
8. State space representation of dynamic system and responses
9. Simulation of dynamic system using Matlab and Simulink

Laboratory Projects: None

Class/Laboratory Schedule: **50 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Two written exams, home-works, one project, and final exam

Class/Laboratory Schedule: MW 10:00-10:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	2 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Woosoon Yim	September 1, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 337: Engineering Measurements (3 credit): Required

Course Description (2008-2010 Catalog):

Generalized measurement systems, characteristics of dynamic signals, basic transducer, signal conditioning and recording systems, applied mechanical measurements, and statistical analysis.

Prerequisite Course: EEG 291, PHY 182, 182L, or consent of instructor

Prerequisite by Topic:

- Electrical Circuit
- Physics

Textbook: "Theory and Design for Mechanical Measurements," 3rd edition, R.S. Figliola, D.E. Beasley (2000)

Other Reference Material: N/A

Course Coordinator: Woosoon Yim, Professor

Course learning outcomes:

1. Acquire the common mechanical measurement signals in the laboratory using either conventional measurement instruments or computer based data acquisition system
2. Design measurement system including the selection of appropriate transducers, signal conditioning units.
3. Understand dynamic characteristics of measurement signal (Fourier analysis) and instruments (frequency response/dynamic bandwidth)
4. Treat measurement data using statistics; probability theory; finite statistics; curve fitting of measurement data and goodness of fit.
5. Analyze the measurement data using uncertainty analysis (design stage and multiple measurement analysis); propagation of individual uncertainties to final measurement results using Taylor series.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M	**H**		**H**	**L**	**L**		**L**					

(L)ow (M)edium (H)igh

Topics Covered:

1. Fundamentals of PC based data acquisition system, sampling theorem, aliasing frequency, and signal conditioning of transducer output.
2. Dynamic signal characterization and dynamics response of measurement instruments: Fourier analysis of dynamic signal is introduced to students along with dynamic characteristics of measurement instruments. Emphasis is given to (1) discrete Fourier transformation that can be implemented for the PC based computer aided data acquisition system (2) selection of right dynamic parameters for instruments; concept of dynamic bandwidth of instrument; design of instrument for a given dynamic range.
3. Probability, statistical method, and uncertainty analysis: Treatment of measurement data using statistics; probability theory; finite statistics; curve fitting of measurement data and goodness of fit.

4. Uncertainty analysis using design stage and multiple measurement analysis; propagation of individual uncertainties to final measurement results using Taylor series.
5. Operational principles of transducers and signal conditioning units commonly encountered in mechanical engineering
6. Familiarize the basic operational principles of motion measurement, temperature measurement, and pressure measurement. Transducers such as incremental encoder, absolute encoder, tachometer, potentiometer, thermocouple, thermistor, RTD, strain gauges are discussed along with appropriate analog/digital signal processing of transducer output.

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Two written exams, home-works, and final exam

Class/Laboratory Schedule: Meet twice per week 75 minutes per lecture (Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	3 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Person who prepared this description:

Woosoon Yim, Professor October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 337L: Engineering Measurements Laboratory (1 credit): Required

Course Description (2008-2010 Catalog):

Laboratory instruction involving oscilloscopes, strain gauges, temperature probe calibration, use of pressure transducers, flow measurement devices and analog-to-digital converters for computer-aided data acquisition.

Corequisite Course: ME337 or consent of instructor

Prerequisite by Topic:

- Electrical Circuit
- Physics

Textbook:

Laboratory handouts

"Theory and Design for Mechanical Measurements," 3rd edition, R.S. Figliola, D.E. Beasley (2000)

Other Reference Material: N/A

Course Coordinator: Woosoon Yim, Professor

Course learning outcomes:

1. Measurement process planning including selection of correct transducers and signal conditioning units commonly encountered in mechanical engineering:
2. Basic hardware set up of PC based data acquisition and control system and software programming skill in LabVIEW
3. Handling and characterization of typical dynamic signals encountered in mechanical engineering in discrete form (DFT, FFT, sampling rate, frequency resolution, dynamic bandwidth)

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M	**H**		**H**	**L**	**L**		**L**					

(L)ow (M)edium (H)igh

Topics Covered:

ME337L is designed to provide undergraduate students hands-on experiences in the engineering measurement commonly encountered in mechanical engineering. Emphasis is given to (1) computer aided data acquisition fundamentals, analysis of measurement data, and programming instruction using graphical programming language LabVIEW (2) Dynamic signal characterization using Discrete Fourier Transformation (DFT) and dynamic response of measurement systems (3) hands-on experience in calibration of various transducers (encoder, tachometer, thermocouples, RTD, thermistor, strain gauges) and signal conditioning of transducer output.

Experiment #	Laboratory Topics
1.	Introduction to Graphical Programming Language LabVIEW: Part I
2.	Introduction to Graphical Programming Language LabVIEW: Part II
3.	Introduction to DAQ in LabVIEW
4.	Computer Aided Data Acquisition (Buffered DAQ and Triggering)
5.	Digital-to-analog Conversion using LabVIEW
6.	Fourier Analysis of Measurement Signals
7.	Measurement System Response I
8.	Measurement System Response II
9.	Statistical Analysis
10.	Applied Mechanical Measurement ▪ Bridge circuit for resistive transducers ▪ Incremental optical encoder ▪ Temperature measurement using thermocouple & RTD

Laboratory Projects: 9-10 Lab projects

Assessment of Student Progress toward Course Objectives

Final exam and laboratory reports, attendance

Class/Laboratory Schedule: Meet once per week 3 hours per lab (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	1 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Person who prepared this description:

Woosoon Yim, Professor October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 380: Fluid Dynamics for Mechanical Engineers (3 credits): Required Course

Course Description (2008-2010 Catalog):

Introduction to fluid properties, statics, and fluid dynamics. Development of the Navier-Stokes equations for the study of flow in closed conduits, external flows, boundary layers, compressible flows, potential flows, and turbomachinery.

Prerequisite Course: ME 242, MATH 283, PHYS 182-182L

Prerequisite by Topic:

- Dynamics
- Calculus III
- Physics for Scientists and Engineers III
- Physics for Scientists and Engineers Lab III

Textbook: Robert W. Fox, Philip J. Pritchard, Alan T. McDonald, "Introduction to Fluid Mechanics," 7th Ed., John Wiley & Sons, Inc. 2009

Other Reference Material: N/A

Course Coordinator: Yi-Tung Chen, Professor

Course learning outcomes:

1. Lead students toward a clear understanding and firm grasp of the basic principles of fluid mechanics.
2. Apply the governing equations in integral form for a control volume and differential analysis to a variety of fluid problems, including those they have not encountered previously.
3. Model the variety of phenomena that occur in real fluid situations.
4. Encourage creative thinking and development of a deeper understanding and intuitive feel for fluid mechanics.
5. Understand motion of a fluid particle (kinematics) such as translation, rotation, angular deformation, and linear deformation.
6. Understand incompressible inviscid flow and Euler's equations in streamline coordinates and apply the Bernoulli equation between any two points on a streamline.
7. Apply dimensional analysis in determining the relevant scales in a given problem, correlating experimental data and extrapolating measurements on small-scale models to large-scale objects.
8. Calculate the entrance length for laminar pipe flow and understand fully developed laminar flow between infinite parallel plates, in a pipe, shear stress distribution, turbulent velocity profiles in fully developed pipe flow, and velocity potential.
9. Calculate the total head loss as the sum of major losses and minor losses and apply the Moody diagram to find friction factor based Reynolds number and relative roughness.
10. Understand flow measurement from different flow meter types such orifice, flow nozzle, and Venturi.
11. Understand the concept of boundary layer and calculate the disturbance thickness, displacement thickness, and momentum thickness.
12. Understand the drag and lift coefficients and use it to calculate drag and lift forces on a body.

13. Understand propagation of sound waves.
14. Understand basic machines that add energy to a fluid by performing work on it.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**M**	**H**	**H**	**L**			**M**			**L**	**H**

(L)ow (M)edium (H)igh

Topics Covered:

1. Velocity and stress fields, viscosity, surface tension, fluid motions
2. Newtonian and non-Newtonian fluids
3. Manometer, hydrostatic forces on a plan or curved submerged surface
4. Basic equations in integral form for a control volume (conservation of mass and momentum)
5. Introduction to differential analysis of fluid motion (stream function and fluid kinematics)
6. Continuity and Navier-Stokes equations
7. Incompressible inviscid flow (Euler and Bernoulli equations; energy and hydraulic grade lines)
8. Dimensional analysis and similitude (Buckingham PI theorem)
9. Internal incompressible viscous flow (fully developed laminar flow; flow in pipes and ducts; flow measurement)
10. External incompressible viscous flow (Boundary-layer, drag and lift)
11. Basic introduction of compressible flow
12. Basic introduction of turbomachinery

Laboratory Projects: None

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives

Homework assignment on each week, two written midterm exams, and final exam

Class/Laboratory Schedule: TTh 8:30-9:45 AM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	3 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By:	**Date:**
Yi-Tung Chen	September 24, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 380L: Fluid Dynamic Laboratory (1 credit): Required Course

Course Description (2008-2010 Catalog):

Laboratory and computer-based experiments on the dynamics of fluids including pressure in pipes, fluid properties, compressible flows, inviscid flow simulations, boundary layer measurements, usage of wind tunnels, and applications of computational fluid dynamics..

Prerequisite Course: ME 242, MATH 283, PHYS 182-182L.

Prerequisite by Topic:

- Dynamics
- Calculus III
- Physics for scientists and engineering III

Textbook: N/A

Other Reference Material: N/A

Course Coordinator: Hui Zhao, Assistant Professor

Course learning outcomes:

1. Measure the viscosity, force, flow rate and friction through experiments.
2. Understand the physical meaning of each measured parameter such as Re number.
3. Analyze the data, identify and estimate errors and know how to reduce the errors.
4. Present the results in scientific written reports.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**L**			**H**		**M**	**M**				

(L)ow (M)edium (H)igh

Topics Covered:

1. Determination of fluid temperature, fluid density and fluid viscosity
2. Forces on a sluice gate
3. Determination of the critical Reynolds number
4. Flow rate and pressure measurements
5. Determination of friction factor in pipe flow
6. Developing pump curves using PUMPLAB®

Laboratory Projects: None

Class/Laboratory Schedule: 2 hours and 50 minutes lab every two weeks

Assessment of Student Progress toward Course Objectives : Six written lab reports.

Class/Laboratory Schedule: F 1:00-3:50 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	1 credit
(c)	General Education:	0 credit
(d)	Others:	0 credit

Prepared By:
Hui Zhao

Date:
September 1, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 400: Intermediate Fluid Mechanics (3 credits): Elective Course

Course Description (2008-2010 Catalog):

Basic laws and equations of fluid flow; very viscous flow solutions; boundary layer flows; potential flows; wave phenomena; transport phenomena; turbulence.

Prerequisite Course: ME 380

Prerequisite by Topic:

- Fluid dynamics for mechanical engineers

Textbooks: (1) David C. Wilcox, "*Element of Fluid Mechanics,*" 1st Edition, 2005, DCW Industries, Inc. (2) Ronald L. Paton, "*Incompressible Flow,*" 3rd Edition, 2005, John Wiley & Sons, Inc.

Other Reference Materials: (1) Frank M. White, "*Fluid Mechanics,*" 6th Edition, 2008, McGraw-Hill Companies, Inc. (2) I.G. Currie, "*Fundamental Mechanics of Fluids*," 3rd Edition, Marcel Dekker, Inc., 2003. (3) Frank M. White, "*Viscous Fluid Flow*," 3rd ed., New York: McGraw-Hill, 2006. (4) Van Dyke, "*An Album of Fluid Motion*," Stanford, Calif.: Parabolic Press, 1982. (5) M. Samimy, K. S. Breuer, L. G. Leal, and P. H. Steen, "*A Gallery of Fluid Motion*," Cambridge University Press, 2003. (6) Hermann Schlichting, "*Boundary-Layer Theory*," 8th Edition, Springer-Verlag, 1999. (7) R. B. Bird, W. E. Stewart, and E. N. Lightfoot, "*Transport Phenomena,*" 2nd Edition, John Wiley & Sons, Inc., 2002. (8) David J. Acheson, "*Elementary Fluid Dynamics*," New York: Oxford University Press, 1990. (9) Rutherford Aris, "*Vectors, Tensors, and the Basic Equation of Fluid Mechanics*," Courier Dover Publications, 1989. (10) D. J. J. Tritton, "*Physical Fluid Dynamics*," 2nd ed., Oxford University Press, 1988.

Course Coordinator: Yi-Tung Chen, Professor

Course learning outcomes:

1. Lead students toward a clear understanding and firm grasp of the fundamentals of the subject with a balance between physics, mathematics, and applications of fluid mechanics.
2. Learn basic vector and tensor calculus to apply into fluid mechanics.
3. Understand the elementary motions of a fluid particle (kinematics) of translation, solid-body rotation, and deformations.
4. Derive two major independent dynamical laws in continuum mechanics: the continuity and momentum equations.
5. Learn the Kelvin's theorem that circulation about any closed path moving with the fluid is a constant.
6. Determine rotational or irrotational flows using vorticity equation.
7. Understand incompressible inviscid flow and Euler's equations in streamline coordinates and apply the Bernoulli equation between any two points on a streamline.
8. Learn stream function and velocity potential for two-dimensional, irrotational, incompressible flow. Then apply elementary plane flows to superposition plane flows.
9. Distinguish Newtonian and non-Newtonian fluids and derive the Navier-Stoke equations from the equation of motions.
10. Learn a few types of exact solutions of viscous flows of incompressible fluid flow such as Couette (wall-driven) steady flows, Poiseuille (pressure-driven) steady duct flows, unsteady duct flows, unsteady flows with moving boundaries, duct flows with suction and injection, and similarity solutions.
11. Understand the fundamentals of computational fluid dynamics (CFD) and able to apply the CFD solution procedure to simple nonlinear equations and assigned class project.
12. Learn and solve flows at low-Reynolds-number (i.e. creeping flows or Stokes flows) for the applications of an oil-lubricated bearing, the flow of groundwater, oil, or natural gas through porous rock, or leading edge of a flat plate aligned with free stream etc. in the future.

13. Understand important phenomena of boundary layers and how to calculate boundary layer thickness and apply it to Blasius flow over a flat plate.
14. Learn the basics of hydrodynamics stability, turbulence, flow separation, and wave phenomena.
15. Model the variety of phenomena that occur in real fluid situations.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**M**	**H**	**H**	**H**			**M**			**L**	**H**

(L)ow (M)edium (H)igh

Topics Covered:

1. Introduction of scalar, vector, and tensors
2. Basic conservation laws and transport phenomena
3. Kinematics of fluid flow
4. Kelvin's theorem
5. Bernoulli equation, Crocco's equation, and vorticity equation
6. Two-dimensional potential flows
7. Viscous flows of incompressible fluid flow
8. Exaction solutions
9. Computational fluid dynamics (CFD)
10. Low-Reynolds-number solutions
11. Boundary layers
12. Hydrodynamics stability, turbulence, and flow separation
13. Wave phenomena

Laboratory Projects: None

Class/Laboratory Schedule: **75 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Homework assignments, one CFD project, one written midterm exams, and final exam

Class/Laboratory Schedule: TR 4:00-5:15 PM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Yi-Tung Chen	September 28, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 402: Applied Numerical Analysis (3 credit): Required Course

Course Description (2008-2010 Catalog):

Numerical analysis is used by engineers to solve problems which are either intractable or too difficult to solve using exact methods. In this course, the student will be introduced to the fundamental concepts and techniques commonly used by engineers to solve simultaneous equations, perform integration, and obtain solutions to ordinary and partial differential equations. *FORTRAN, C/C++, JAVA, MathCad, MATLAB, MAPLE,* or *Mathematica* can be used to write programs and graphical displays. *Maple 13 is recommended for the course.*

Prerequisite Course: MATH 431, ME 242

Prerequisite by Topic: - Matlab - Calculus and Differential equations

Textbook: Numerical Methods for Engineers, 6th ed., McGraw-Hill

Other Reference Material: N/A

Course Coordinator: Darrell Pepper, Professor

Course learning outcomes:

a) Model governing equations employed in engineering problems using various numerical techniques.
b) Develop computer programs that will operate on PCs using a preferred computer language or one of the commercial packages including Matlab, Maple, MathCad, or Mathematica.
c) Understand the transient and steady state solutions of systems of equations and the effects of changes in the system variables on the output.
d) Be familiar with ways to numerically solve matrices, discretize equations, and apply statistical measures to examine accuracy.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1 (3a): Provide mechanical engineering graduates with ability to apply mathematics, science, and engineering	Goal 2 (3e): Provide the mechanical engineering graduates with ability to identify, formulate, and solve engineering problems	Goal 2 (3k): Provide the mechanical engineering graduates with ability to use techniques, skills and modern engineering tools.

Topics Covered:

1. Roots of equations
2. Systems of equations
3. Interpolating polynomials
4. Differentiation
5. Integration
6. Solution of ODEs
7. Curve Fitting
8. Statistics
9. Solution of PDEs

Laboratory Projects: None

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives

Six written exams, homework (seven project-based), and final exam

Class/Laboratory Schedule: TTh 8:30-10:00 AM (Fall Semester)

Contribution of Course for meeting Professional Component:

a) Mathematics and basic sciences:	2 credit
b) Engineering Topics (Design/Science):	1 credit
c) General Education:	0 credit
d) Others:	0 credits

Prepared By:	**Date:**
Darrell Pepper	September 24, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 415: Design of Thermal Systems (3 credits): Elective Course

Course Description (2008-2010 Catalog):

Design of thermal systems and subsystems, especially as they relate to current and new means of energy utilization and power generation; computer simulation and optimization of thermal systems based on performance and economic constraints.

Prerequisite Course: EGG 307, ME 311, 314, 380

Prerequisite by Topic:

- Engineering Economics
- Engineering Thermodynamics
- Engineering Heat Transfer
- Fluid Mechanics

Textbook: Design Analysis of Thermal Systems, R. Boehm, J. Wiley

Other Reference Material: N/A

Course Coordinator: Robert Boehm, Distinguished Professor

Course Objectives:

1. Review pertinent prerequisite topics emphasizing design aspects
2. Emphasize applications of various devices and software used in thermal systems design
3. Working in a group, perform a major open-ended design project that uses costing as a key element
4. Give oral and written reports on a regular basis

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective …				Goal 3: Instilling a sense of responsibility as a professional member …			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**	**M**	**H**	**H**	**M**	**H**	**M**	**M**		**M**	**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Selection of fluid flow equipment in practical designs
2. Heat exchange options in design
3. Fitting of physical data and solving equations numerically
4. Economic evaluation techniques
5. Preliminary cost estimation
6. Availability analysis
7. Introduction to optimization techniques
8. Outline of some commercial software
9. Major group design project

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Regular oral reports, midterm exam, final group project

Class/Laboratory Schedule: MW 4:00-5:15 (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credits
(b)	Engineering Topics (Design/Science):	3 credits
(c)	General Education:	0 credits
(d)	Others:	0 credits

Prepared By: **Date:**

Robert Boehm September 24, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 416: Introduction to Biomechanical Engineering (3 credits): Elective Course

Course Description (2008-2010 Catalog):

Fundamental engineering principles in several engineering areas to problems in the biological world. Discuss includes biomechanics of solids, biofluid and transport phenomena, biomaterials, cell and tissue engineering, medical imaging and electrophoresis.

Prerequisite Course: BIOL 223. ME 314, ME 380

Prerequisite by Topic:

- Human Anatomy and Physiology
- Introduction to Heat Transfer
- Fluid Dynamics for Mechanical Engineers

Textbook: Introductory Biomechanics from Cells to Organisms by Ethier and Simmons, Cambridge University press.

Other Reference Material: N/A

Course Coordinator: Hui Zhao, Assistant Professor

Course Objectives:

1. Understand the cellular biomechanics, circulatory and respiratory systems
2. Mathematically model and analyze simplified biological and medical problems

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**M**	**M**	**H**				**M**				

(L)ow (M)edium (H)igh

Topics Covered:

1. Fundamentals of solid mechanics
2. Cellular biomechanics
3. Fundamentals of fluid mechanics
4. Hemodynamics
5. The circulatory system
6. The interstitial fluid flow
7. Respiration
8. Fundamentals of mass transfer
9. Mass transfer applications
10. Particle transport in the lung

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives: Two written exams and home-works.

Class/Laboratory Schedule: MW 5:30-6:45 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credits
(c)	General Education:	0 credit
(d)	Others:	0 credit

Prepared By:	**Date:**
Hui Zhao	September 24, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 417: Introduction to Fuel cell (3 credits): Elective Course

Course Description (2008-2010 Catalog):

To learn the fundamentals of fuel cell principles; to learn fuel cell thermodynamics; to learn fuel cell reaction kinetics; to learn fuel cell charge transport; to learn fuel cell mass transport; to learn fuel cell modeling; to learn fuel cell characterization; to learn fuel cell types, to learn PEMFC and SOFC materials, to learn fuel cell systems, to learn fuel processing subsystem design, to learn thermal management subsystem design, to learn fuel cell system design, and to learn environmental impact of fuel cells.

Prerequisite Course: ME 311

Prerequisite by Topic:

- Engineering Thermodynamics I

Textbooks: (1) Ryan O'hayre, Suk-Won Cha, Whitney Colella, Fritz B. Prinz, "*Fuel Cell Fundamentals,*" 2nd Edition, 2009, John Wiley & Sons, Inc. (2) Colleen Spiegel, "*PEM Fuel Cell Modeling and Simulation Using MATLAB,*" 2008, Elsevier Inc.

Other Reference Material: N/A

Course Coordinator: Yi-Tung Chen, Professor

Course learning outcomes:

1. Lead students toward a clear understanding and firm grasp of the basic principles of fuel cell.
2. Understand the conversion of chemical energy into electrical energy through fuel cell thermodynamics.
3. Apply thermodynamics to predict whether a candidate fuel cell reaction is energetically spontaneous and to find the upper bound limits on the maximum electrical potential that can be generated in a reaction.
4. Understand the mechanisms by which electron transfer processes occur and know that increasing the rate of the electrochemical reaction is crucial to improving fuel cell performance.
5. Apply the Butler-Volmer and Nernst equations to calculate overvoltage and species concentrations.
6. Understand two major types of charged specie of electrons and ions and charge transport in a fuel cell.
7. Understand the mass transport of uncharged species movement of reactants and products within a fuel cell.
8. Calculate the real voltage output of a fuel cell by starting with the thermodynamically predicted voltage and then subtracting the various overvoltage losses (activation, ohmic, and concentration) and parasitic losses.
9. Develop a 1-D model for SOFCs and PEMFCs based on the flux balance concept and calculate i-V curves and generated power density curves.
10. Understand why a fuel cell performs well or poorly using the characterization techniques.
11. Understand PEMFC electrolyte materials and SOFC electrolyte/catalyst materials, interconnect materials, and sealing materials.
12. Understand of how fuel cells work, why they offer the potential for high efficiency, and how their unique advantages can best be used.
13. Apply the fundamental scientific principles that govern fuel cell operation to different types of fuel cell or technology.
14. Understand the fuel cell stack, the thermal management subsystem, the fuel delivery/processing subsystem, and the power electronic subsystem.
15. Learn how to select the right fuel cell for a given application and how to design a complete system.
16. Learn how to assess the potential environmental impact of fuel cell technology.
17. Simulate the PEM fuel cell modeling using Matlab.

18. Apply the fundamentals of fuel cell principles and technology to the class project design.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**	**H**	**H**	**H**	**L**	**L**	**M**			**M**	

(L)ow (M)edium (H)igh

Topics Covered:

1. Introduction of fuel cells of AFC, PAFC, PEMFC, MCFC, SOFC, and DMFC
2. Thermodynamics review
3. Heat potential of a fuel (enthalpy of reaction)
4. Work potential of a fuel (Gibbs free energy)
5. Nernst equation
6. Predicting reversible voltage of a fuel cell under non-standard-state conditions
7. Fuel cell efficiency
8. Thermal and mass balances in fuel cells
9. Electrode kinetics
10. Activation energy, net rate of a reaction, Galvani potential
11. Butler-Volmer equation and Tafel equation
12. Catalyst-electrode design
13. Fuel cell electrolytes classes
14. Transport in electrode and flow structures
15. Basic fuel cell modeling
16. In-situ and ex-situ electrochemical characterization techniques
17. Fuel cell materials
18. Fuel cell stack
19. Power electronics subsystem
20. Fuel reforming
21. Pinch point analysis
22. Fuel cell system design life cycle assessment
23. Emissions related to global warming and air pollution

Laboratory Projects: None

Class/Laboratory Schedule: **75 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Homework assignments, design project and presentation, one written midterm exam, and final exam

Class/Laboratory Schedule: TTh 4:00-5:15 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Yi-Tung Chen	September 28, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 418: Air Conditioning Engineering Systems(3 credits): Elective Course

Course Description (2008-2010 Catalog):

Analysis and design of air conditioning systems, load calculations, system selection, duct sizing, and controls. Relationships between internal and external environments. Development of economic, functional and energy conserving concepts in air conditioning design

Prerequisite Course: ME311

Prerequisite by Topic:

- Knowledge of thermodynamic properties
- Knowledge of first law of thermodynamics for open systems and its applications
- Basic knowledge of various heat transfer modes

Textbook: Heating, Ventilating, and Air Conditioning: Analysis and Design, McQuiston/Parker/Spitler, 6th edition, J. Wiley

Other Reference Material: N/A

Course Coordinator: Samir Moujaes, Professor

Course Objectives:

1. Perform basic psychrometric calculations and designate HVAC air processes on the charts.
2. Perform necessary calculations to determine overall heat transfer coefficient of different wall/glass sections and piping surfaces.
3. Perform necessary design heating load calculations for a variety of building conditions.
4. Perform cooling load calculations given a variety of building conditions.
5. Layout and select the necessary piping and pump sizes needed for a water cooled/heated system.
6. Select the necessary air registers to meet the overall comfort requirements in a conditioned space.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.						Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M		**H**		**M**	**H**	**L**	**L**		**M**	**L**		**M**	**M**

(L)ow (M)edium (H)igh

Topics Covered:

1. Air Conditioning systems survey
2. Moist Air Properties and conditioning processes
3. Heat Transmission in Building Structures
4. Space heating load
5. Space Cooling Load
6. Flow, Pumps and Piping Design
7. Space Air Diffusion

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Six take home exams, one design project, one computer project and final exam

Class/Laboratory Schedule: T,Th 4:00-5:15, SP09

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences: 0 credit
(b) Engineering Topics (Design/Science): 3credit
(c) General Education: 0 credit
(d) Others: 0 credits

Prepared By:	**Date:**
Samir Moujaes	September 24, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 419: Advanced HVAC and Energy Conservation Systems(3 credits): Elective Course

Course Description (2008-2010 Catalog):

Room air distribution. Fan and building air distribution. Mass transfer and humidity measurement. Direct contact heat and mass transfer extended surface heat exchangers. Refrigeration. Current energy conservation technologies, computer simulations of dynamic building energy demand

Prerequisite Course: ME 311

Prerequisite by Topic:

- Knowledge of thermodynamic properties
- Knowledge of first law of thermodynamics for open systems and its applications
- Basic knowledge of various heat transfer modes

Textbook: Heating, Ventilating, and Air Conditioning: Analysis and Design, McQuiston/Parker/Spitler, 6th edition, J. Wiley

Other Reference Material: N/A

Course Coordinator: Samir Moujaes, Professor

Course Objectives:

1. Perform the necessary calculations to estimate the pressure drop in the ducting system and select fans.
2. Perform the necessary calculations to design direct contact heat exchangers such as air washers and cooling towers.
3. Perform the necessary calculations to design an indirect heat exchanger.
4. Perform the necessary calculations to estimate thermal efficiencies and performance of a realistic vapor compression refrigeration cycle.
5. Perform the necessary calculations to estimate solar loads on walls and fenestration as a function of time and location.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e 1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**H**		**M H**	**L**			**M**	**L**		**M**	**M**

(L)ow (M)edium (H)igh

Topics Covered:

1. Air Conditioning System Survey
2. Fans and Building Air Distribution
3. Direct Contact Heat and Mass Transfer
4. Extended Surface Heat Exchangers
5. Refrigeration
6. Solar radiation

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Five take home exams, one design project, one computer project and final exam

Class/Laboratory Schedule: T,Th 4:00-5:15 Fa09

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By: **Date:**

Samir Moujaes September 24, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 421: Automatic Controls (3 credit): Required Course

Course Description (2008-2010 Catalog):

Introduction to feedback system concepts; mathematical modeling of mechanical, hydraulic, electromechanical and servo systems; feedback system characteristics and performance; stability; design and compensation of control systems. **Prerequisite Course:** EE 290, and ME 330

Prerequisite by Topic:

- Electric Circuits
- Mathematics for Engineers.
- Analysis of Dynamic Systems

Textbook: " Feedback Control of Dynamic Systems," Franklin, Powell et al. Addison-Wesley

Other Reference Material: N/A

Course Coordinator: Georg F. Mauer, Professor

Course learning outcomes:

1. Develop an understanding of the fundamental principles governing the feedback control of dynamic systems.
2. Develop the ability to design feedback control systems to specified performance objectives, and predict the behavior of these systems using mathematical models.
3. Practice numerical and symbolic analysis of feedback system dynamics using state of the art software tools.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.e**	**1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**H**	**H**	**H**	**H**			**L**	**M**			

(L)ow (M)edium (H)igh

Topics Covered:

1. Introduction to control systems. (2 classes)
2. 2. Analytical modeling of mechanical and electromechanical systems, revision of Laplace transforms. (6 classes)
3. Sensitivity, errors, controller design, performance. (4 classes)
4. Stability: Routh-Hurwitz and root locus methods, R.L. control loop design. (4 classes)
5. Frequency response methods, polar and bode plots. (4 classes)
6. Nyquist criterion and controller design. (3 classes)
7. Time domain methods (state variable analysis and state compensator design). (1 class)
8. Control system design and compensation, case studies. (1 class)
9. Tests. (3 classes)

Laboratory Projects: None

Class/Laboratory Schedule: **75 minutes lecture, two sessions per week**

Assessment of Student Progress toward Course Objectives

Three written exams, home-works, one project, 5 design project reports (distinct and individualized assignments for each student), and final exam

lass/Laboratory Schedule: MW 8:30-10:50 AM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Georg Mauer	September 10, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 421L: Automatic Controls Laboratory (1 credit): Required Course

Course Description (2008-2010 Catalog):

Control system identification. Controller design, experimentation, computer simulation, and analysis of position and speed control systems. Control system performance optimization.

Prerequisite Course: Corequisite ME 421

Prerequisite by Topic: Automatic controls

Textbook: Feedback Control of Dynamic Systems Franklin, Powell et al. Addison-Wesley

Other Reference Material: N/A

Course Coordinator: Georg F. Mauer, Professor

Course learning outcomes:

1. **Computer Programming.** Model and simulate feedback systems in Matlab and VisSim.
2. **Controller Design.** Using the theories from the lecture, identify the dynamic system properties of real feedback control plants, design and optimize controllers for these plants, and verify the closed loop system performance.
3. **Lab Reports.** Describe your analysis, design, and experimental results in weekly lab reports, one report per experiment.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.e**	**1.f**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**		**H**	**H**	**H**		**H**	**M**	**M**			

(L)ow (M)edium (H)igh

Topics Covered:

1. Introduction to control system simulations (3 labs)
2. Dynamic systems step response (DC Motor)(2 labs)
3. Time domain feedback system design (four different experiments: DC Motor fluid flow system, fluid level, pneumatic pressure) (4 labs)
4. Linear Series compensator design, DC Motor and fluid flow systems (2 labs)
5. System Identification: Experimental frequency response and step response methods

Laboratory Projects: yes

Class/Laboratory Schedule: class meets 1 time per week, 180 minutes per session

Assessment of Student Progress toward Course Objectives

Weekly Lab reports

Class/Laboratory Schedule: multiple lab sections (Fall Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	1 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:
Georg Mauer

Date:
September 11, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 425: Robotics (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Introduction to robotic system concepts; analysis of robot arm dynamics, speed and accuracy; end or arm tooling and gripper concepts; smart robot concepts; touch and vision systems; robot software concept

Prerequisite Course: ME320, MAT 429

Corequisite: ME 421

Prerequisite (Corequisite) by Topic:

- Machine dynamics, Differential equation & linear algebra, Automatic Control

Textbook:

Introduction to Robotics, John J. Craig, 1989, Addison-Wesley Publishing Co.

Other Reference Material: N/A

Course Coordinator: Woosoon Yim, Professor

Course learning outcomes:

1. Understand the science and engineering behind the motions generated by robot manipulators
2. To introduce kinematics, dynamics, and control problems of robotic manipulators
3. Design the basic feedback position controller for robot manipulator
4. Simulate the robot system using Matlab and Simulink (kinematics, dynamics, controller)
5. Deal with common control and dynamic problems in robot manipulators

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace…				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**L**	**H**	**H**	**M**		**L**					

(L)ow (M)edium (H)igh

Topics Covered:

1. Space description and homogeneous transformation.
2. Robotic Fundamentals
    - Kinematics (DH notations)
    - Manipulator Jacobian
    - Forces, Moments dynamics
    - Feedback control Techniques
3. Applications and Advanced Topics
    - Robot compliance
    - Operational space
    - Force control

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Two mid-term exams, Semester Project, final exam

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	3 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Person who prepared this description:

Woosoon Yim, Professor October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 426 – Manufacturing Processes (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Survey of the principal processes used to cast, form, machine, and join material. Tolerances, statistical quality control, costs, operation sequencing, and design for productivity covered. Research paper on related topic required.

Prerequisite Course: Senior standing in engineering or architecture.

Textbook: Mikell P. Groover, Fundamentals of Modern Manufacturing, Materials, Processes, and Systems, Prentice Hall Inc.

Other Reference Material: N/A
Course Coordinator: Z.Y. Wang, Associate Professor
Course learning outcomes:

1. Understanding the fundamentals of machining, NC Control and CAD/CAPP/CAM, Hot and Cold Forming and Sheet Metalworking, Casting/Molding, Joining and Assembly Processes, and Finishing;
2. Be able to conduct Measurement and Quality Assurance activities with knowledge on Inspection by variables, Inspection by attributes, gage blocks, Surface plate, Caliper, Micrometer, Master gage, Master gage, Process Capability, Taguchi Method for Robust Design, etc;

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**M**	**L**	**L**	**M**	**M**	**L**	**L**	**M**	**M**	**L**	**M**	**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Machining;
2. NC Control and CAD/CAPP/CAM;
3. Hot and Cold Forming and Sheet Metalworking;
4. Casting/Molding;
5. Joining and Assembly Processes;
6. Finishing;
7. Measurement and Quality Assurance;
8. operation sequencing;
9. design for productivity;

Laboratory Projects: A student project is assigned in the 10th week to all students, team effort is required.

Assessment of Student Progress toward Course Objectives

Ten homework are assigned in the semester, projects are given in the tenth week, and two mid-terms exams and one final exam are given during the semester.

Class/Laboratory Schedule: MW 11:00-11:45 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Z.Y. Wang	10/22/2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS
ME 427 - Manufacturing Systems (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Study of the ways of organizing people and equipment so that production can be performed more efficiently. Includes production lines design, CIM, GT, FMS, production planning, inventory control and MRP, lean production, JIT, and agile manufacturing

Prerequisite Course: ME 301

Textbook: Mikell P. Groover, Fundamentals of Modern Manufacturing, Materials, Processes, and Systems, Prentice Hall Inc.

Other Reference Material: N/A

Course Coordinator: Z.Y. Wang, Associate Professor

Course learning outcomes:

Provide our students overall pictures of modern manufacturing systems, and the ways of organizing people and equipment to achieve more efficient production.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**M**	**L**	**L**	**M**	**M**	**L**	**L**	**M**	**M**	**L**	**M**	**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Computer-Integrated Manufacturing ;
2. Process Planning and Production Planning;
3. Materials Requirements Planning;
4. Just-In-Time Manufacturing;
5. Agile manufacturing;
6. Automation and Production Systems;
7. Group Technology and Flexible Manufacturing System;
8. Inventory Control;
9. Lean Production;

Laboratory Projects: A student project is assigned in the 10th week to all students, team effort is required.

Assessment of Student Progress toward Course Objectives

Ten homework are assigned in the semester, projects are given in the tenth week, and two mid-terms exams and one final exam are given during the semester.

Class/Laboratory Schedule: MW 11:00-11:45 AM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:
Z.Y. Wang

Date:
10/22/2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 429: Computer Control of Machines and Processes (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Discrete control theory reduced to engineering practice through a comprehensive study of discrete system modeling, system identification and digital controller design. Selected industrial processes and machines utilized as subjects on which computer control is to be implemented. Focuses on the time-domain analysis of the control theory and programming.

Prerequisite Course: ME421

Prerequisite by Topic:
- Automatic Control

Textbook:
"Computer Control of Machines and Processes", J.G. Bollinger and N.A. Duffie, Addison-Wesley, 1988
Other Reference Material: N/A
Course Coordinator: Woosoon Yim, Professor
Course learning outcomes:
1. Develop the discrete models the machines and processes both in theoretically and experimentally
2. Design the discrete controllers based on the discrete models students develop.
3. Select appropriate actuators and sensors for computer control system of machines and processes
4. Determine the stability of the discrete closed-loop control system

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
M		**H**	**H**	**H**	**M**		**L**	**L**				

(L)ow (M)edium (H)igh

Topics Covered:
1. Discrete modeling
2. System responses
3. Discrete controller design
4. Sample period selection
5. Feedforward control
6. Cascade control
7. Control software design
8. Computer interface
9. Sensors and actuators
10. Command generation
11. Experimental process modeling
12. Z transformation
13. Controller design using Z transformation

Laboratory Projects: None
Assessment of Student Progress toward Course Objectives
Two mid-term exams, Semester Project, final exam
Class/Laboratory Schedule: 75 minutes lecture two sessions per week
Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Person who prepared this description:
Woosoon Yim, Professor October 12, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 440: Mechanical Engineering Design (3 credit): Required Course

Course Description (2008-2010 Catalog):
Stress analysis; deflection of machine elements; design of machine elements for static and fatigue strength.
Prerequisite Course: ME 301, ME 302
Prerequisite by Topic:

- Structure and Properties of Solids
- Mechanics of Materials

Textbook: "Fundamentals of Machine Component Design", Juvinall and Marshek, 4th Edition, Wiley & Sons, 2006, ISBN 0-471-66177-5
Other Reference Material: N/A
Course Coordinator: Brendan O'Toole, Associate Professor
Course learning outcomes:

1. Identify critical static and dynamic stresses in a mechanical component.
2. Suggest suitable dimensions and material to ensure that a mechanical component meets its design requirements.
3. Select mechanical components from appropriate catalogs.
4. Design simple mechanical systems starting from an abstract specification list.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**M**	**H**	**M**	**H**	**H**	**L**	**H**	**M**	**L**			**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Load Analysis
2. Material Properties
3. Combined Stresses and Stress Concentration
4. Elastic Strain, Deformations, Energy Methods for Deflection
5. Failure Theories, Reliability
6. Fatigue
7. Threaded Fasteners and Power Screws
8. Shear and Welded Connections
9. Springs
10. Bearings
11. Spur Gears
12. Shafts and Keys

Laboratory Projects: Students perform a semester-long design project. They must fabricate a model of at least part of their design using a 3D printer in the ME machine shop.
Class/Laboratory Schedule: 75 minutes lecture two sessions per week
Assessment of Student Progress toward Course Objectives
Three written exams, home-work assignments, two group projects, final exam, and model fabrication

Class/Laboratory Schedule: TR 10:00 - 11:15 AM (Fall Semester)
Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Brendan O'Toole	October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 443: Design Techniques in Mechanical Engineering (3 credits): Elective Course

Course Description (2008-2010 Catalog):

Computational techniques for use in mechanical engineering design. Emphasis on the use of existing commercial codes for the analysis and design of machine elements and for the study of heat transfer and fluid flow.

Prerequisite by Topic:

- Mechanics of Materials
- Fluid Mechanics

Textbook: A First Course in Finite Element Method Using ALGOR (2nd edition), Daryl L. Logan, PWS Publishing Company.

Other Reference Material:

Personal handouts, available on the course web site (http://me.unlv.edu/~mbt/320/320.html)

Course Coordinator: Mohamed Trabia, Professor

Course learning outcomes:

1. Decide when it is the right time to use finite element analysis instead of mechanics of material equations.
2. Select the appropriate element type for the mechanical component you are designing.
3. Develop a finite element analysis model of a mechanical component.
4. Develop the ability to inspect finite element analysis results critically.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**M**	**H**	**H**	**M**			**M**				

(L)ow (M)edium (H)igh

Topics Covered:

1. Understand the basic theory of finite element analysis.
2. Develop finite element equations for different systems.
3. Apply the knowledge gained in steps (i) and (ii) to commercial finite element software to solve real-life design problems.

Laboratory Projects: None

Class/Laboratory Schedule: **75 minutes lecture two sessions per week**

Assessment of Student Progress toward Course Objectives

Two written exams, homework, one project, and final exam

Class/Laboratory Schedule: MW 10:00-10:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:
Mohamed Trabia

Date:
June 21, 2010

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 446: Composite Materials (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Overview of matrix and fiber systems, processing techniques, anisotropic elasticity, unidirectional lamina, multidirectional laminate theory, failure theories, and design of composite structures.

Prerequisite Course: ME 302, MATH 431

Prerequisite by Topic:

- Mechanics of Materials
- Differential Equations

Textbook: "Fiber Reinforced Composites: Materials, Manufacturing, and Design", P.K. Mallick, 3rd Edition, CRC Press, 2007, ISBN 9780849342059

Other Reference Material: N/A

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

1. Identify the materials used in modern composite materials and their important properties
2. Understand how the different manufacturing methods affect design parameters such as strength and stiffness
3. Use micromechanics to predict lamina properties
4. Use laminate analysis to predict laminated structural response

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**L**	**M**	**L**	**H**	**L**	**L**	**H**	**M**	**L**			**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Composite Applications
2. Fiber and Matrix Properties
3. Fiber Reinforced lamina Properties
4. Laminate Analysis
5. Software for Lamina and Laminate Analysis
6. Overview of Mechanical Properties of Composites
7. Manufacturing Methods for Composites
8. Failure Predictions
9. Design
10. Special Topics (Varies by semester)

Laboratory Projects: This is a lecture course but I try to schedule informal laminate fabrication exercises related to on-going research or design projects.

Class/Laboratory Schedule: 170 minutes lecture one session per week (sometimes it is taught in twice per week format)

Assessment of Student Progress toward Course Objectives

Six quizzes, Homework assignments, a group design project

Class/Laboratory Schedule: F 10:00 – 12:50 AM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	3 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By:	**Date:**
Brendan O'Toole	October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 453 - Mechanical Vibration (3 credits): Required Course

Course Description (2008-2010 Catalog):

Free and forced response of single-and-multi-degree-of-freedom, lumped parameter systems. Fourier series and Fourier and Laplace transforms. Introduction to vibration of continuous systems and applications.

Prerequisite Course: ME 242, ME 330

Prerequisite by Topic:

- **Dynamics**
- **Analysis of Dynamic Systems**

Textbook: Engineering Principles of Mechanical Vibration, Reynolds, Trafford Publishing
Other Reference Material: N/A
Course Coordinator: Douglas Reynolds, Professor
Course Learning Outcomes:

(a) Have a clear understanding of the different mechanical elements that comprise the mass, spring, and damping elements of simple vibration systems.
(b) Know how to develop the equations of motion associated with one- and two-degree-of-freedom vibration systems using Newton's method, d'Alembert's principle, energy method, and Lagrange's equation.
(c) Know how to solve the equations of motion for one-degree-of-freedom systems for initial conditions and for harmonic and complex periodic excitation; know how to solve the equations of motion for two-degree-of-freedom systems to determine the system resonance frequencies and corresponding vibration mode shapes and to determine the system responses to harmonic excitation.
(d) Understand basic concepts associated with harmonic response functions, vibration transmissibility, and analytical modal analysis. Understand basic concepts associated with system resonances and how they can cause problems in and/or the failures of mechanical systems. Know how simple vibration tests can be used to identify the values of the mass, spring, and damping elements of simple mechanical systems and to determine if vibration resonances exist in mechanical systems.

Relationship of Course to Mechanical Engineering Program Outcomes:

Educational Objective 1: Provide mechanical engineering graduates with technical capabilities.					**Educational Objective 2:** Prepare the mechanical engineering graduates to have effective workplace skills.				**Educational Objective 3:** Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H		**L**	**H**	**H**				**M**			**L**	

(L)ow (M)edium (H)igh

Topics Covered:

1. Complex vectors
2. Addition of harmonic signals
3. Complex periodic signals
4. Degrees of freedom
5. Mass elements
6. Spring elements
7. Vibration isolators
8. Damping elements
9. Equations of Motion - Newton's method, d'Alembert's principle, energy method
10. Vibration criteria

11. Problem solving procedures
12. Equations of motion - one-degree-of-freedom systems
13. Free vibration with no damping
14. Free vibration with viscous damping
15. Free vibration with structural damping
16. Harmonic excitation - forced response of a system without damping
17. Harmonic excitation - forced response of a system with viscous damping
18. Harmonic excitation - forced response of a system with structural damping
19. Vibration transmissibility - without damping, with viscous and structural damping
20. Vibrating system with a moving base
21. Critical speed of a rotating disk on a shaft
22. Equations of motion - two-degree-of-freedom systems
23. Free vibration without damping - resonance frequencies and modal vectors
24. Coordinate coupling
25. Harmonic excitation - forced vibration
26. Tuned absorbers
27. Machine mounted on a flexible structure

Laboratory Projects: None

Class/Laboratory Schedule: 75 minute lecture two sessions per week

Assessment of Student Progress toward Course Objectives:

Two written exams, weekly quizes, home work, and final exam

Class/Laboratory Schedule: MW 1:00-2:15 pm (Fall Symester)

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	3 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared by:	**Date:**
Douglas Reynolds	December 16, 2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 434 - Noise Control (3 credits): Elective Course

Course Description (2008-2010 Catalog):

Development and solution of one-dimensional wave equation for propagation of sound in air; one-dimensional plane and spherical sound waves; sound transmission phenomena; sound in enclosed spaces; sound propagation outdoors; and human responses to noise.

Prerequisite Course: MATH 431 and junior or senior standing

Prerequisite by Topic:

- **Mathematics for Engineers and Scientists I**

Textbook: Engineering Principles of Acoustics and Noise Control, Reynolds, Trafford Publishing
Other Reference Material: N/A
Course Coordinator: Douglas Reynolds, Professor
Course Learning Outcomes:

(a) Have an understanding of physics associated with the propagation of sound in air, the physical variables used to describe this propagation, and some of the factors associated with human response to sound.
(b) Have an understanding of the engineering guidelines associated with specifying the acoustic acceptability of indoor spaces based on their intended use and determining the acceptability or unacceptability of outdoor environmental noise based on government regulations.
(c) Have an understanding of how to analyze the acoustic properties of small rooms, auditoria, and worship spaces.
(d) Have an understanding of the physical characteristics of solid barriers and walls that enable them to effectively attenuate sound that is transmitted from one interior space in a building into another interior space.
(e) Gain insights in to how to design indoor spaces so that they have acoustic characteristics that are compatible with their intended uses.

Relationship of Course to Mechanical Engineering Program Outcomes:

Educational Objective 1: Provide mechanical engineering graduates with technical capabilities.					**Educational Objective 2:** Prepare the mechanical engineering graduates to have effective workplace skills.				**Educational Objective 3:** Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**M**	**M**	**H**				**M**			**L**	

(L)ow (M)edium (H)igh

Topics Covered:

1. Acoustics, reasons for studying acoustics, sound and types of sound
2. Transmission of sound, source-path-receiver, analysis of sound
3. Development of the one-dimensional wave equation
4. General expression for one-dimensional sound waves
5. Solution to the wave equation - standing waves
6. One-dimensional spherical sound waves
7. Sound pressure, sound intensity, sound energy density, sound power
8. Levels, additive effects of sound sources
9. Effects of reflecting surfaces
10. Weighted sound levels, band sound levels, spectrum sound levels
11. General description and characteristics of the ear

12. Loudness calculations from sound measurements
13. Masking and speech interference
14. Speech intelligibility
15. Indoor noise criteria
16. Outdoor noise criteria, community reaction to sound, environmental noise criteria
17. Industrial noise regulations
18. Sound fields and design criteria in small rectangularly shaped rooms
19. Room equation for an ideal room
20. Room equation for real rooms
21. Reverberation time equations
22. Ray acoustics
23. Auditorium and worship space design
24. Sound transmission from one medium to another
25. Interaction of plan sound waves with a normally reacting surface
26. Sound transmission through thin massive panels
27. Sound transmission through a wall separating two rooms
28. STC rating of wall and floor/ceiling systems, IIC ratings of floor/ceiling systems
29. Field measurements of airborne sound insulation in buildings
30. Acoustical leaks and flanking sound transmission

Laboratory Projects: None

Class/Laboratory Schedule: 75 minute lecture two sessions per week

Assessment of Student Progress toward Course Objectives:

Take-home problem exercise, two laboratory exercises, design project

Class/Laboratory Schedule: MW 10:00-11:15 am (Spring Symester)

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	2 credit
b)	Engineering Topics (Design/Science):	1 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared by:	**Date:**
Douglas Reynolds	December 16, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 460: High School Mentoring for Engineering Design (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Students help high school teams design robots for the FIRST robotics competition. Weekly meetings discuss: mentoring, design, robotics, organizational skills, and teamwork. Must arrange transport to assigned local high school. Class begins with the international FIRST Kick-off meeting usually scheduled for the first Saturday after New Year's Day.

Prerequisite Course: Junior Standing

Prerequisite by Topic:

- Junior Standing

Textbook: N/A

Other Reference Material: N/A

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

1. Understand engineering design and fabrication issues related to robotics including: statics, machine design, materials, power systems, control systems
2. Appreciate importance of time management and decision making in pressure situations with limited time and information
3. Learn about individual and team dynamics while mentoring young high school students
4. Learn about the realities of obtaining parts from suppliers or making parts in the machine shop in a short time-frame
5. Learn to present problems clearly and succinctly in weekly group design meetings.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**H**	**M**	**M**	**H**	**M**	**H**	**M**	**L**	**L**	**M**	**M**

(L)ow (M)edium (H)igh

Topics Covered:

1. Mentoring Guidelines for High School Design
2. Materials and Structures
3. Power Supply Systems
4. Control Systems
5. Time Management and Scheduling
6. Parts Suppliers and fabrication
7. Presentation of design projects

Laboratory Projects: This is a group project class focused on the design and fabrication of a robotic system that has autonomous and tele-operated control segments.

Class/Laboratory Schedule: **170 minutes lecture one session per week**

Assessment of Student Progress toward Course Objectives

Weekly Progress reports, Written Final Report, Oral Final Presentation

Class/Laboratory Schedule: F 10:00 – 12:50 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	3 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Brendan O'Toole	October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 462: Vehicle Design Projects (3 credit): Elective Course

Course Description (2008-2010 Catalog):

Students design and build a vehicle for entry into a national or regional collegiate competition such as Mini-Baja or Human Powered Vehicle. Design topics may include structural analysis, composite materials, aerodynamics, engine performance, occupant safety, drive train, suspension systems, project management, team building, technical report writing, and oral presentations.

Prerequisite Course: Junior Standing

Prerequisite by Topic:

- Junior Standing

Textbook: N/A

Other Reference Material: N/A

Course Coordinator: Brendan O'Toole, Associate Professor

Course learning outcomes:

(a) Understand engineering design and fabrication issues related to vehicles including: statics, machine design, materials, power systems, control systems, safety
(b) Appreciate importance of time management and decision making in pressure situations with limited time and information
(c) Learn about individual and team dynamics and responsibilities in a large group project
(d) Learn about the realities of obtaining parts from suppliers or making parts in the machine shop in a short time-frame
(e) Learn to present problems clearly and succinctly in weekly group design meetings.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal 1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	1.b	1.c	1.d	1.e	2.a	2.b	2.c	2.d	3.a	3.b	3.c	3.d
H	H	H	M	M	H	H	H	M	L	L	L	L

(L)ow (M)edium (H)igh

Topics Covered:

11. Design process
12. Materials and Structures
13. Power Supply Systems
14. Steering, Stability, and Control Systems
15. Time Management and Scheduling
16. Parts Suppliers and fabrication
17. Presentation of design projects

Laboratory Projects: This is a group project class focused on the design and fabrication of a vehicle system.

Class/Laboratory Schedule: **170 minutes lecture one session per week**

Assessment of Student Progress toward Course Objectives: Weekly Progress reports, Written Overall Design Report, Written Report on Testing and Performance Evaluation

Class/Laboratory Schedule: F 10:00 – 12:50 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	3 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: **Date:**
Brendan O'Toole October 12, 2009

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS
ME 497 - Senior Design Project I (2 credit): Required Course

Course Description (2008-2010 Catalog): Synthesis course to involve students in the design process. Project proposal and design definition.

Prerequisite Course: Corequisites Senior standing in engineering

Textbook: Product Design and Development, 4th edition, K.T. Ulrich and S.D. Eppinger, MCGraw-Hill (suggested);

Other Reference Material: Innovation on Demand, New Product Development Using Triz, V. Fey and E. Rivin, Cambridge (suggested);

Course Coordinator: Z.Y. Wang, Associate Professor

Course learning outcomes:

1. The general scope and feasibility of the design should be accomplished, and the design is to be completed with full documentation during the second semester.
2. This design experience should involve elements defined by the Accreditation Board for Engineering and Technology (ABET).
3. To receive a passing grade in the class, each student will have to demonstrate that the design has met objectives by considering various alternatives and meeting predefined constraints;
4. Understanding the impact of engineering solutions in a global and societal context and professional and ethical responsibility.
5. Multi-disciplinary projects and producing prototypes are strongly encouraged.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective …				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**H**	**M**	**M**	**M**	**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Recognition of the needs (Who are the real customers? Who will buy the product? Is it profitable to develop the product? Is it feasible to develop the product?)
2. Definition of the problem (problem statement, what this design is intended to accomplish – customers' requirements and design specifications, clearly outline the overall function that needs to be accomplished and provide sub-function descriptions);
3. Gathering of information (history of the problem, any similar designs?)
4. Design conceptualization (decompose your designs (3-5) into subsystems; start drawings - sketch)
5. Evaluate 3-5 conceptual designs and choose the best design by feasibility, technology readiness, and decision matrix that includes technical requirements, costs, easy to produce, and product safety and liability, etc.
6. Decompose design into components; Perform stress/strain/deformation analyses on the components of your design.
7. Modify design based upon performance, cost, design for manufacture, and design for assembly.
8. Produce layout drawings, assembly drawings, and some detailed drawings with dimensions and tolerances.

Laboratory Projects: N/A

Class/Laboratory Schedule: **N/A**

Assessment of Student Progress toward Course Objectives

Two monthly presentations, ten monthly briefings, and final presentation and final report

Class/Laboratory Schedule: MW 2:30-3:20 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	0 credit
(b) Engineering Topics (Design/Science):	2 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By:	**Date:**
Z.Y. Wang	10/22/2009

MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 498 - Senior Design Project II (2 credit): Required Course

Course Description (2008-2010 Catalog): Synthesis course to involve students in the design process. Analysis, design completion, and presentation.

Prerequisite Course: ME 497

Textbook: Product Design and Development, 4th edition, K.T. Ulrich and S.D. Eppinger, MCGraw-Hill (suggested);

Other Reference Material: Innovation on Demand, New Product Development Using Triz, V. Fey and E. Rivin, Cambridge (suggested);

Course Coordinator: Z.Y. Wang, Associate Professor

Course learning outcomes:

1. The general scope and feasibility of the design should be accomplished, and the design is to be completed with full documentation during the second semester.
2. This design experience should involve elements defined by the Accreditation Board for Engineering and Technology (ABET).
3. To receive a passing grade in the class, each student will have to demonstrate that the design has met objectives by considering various alternatives and meeting predefined constraints;
4. Understanding the impact of engineering solutions in a global and societal context and professional and ethical responsibility.
5. Multi-disciplinary projects and producing prototypes are strongly encouraged.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1: Provide mechanical engineering graduates with technical capabilities.					Goal 2: Prepare the mechanical engineering graduates to have effective workplace skills.				Goal 3: Instilling a sense of responsibility as a professional member of society.			
1.a	**1.b**	**1.c**	**1.d**	**1.e**	**2.a**	**2.b**	**2.c**	**2.d**	**3.a**	**3.b**	**3.c**	**3.d**
H	**H**	**H**	**H**	**H**	**H**	**M**	**M**	**H**	**M**	**M**	**M**	**L**

(L)ow (M)edium (H)igh

Topics Covered:

1. Recognition of the needs (Who are the real customers? Who will buy the product? Is it profitable to develop the product? Is it feasible to develop the product?)
2. Definition of the problem (problem statement, what this design is intended to accomplish – customers' requirements and design specifications, clearly outline the overall function that needs to be accomplished and provide sub-function descriptions);
3. Gathering of information (history of the problem, any similar designs?)
4. Design conceptualization (decompose your designs (3-5) into subsystems; start drawings - sketch)
5. Evaluate 3-5 conceptual designs and choose the best design by feasibility, technology readiness, and decision matrix that includes technical requirements, costs, easy to produce, and product safety and liability, etc.
6. Decompose design into components; Perform stress/strain/deformation analyses on the components of your design.
7. Modify design based upon performance, cost, design for manufacture, and design for assembly.
8. Produce layout drawings, assembly drawings, and some detailed drawings with dimensions and tolerances.
9. Order all parts and secure components.
10. Document all the modifications made in ME498 for the design, provide engineering analysis to support your modifications.
11. Prototype assembly and cost analysis.
12. All changes from original design have been documented and analysis must be available to justify the changes.
13. Guidelines for product testing should be developed for the next five weeks (stating the goals of performance evaluation, testing methods, tools for measurement, and your plan to hear customers' comments)

Laboratory Projects: N/A

Class/Laboratory Schedule: **N/A**

Assessment of Student Progress toward Course Objectives

Two monthly presentations, ten monthly briefings, and final presentation and final report

Class/Laboratory Schedule: MW 2:30-3:20 PM (Spring Semester)

Contribution of Course for meeting Professional Component:

(a)	Mathematics and basic sciences:	0 credit
(b)	Engineering Topics (Design/Science):	2 credit
(c)	General Education:	0 credit
(d)	Others:	0 credits

Prepared By:	**Date:**
Z.Y. Wang	10/22/2009

UNIVERSITY OF NEVADA LAS VEGAS

Department of Civil and Environmental Engineering

CEE 241: Statics (Required)
Fall 2009, Spring 2010

2010-2012 Catalog Data:

Engineering analysis of concentrated and distributed force systems at equilibrium; analysis of structures, beams and cables, friction, virtual work, fluid statics, shear and moment diagrams. Prerequisite: PHY 180-180L, MAT 182, CEE 110, and ME 100 and 110L. 3 credits.

Prerequisites by Topic:

1. PHY 180-180L. Newtonian mechanics
2. MAT 182. Line integrals, area integrals
3. CEE 110. Introduction to civil engineering.
4. ME110/110L. Introduction to mechanical engineering design

Textbook:

Vector Mechanics for Engineers, Statics, Beer and Johnston, 9th Ed; McGraw-Hill, 2009

Course Learning Outcomes:

1. Students can apply principles of equilibrium to determine reactions
2. Students can apply principles of equilibrium to determine internal forces
3. Students can apply integral calculus to determine locations of centroids
4. Students can calculate centroids for composite areas
5. Students can apply integral calculus to determine moments of inertia of area
6. Students can apply parallel axis theorems
7. Students can calculate equivalent force systems
8. Students can apply vector calculus

Topics Covered:

1. Vectors, 2. Forces, moments and couples, 3. Resultant force systems, 4. Free body diagrams and equilibrium, 5. Center of mass and centroids, 6. Truss analysis, 7. Frame and machine analysis, 8.

External and internal beam forces, 9. Shear and moment diagrams, 10. Moments of inertia of areas and products of inertia, 11.Parallel axis theorems, and 12. Principal moments of inertia, 13.Friction

Class/Laboratory Schedule:

Two 75 minutes lectures per week.

Contribution of Course to Meeting Criterion 5:

This is a required course that meets ABET outcomes 1.

Relation of course to Program Outcomes:

Outcome 1. An ability to apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, and engineering.

Prepared by: Nader Ghafoori Date: April 13 2010

CHEM 121/121L: General Chemistry I

Course Description (2010-2012 Catalog):

Fundamental principles of chemistry and their correlation with the properties of the elements.

Prerequisite Course:

Corequisites MATH 127 or MATH 128 or higher.
Prerequisites A passing score on the Chemistry Placement Exam or a grade of C or better in CHEM 103 . Lab/Lecture/Studio Hours Three hours lecture and three hours laboratory.

Prerequisite by Topic:

Precalculus and Trigonometry or higher mathematical backgrounds

Textbook: Chemistry: The Molecular Nature of Matter and Change-fifth edition-Silberberg

Other Reference Material: N/A

Course Coordinator: Dr. S. Steinberg, spencer.steinberg@unlv.edu

Course Objectives:

This course provides an introduction to chemical principles for students that have had high school chemistry, or an introductory level course such as Chemistry 103. Conceptual understanding of the electronic structure of the atom, periodic properties of the elements and chemical bond formation will be emphasized. Students will master the balancing of chemical reactions and the use of chemical reactions for predicting product yields. Students will learn to understand the nature of intermolecular forces and solution behavior. In addition, students will develop problem solving skills for success in future course work.

Topics Covered:

- Keys to the Study of Chemistry
- The Components of Matter
- Stoichiometry of Formulas & Equations
- The Major Classes of Chemical Rxns
- Redox/Net Ionic Equations
- Gases & The Kinetic Molecular Theory
- Thermochemistry
- Quantum Theory & Atomic Structure
- Electron Configuration & Chem Periodicity
- Models of Chemical Bonding
- Shapes of Molecules
- Theories of Covalent Bonding
- Intermolecular Forces
- Properties of Mixtures: Solutions & Colloids

Class/Laboratory Schedule: REQUIRED LABORATORY TEXT: "Cu IN LaB" General Chemistry Laboratory Manual by D. L. Stevens [5th Edition, Kendall/Hunt Publishing]

- Density - A Physical Property of Matter
- The Physical Separation Of A Ternary Mixture
- Determining the Empirical Formula of a Compound **&** Determining the Percentage of Water & the Number of Water Molecules in a Hydrate
- Colorimetry
- Recycling of Aluminum (Part I)
- Finish Recycling of Aluminum (Part II)
- Paper Chromatography
- Cu Later
- Volumetric Analysis: Acid-Base Titration

- Volumetric Analysis: A Redox Titration
- Determining the Molar Volume of HRR2RR Gas, the Value of “R”, & the Molar Mass of Mg
- Heat of Neutralization, ΔH RRneutrzn
- Hess’s Law & the Enthalpy Changes Involving Three Reactions
- Molecular Modelling Due (TA may assign it as a dry lab)
- Hess’s Law & the Enthalpy Changes
- Involving Three Reactions

Assessment of Student Progress toward Course Objectives:

The course grade will be based upon online quizzes (5%), three midterm exams (40%), a final exam (30%) and the Laboratory (25%).

Class/Laboratory Schedule: 3 hr lecture and 3 hr Lab per week

Contribution of Course for meeting Professional Component:

e)	Mathematics and basic sciences:	4 credit
f)	Engineering Topics (Design/Science):	0 credit
g)	General Education:	0 credit
h)	Others:	0 credits

PHYS 180 & 180L: Physics for Scientists and Engineers I

Course Description (2010-2012 Catalog):

Lecture in Newtonian mechanics. Rectilinear motion, particle dynamics, work and energy, momentum and collisions, rotational mechanics, oscillations, wave motion, and gravitation.

Prerequisite Course: MATH 181

Prerequisite by Topic: Calculus

Textbook: *Physics for Scientists and Engineers, Volume 1* by Randall D. Knight (Pearson Education, second edition, 2008). A software access kit for *MasteringPhysics* comes with purchase of a new textbook. If you buy a used textbook, you MUST purchase a stand-alone copy of the *MasteringPhysics Student Access Kit* at www.masteringphysics.com. Homework will be assigned and completed online through *MasteringPhysics*. The course ID is MPFARLEY46844

Other Reference Material: N/A

Course Coordinator: Prof. John Farley

Course learning outcomes:

- Students will understand the basic concepts of mechanics (statics and dynamics) that is deep enough and accurate enough to analyze simple physical situations properly;
- Students will develop and enhance their technical skills and will be able to calculate accurately numerical solutions of mechanics problems assigned in this course, encountered later in other technical courses, and faced in their future careers;
- Students will obtain effective levels of self-discipline, motivation, and confidence that will help develop their technical potential to its fullest.
- As the first course in the calculus-based physics sequence for scientists and engineers, Physics 180 will prepare students for PHYS 181, PHYS 182, and a wide range of engineering courses.
- Physics 180 will provide long-term benefits for our students who we hope will become future leaders in their professions, using the technical expertise required by twenty-first century civilization.

Laboratory Projects: **1 cr. lab PHYS 180L**

Text: Physics Laboratory Manual (3rd edition, 2008) by D.H. Loyd

LAB #	LAB TITLE
handout	Review of Laboratory Skills / Uniformly Accelerated Motion
3	Force Table and Vector Addition of Forces
13b	Projectile Motion (Note: do Prelab questions 6 through 9 only)
7	Coefficient of Friction (Note: partial handout)
16	Centripetal Acceleration of an Object in Circular Motion
12	Conservation of Spring and Gravitational Potential Energy
13a	The Ballistic Pendulum (Note: do Prelab questions 1 through 5 only)
-	Study day (no lab)
10	Torques and Rotational Equilibrium of a Rigid Body
17	Moment of Inertia
-	Holiday (no lab)
20	Simple Harmonic Motion
-	Review for Lab Final Exam
-	Lab Final Exam

Class/Laboratory Schedule: 3 hr lecture and 3 hr lab per week

Assessment of Student Progress toward Course Objectives

You have the opportunity to earn points in this course in a variety of ways:

- **Hour Tests** given only on the test dates listed in the course *Calendar*. Examinations are closed book, but a formula sheet will be provided. Your own calculators are not allowed on examinations, bt simple calculators will be provided. To get full credit in solving a problem, you ***must*** follow the procedure outlined in the handout *Expert Technique* distributed at the beginning of the course.
- **Final Exam** given during Finals Week. See course's web site for Final Exam room.
- **Mini-Tests**, one given during a lecture early in the course and one given with the Final Exam.
- **Reading-Assignment Quizzes**, given in class (unannounced beforehand) on the reading material indicated in the Calendar for that lecture. These can be given during any lecture. You are responsible to read a chapter in the textbook completely before the chapter is first discussed in lecture (see course *Calendar*).
- **Homework Assignments** are assigned and completed online at MasteringPhysics (www.masteringphysics.com), where you will get immediate feedback.

The course ID is MPFARLEY46844

- **Exercises** done individually in class (unannounced beforehand). These will be similar to the last homework assignment due. To get full credit in solving a problem, you ***must*** follow the procedure outlined in the handout *Expert Technique* distributed at the beginning of the course.

* Participation points

Grading of Assignments:

Points are available in the following manner:

Highest 3 scores of {three Hour Tests & Final, each 200 points}	=	600	(Tests in lecture on dates listed in course *Calendar*) (Final given on date/time given in course *Calendar*)
Basic Math MiniTest	=	50	(given during Lecture 3)
End-material MiniTest	=	50	(given concurrently with the Final Exam)
Reading Quizzes	=	50	(lowest dropped, others scaled)
Homework (online)	=	100	(lowest dropped, others scaled)
Participation points (in class)	=	50	(answering ConcepTests)
Exercises (in class)	=	100	(lowest dropped, others scaled)
Total Possible Points		1000	

Grades are earned based on the following grade cuts (points to three significant figures):

A	for 93% of total possible points	≥	930 pts (Excellent performance)
A–	for 86% of total possible points	≥	860
B+	for 79% of total possible points	≥	790
B	for 72% of total possible points	≥	720 (Very good performance)
B–	for 65% of total possible points	≥	650
C+	for 58% of total possible points	≥	580
C	for 51% of total possible points	≥	510 (Good performance)
C–	for 44% of total possible points	≥	440
D+	for 37% of total possible points	≥	370
D	for 32% of total possible points	≥	320 (Underperformance)
D–	for 25% of total possible points	≥	250
F	for less than 25% of possible pts	<	250 (Re-examine academic attitudes & goals)

Contribution of Course for meeting Professional Component:

i)	Mathematics and basic sciences:	4 credit
j)	Engineering Topics (Design/Science):	0 credit
k)	General Education:	0 credit
l)	Others:	0 credits

Prepared By: Prof. John Farley **Date:**

PHYS 182 & 182L: Physics for Scientists and Engineers III

Course Description (2010-2012 Catalog):

Lecture in fluid mechanics, thermodynamics, and optics. Sound, temperature and thermometry, heat, gases, intermolecular forces, kinetic theory, entropy, nature of light, geometrical optics, physical optics including diffraction and interference, introduction to modern developments.

Prerequisite Course: PHYS 180 and MATH 182
Prerequisite by Topic: Physics I, Calculus II

Text: Randall D. Knight, *Physics for Scientists and Engineers (2nd Edition)* – Chaps. 15-25,

38+ (Vols. 2, 3, 5 of split edition – Chapter 15 is in Vol. 1 but can be read on WebCampus)

Other Reference Material: N/A
Course Coordinator: Prof. Andrew Cornelius
Course learning outcomes:

Learning Outcomes – Student should achieve basic understanding of fluid mechanics, thermodynamics, and optics necessary for future advanced coursework. This includes material pertaining to sound, temperature and thermometry, heat, gases, intermolecular forces, kinetic theory, entropy, nature of light, geometrical optics, physical optics including diffraction and interference, introduction to modern developments.

Laboratory Projects: **1 cr. lab PHYS 182L**

Text: Physics Laboratory Manual (3rd edition, 2008) by D.H. Loyd

MONTH	DAY	LAB #	LAB TITLE
Jan	21	18	Archimedes' Principle
	28	21	Standing Waves on a String
Feb	4	23	Specific Heat of Metals
	11	24	Linear Thermal Expansion
	18	-	Holiday (no lab)
	25	25	Gas Law
Mar	4	-	Study day (no lab)
	11	40	Reflection and Refraction with the Ray Box
	18	41	Focal Length of Lenses
	25	handout	Polarized Light
Apr	1	-	Holiday (no lab)
	8	42	Diffraction Grating Measurement of the Wavelength of Light
	15	43	The Rydberg Constant - Hydrogen Spectra
	22	-	Review for Lab Final Exam
	29	-	Lab Final Exam

Class/Laboratory Schedule: Two 75 min lecture per session per week
Assessment of Student Progress toward Course Objectives

100	In Class Points
200	Online Homework (www.masteringphysics.com class ID is 'CorneliusP182S2010')
400	Best two scores on 3 one hour exams worth 200 points each
300	Final Exam (Comprehensive)

Grading of Assignments:

Number for each letter grade shows minimum score, out of 1000 possible points, required for the given grade.

	B+: 825	C+: 700		
A: 900	B: 800	C: 650	D: 500	F: 0
A-: 850	B-: 750	C-: 600		

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	4 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: Prof. Andrew Cornelius **Date:**

MATH 181: Calculus I

Course Description (2010-2012 Catalog):

Differentiation and integration of algebraic and transcendental functions, with applications.

Prerequisite Course: Prerequisites MATH 128 or equivalent.

Prerequisite by Topic: Pre-calculus and Trigonometry

Textbook:

James Stewart, Essential Calculus, Early Transcendentals, Brooks Cole Publishing 2007.**Other Reference Material:** N/A

Course Coordinator: Anthony D Holmes

Course learning outcomes:

Students should be able to find derivatives and integrals of basic functions and their compositions and to be able to apply theses concepts to a variety of different situations.

COURSE OBJECTIVES:

To familiarize students with the concepts of differential and integral calculus and their applications.

Topics Covered:

Limit of a function, limit laws, precise definition of a limit, continuity, limits at infinity, horizontal asymptotes, tangents, velocity, derivatives of polynomial and exponential functions, product and quotient rules, rates of change, derivatives of trigonometric functions, chain rule, implicit differentiation, higher derivatives, derivatives of logarithmic functions and hyperbolic functions, related rates, differentials, maximum and minimum values, mean value theorem, applications to curve sketching, indeterminate forms and L'Hospital's Rule, optimization problems, Newton's method, antiderivatives, areas and distances, definite integral, fundamental theorem of calculus, indefinite integrals, substitutions, logarithm as a definite integral.

Laboratory Projects: None

Class/Laboratory Schedule: Lecture, 4 hours per week

Assessment of Student Progress toward Course Objectives

Attendance, Punctuality, and Participation	10%
10 1 full page Response Papers	15%
3 Quizzes	15%
3 Exams (2 Midterms and 1 Final)	30%
3 Essays (3 full to 4 pages)	30%
Total	100%

Grading of Assignments:

Assignments will be graded on the standard A to F system with plusses and minuses.

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	4 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: Anthony D Holmes **Date:**

MATH 182: Calculus II

Course Description (2010-2012 Catalog):

Further applications and techniques of integration including integration by parts, sequences and series, polynomial approximations.

Prerequisite Course: Prerequisites MATH 181

Prerequisite by Topic: Calculus

Textbook:

James Stewart, Essential Calculus, Early Transcendentals, Brooks Cole Publishing 2007.

Other Reference Material: N/A

Course Coordinator: Arthur Baragar

Course learning outcomes:

Students should be able to evaluate more complex integrals and apply these techniques to find arc lengths, surface areas, and volumes. Furthermore, they should be obtain power series representations of functions and be able to apply these to a variety of problems that arise in science and engineering.

Course Objective:

To familiarize students with further concepts in integral calculus and also to introduce them to sequences and series.

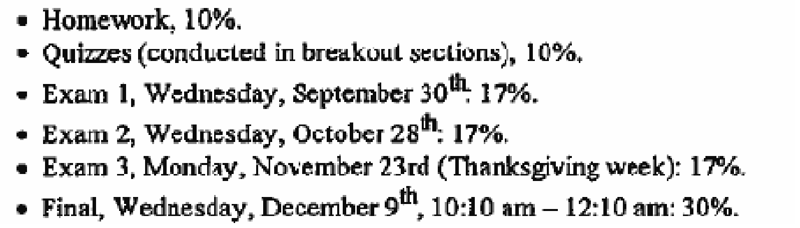
Topics Covered:

Areas between curves, volumes, work, integration by parts, trigonometric integrals, trigonometric substitutions, partial fractions, improper integrals, arc length, area of a surface of revolution, applications to physics and engineering, parametric curves, polar coordinates, areas and lengths in polar coordinates, conic sections, sequences, series, integral test, comparison tests, alternating series, absolute convergence, ratio and root tests, power series and representation of functions, Taylor and Maclaurin series, binomial series, applications.

Laboratory Projects: None

Class/Laboratory Schedule: Lecture, 4 hours per week

Assessment of Student Progress toward Course Objectives



- **Homework, 10%.**
- **Quizzes (conducted in breakout sections), 10%.**
- **Exam 1, Wednesday, September 30th: 17%.**
- **Exam 2, Wednesday, October 28th: 17%.**
- **Exam 3, Monday, November 23rd (Thanksgiving week): 17%.**
- **Final, Wednesday, December 9th, 10:10 am – 12:10 am: 30%.**

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	4 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: Arthur Baragar **Date:**

MATH 283: Calculus III

Course Description (2010-2012 Catalog):

Vectors; differentiation and integration of vector valued functions; multivariable calculus; partial derivatives; multiple integrals and applications; line, surface and volume integrals; Green's theorem; divergence theorem; and Stoke's theorem.

Prerequisite Course: Prerequisites MATH 182

Prerequisite by Topic: Calculus II

Textbook:

Essential Calculus by James Stewart (Chapter 10-13)

Other Reference Material: N/A

Course Coordinator: E. Salehi, ebrahim.salehi@unlv.edu

Course learning outcomes:

Students should be able analyze problems involving three dimensional vectors, solve a variety of optimization problems, evaluate multiple integrals using the appropriate transformations, and apply techniques of vector calculus to a wide array of problems.

Course Objective:

To familiarize students with vector calculus, multivariable calculus, multiple integrals, and their applications.

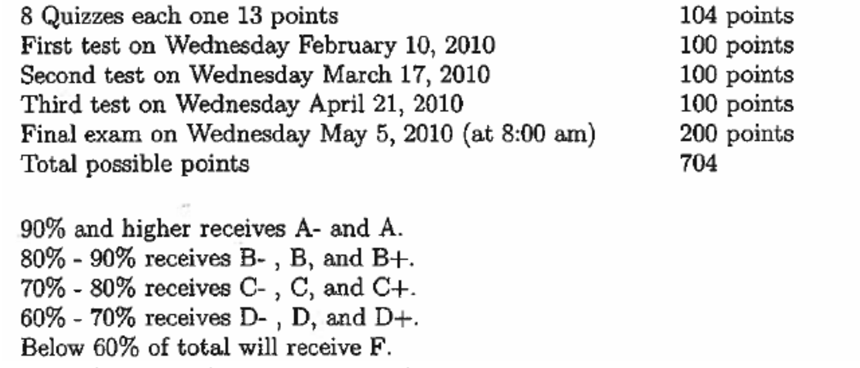
Topics Covered:

Vectors in three dimensions, dot and cross product, equations of lines and planes, cylindrical and spherical coordinates, vector functions and space curves, derivatives and integrals of vector functions, arc length and curvature, velocity and acceleration, functions of several variables, limits and continuity, partial derivatives, tangent planes, chain rule, directional derivative, gradient vector, maximum and minimum values, Lagrange multipliers, double integral over a rectangular region, iterated integrals, double integral over a general region, polar coordinates, applications of double integrals, surface area, triple integrals, triple integrals in cylindrical and spherical coordinates, change of variables in multiple integrals, vector fields, line integrals, Green's theorem, surface integrals, Stokes' theorem, divergence theorem.

Laboratory Projects: None

Class/Laboratory Schedule: Lecture, 4 hours per week

Assessment of Student Progress toward Course Objectives



Homework assignments will be collected unannounced	100 points
8 Quizzes each one 13 points	104 points
First test on Wednesday February 10, 2010	100 points
Second test on Wednesday March 17, 2010	100 points
Third test on Wednesday April 21, 2010	100 points
Final exam on Wednesday May 5, 2010 (at 8:00 am)	200 points
Total possible points	704

90% and higher receives A- and A.
80% - 90% receives B- , B, and B+.
70% - 80% receives C- , C, and C+.
60% - 70% receives D- , D, and D+.
Below 60% of total will receive F.

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	4 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: E. Salehi **Date:**

MATH 431: Mathematics for Engineers and Scientists I

Course Description (2010-2012 Catalog):

First order linear and non-linear differential equations, second and higher order differential equations with constant coefficients, Laplace transforms and applications, Gaussian elimination and eigenvalue problems, solutions of systems of differential equations.

Prerequisite Course: Prerequisites MATH 283
Prerequisite by Topic: Calculus III
Textbook:

Advanced Engineering Mathematics, 9 th Edition by Erwin Kreyszig

Other Reference Material: N/A
Course Coordinator: Xin Li
Course learning outcomes:

Students should be able to solve a wide variety of ordinary differential equations that they will encounter in engineering and science. Furthermore, they would have grasped the fundamentals of matrix algebra and its applications.

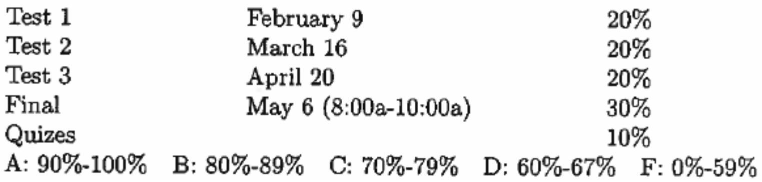
Course Objective:

To familiarize students with the basic concepts of matrix algebra including elimination and their applications to systems of differential equations, introduce them to ordinary linear differential equations and their applications to engineering, and also to introduce them to Laplace transform methods.

Topics Covered:

Separable and exact equations, integrating factors, linear equations, second order and higher order homogeneous linear equations with constant coefficients, Euler-Cauchy equations, nonhomogeneous equations, methods of undetermined coefficients and variation of parameters, homogeneous linear systems with constant coefficients, phase plane, critical points, stability, nonhomogeneous linear systems, Laplace transform and the inverse transform, transforms of derivatives and integrals, applications to linear differential equations, unit step function and the Dirac-delta function, differentiation and integration of transforms, convolutions, matrix algebra, linear systems of equations, Gaussian elimination, vector spaces, determinants, inverse os a matrix, eigenvalues and eigenvectors, similarity, diagonalization.

Laboratory Projects: None
Class/Laboratory Schedule: Lecture, 4 hours per week
Assessment of Student Progress toward Course Objectives



Test 1	February 9	20%
Test 2	March 16	20%
Test 3	April 20	20%
Final	May 6 (8:00a-10:00a)	30%
Quizes		10%

A: 90%-100% B: 80%-89% C: 70%-79% D: 60%-67% F: 0%-59%

Contribution of Course for meeting Professional Component:

a) Mathematics and basic sciences: 4 credit
b) Engineering Topics (Design/Science): 0 credit
c) General Education: 0 credit
d) Others: 0 credits

Prepared By: Xin Li **Date:**

STAT 463: Applied Statistics for Engineers

Course Description (2010-2012 Catalog):

Elementary probability, commonly used discrete and continuous probability distributions, estimation and hypothesis testing, categorical data testing, regression, model building, analysis of variance, product and system reliability and engineering applications, and quality control.

Prerequisite Course: Prerequisites MATH 283

Prerequisite by Topic: Calculus III

Textbook:

Applied Statistics for Engineers and Scientists (2nd Edition) by Jay Devore and Nicholas Farnum, Thomson Brooks/Cole

Other Reference Material: N/A

Course Coordinator: Kaushik Ghosh

Course learning outcomes:

Students should be able to do statistical data analysis on a wide array of engineering problems and be able to justify such an analysis.

Course Objective:

To familiarize students with the standard statistical methods in practice and applications of these methods to a variety of applications in engineering using statistical software.

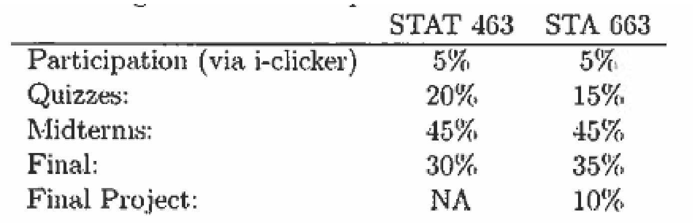
Topics Covered:

Descriptive statistics, normal and other continuous distributions, useful discrete distributions, measures of center and dispersion, plots and correlation, collection of data, concepts of probability, sampling distribution, point estimation, confidence intervals, testing of hypotheses, ANOVA, linear and multiple regression, applications.

Laboratory Projects: None

Class/Laboratory Schedule: Lecture, 3 hours per week

Assessment of Student Progress toward Course Objectives



	STAT 463	STA 663
Participation (via i-clicker)	5%	5%
Quizzes:	20%	15%
Midterms:	45%	45%
Final:	30%	35%
Final Project:	NA	10%

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	3 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	0 credit
d)	Others:	0 credits

Prepared By: Kaushik Ghosh **Date:**

ENG 101: Composition I

Course Description (2010-2012 Catalog):
Evidence-based, writing intensive course designed to improve critical thinking, reading, and writing proficiencies through guidance in writing the thesis-driven essay. Students develop strategies for turning their experience, observations, and analyses into evidence suitable for academic writing. Emphasis on writing the short, focused, concretely developed college paper.

Prerequisite Course: Qualifying score on a placement exam

Prerequisite by Topic: N/A

Textbook: *Text Messages*, UNLV Custom Edition of *Guide for College Writers*
The Little, Brown Essential Handbook, 6th edition

Course Objectives: Among the specific abilities you should learn in this course are these:

8. To plan and organize an essay by working through your writing process
9. To benefit from peer response to your writing
10. To identify and understand the audience and purpose in writing
11. To develop effective critical reading skills through close analysis of texts
12. To use reading and writing as tools for questioning, critical thinking, and informed communication
13. To incorporate knowledge from texts into thesis-guided expository writing
14. To adopt appropriate voice, tone, and level of formality in your writing

(e) To edit final drafts for format, structure, grammar, and mechanics

Course Requirements: To successfully complete this course, **all** of the following work is required:

- An ungraded diagnostic essay completed within the first week of class
- Reading assignments of approximately 60 pages per week
- Daily informal writing, to include journal entries, in-class writing, quizzes, homework, and peer reviews
- Prewriting and drafts of essays in progress
- Four out-of-class essays, to include a personal expressive essay, an analysis essay, an evaluation essay, and a position or problem/solution essay*
- Midterm and final exams that include a graded timed essay

Other Reference Material: N/A

Topics Covered:

Week 1		
Tuesday, January 12	Intro to class and syllabus	Write diagnostic essay in class
Thursday, January 14	Adler, "How to Mark Book," p165; Roberts, "How to Say Nothing," p178; S. King, "On Reading & Writing," p190	Inventory of Your Writing, p7-8
Week 2		
Tuesday, January 19	Chapter 1, p3-35	Page 15, #1; p34, #1
Thursday, January 21	Chapter 3, p59-69; Townsend, "First Hours," p195; Morgan, "Ghosts & Echoes," p199; Chapter 2, p37 + mid p50-top p53	Page 69, #7
Week 3		
Tuesday, January 26	Chapter 4, p71-79; Chapter 2, p38-top p45 Tan, "Mother Tongue," p201; Cisneros, "Only Daughter," p243; Hwang, "Good Daughter," p246	Page 79, #6 or #7
Thursday, January 28	Chapter 2, bottom p46- mid p48; Walker, "Beauty," p223; Keillor, "How Crab Apple Grew," p410	Page 230, #1 and #2 + identify figurative language in Keillor
Week 4		
Monday, February 1	Rough draft of Essay 1 submitted by 10:30 p.m. via WebCampus for peer review	
Tuesday, February 2	LB Handbook, Pt 1, p3-14, Pt 3, p69-73,	Essay 1 rough draft workshop Pt 5, p97-100
Thursday, February 4	Mairs, "On Being a Cripple," p231	Essay 1 submission portfolio due
Week 5		

Tuesday, February 9	Chapter 5, p81-97; Chapter 2, mid p48-mid p50	Page 96, #1
Thursday, February 11	Chapter 6, p99-106; Vonnegut, "How to Write," p172; Orman, "Control Credit Cards," p379	Page 106, #1 or #2 or #3
Week 6		
Tuesday, February 16	Chapter 6, p107-112; Frye, "Don't You Think," p170; Tavris, "In Groups We Shrink," p323; Orwell, "Shooting an Elephant," p326; Stone, "My Friend Michelle," p395; Brosseau, "Anorexia Nervosa," p398	Page 112, #2 or #3 or #5
Thursday, February 18	Chapter 6, p113-123; Lincoln, "Gettysburg Address," p276; Tannen, "Marked Women," p354	Analyze Zinsser or Tannen using Critical Rereading Guide, p85-86
Week 7		
Tuesday, February 23	Mabry, "Two Worlds," p250; Obama, "Speech on Race," p265; Chapter 2, p45-46, p53	Analyze Obama using Critical Rereading Guide, p85-86
Wednesday, February 24	Rough draft of Essay 2 submitted by 10:30 p.m. via WebCampus for peer review	
Thursday, February 25	LB Handbook, Pt 3, p48-69, Pt 5, p100-106	Essay 2 rough draft workshop
Week 8		
Tuesday, March 2	Appendix A, Writing Under Pressure, p431	Essay 2 submission portfolio due
Thursday, March 4	Midterm Exam	
Week 9		
March 8 – 11	Student-Instructor Conferences	
Week 10		
Tuesday, March 16	Chapter 7, p125-140; Ebert, "Harry Potter," p385; Mitchell, "Sorcerer's Apprentice," p387	Create a 3-column log (p136) in response to p135, #2 or #3 or #5
Thursday, March 18	ML King, "Meeting Oppression," p277; Stoll, "Makes Learning Fun," p308; Tapscott, "Learning as Torture," p317	Respond to ideas in p134, #1 and p322-23, Writing from Text, #1 & #2
Week 11		
Tuesday, March 23	Readings to be assigned	
Thursday, March 25	Readings to be assigned	
Week 12		
Monday, April 5	Rough draft of Essay 3 submittedby 10:30 p.m. via WebCampus for peer review	
Tuesday, April 6	LB Pt 4, p77-94 Essay 3 rough draft workshop	
Thursday, April 8	Chapter 8, p143 Essay 3 submission portfolio due	
Week 13		
Tuesday, April 13	Tannen "Argument Culture," p359; Devlin, "Teaching Tolerance," p391; Berube, "End Grade Inflation," p415	Page 364, #1
Thursday, April 15	Staples, "Just Walk On By," p216; Brown, "For the Muslim Prom Queen," p261	Page 221, #1 or #2
Week 14		
Tuesday, April 20	Friedman, "Whole World Watching," p281; Queenan, "You Tube This!," p285; OR Poniewozik, "Reality TV Is Good,"p296; Page 302, Writing from Text, #1 OR Peters, "Reality TV Too Real," p303; Page 303, Connecting Texts, #1 OR Brooks, "Outsourced Brain," p373; Page 157, #5 Coben, "Undercover Parent," p375	Page 288, Connecting Texts, #1
Thursday, April 22	Cameron, "Want Less," p377;	Respond to p424, #5 Rowling, "Fringe Benefits," p417
Week 15		
Monday, April 26	Rough draft of Essay 4 submitted by 10:30 p.m. via WebCampus for peer review	
Tuesday, April 27	LB Pt 2, p22-40 Essay 4 rough draft workshop	
Thursday, April 29	Prep for Final ExamEssay 4 submission portfolio due Course evaluation completed in class	

Week 16
Tuesday, May 4 Final Exam, 3:10-5:10 p.m., CBC C212

Laboratory Projects: None
Class/Laboratory Schedule: Two 75 min lecture per session per week

Assessment of Student Progress toward Course Objectives

Grading: The familiar A-F grading scale will be used on essays (along with + and -). The Undergraduate Catalog defines each grade as follows:

A – Superior	C – Average	F – Failing
B – Above Average	D – Below Average	

Essays are graded for content, completeness and correctness. A grading rubric will be provided with every out-of-class essay assignment.

Grades for this course will be assigned in this way:

Essay 1	15	Essay 3	20
Essay 2	15	Essay 4	20
Participation	7.5	Participation	7.5
(homework, daily writing, discussion, peer review)		(homework, daily writing,	
discussion, peer review)			
Midterm Exam	7.5	Final Exam	7.5
Midterm Assessment	45% of final grade	Final Assessment	100% of final grade

Class/Laboratory Schedule: N/A

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	3 credit
d)	Others:	0 credits

ENG 102: Composition II

Course Description (2010-2012 Catalog):

Builds on the critical thinking, reading, and writing skills developed in ENG 101. Students learn the processes necessary for collecting and incorporating research material into their writing. They learn to cite and document research sources and how to develop arguments and support them with sound evidence.

Prerequisite Course: Prerequisites ENG 101 , ENG 101F , or equivalent.

Prerequisite by Topic: English Composition I

Textbook:

- *Guide to Academic Research and Writing: Custom Edition for UNLV*
- *Writing in the Margins*, Brown

Other Reference Material: N/A

Course Coordinator:

Course learning outcomes:

- To understand argumentation as a process that seeks to understand a range of views and that treats opposing views respectfully
- To use research, reading, and writing as tools for questioning, critical thinking, and informed communication
- To *critically* read and write with attention to the use of evidence
- To develop an understanding of the strategies of argument
- To analyze and evaluate reasons and evidence in arguments
- To design and implement appropriate research strategies
- To evaluate primary and secondary research sources
- To summarize, paraphrase, and synthesize research material
- To plan and to organize a research essay
- To integrate and document research sources
- To address purpose and audience effectively in a research essay
- To evaluate the strengths and weaknesses of their own writings and those of others
- To revise through several drafts
- To use conventions of format, structure, and language

Topics Covered:

Project I: Summary & Paraphrase/Response Essay

Your first major writing assignment will be to write a summary of approximately one page and a response essay of no less than two full pages. The purpose of this assignment is for you to learn and to practice the skills of

- reading critically
- identifying claims and reasons
- quoting, paraphrasing, and summarizing
- citing source

Each of these skills is essential to all research-based writing. You will use them in all of the other writing projects and the final exam. I will expect you to improve your skills in these areas with each project.

Project II: Analysis/Evaluation of an Argument

For this project, you will write a three-to-five-page essay in which you analyze the elements of an assigned written argument and interpret how the writer's techniques convey meaning. The purpose of this assignment is to learn and to practice the skills of

- recognizing strategies of written argument
- analyzing audience and purpose
- evaluating use of evidence
- evaluating response to opposing views
- evaluating anticipation of possible reader objections

Project III: Critical Annotated Bibliography & Proposal Essay

Your third assignment will be to write a critical annotated bibliography consisting of eight academic-level sources. The purpose of this assignment is to learn and to practice the skills of

- choosing and narrowing a research topic
- designing search strategies
- conducting academic research
- planning a research-based argument essay

You will also write a two-page introduction in which you explain your search strategy and your proposed plan for using your sources in your researched essay. The research you conduct for your annotated bibliography will be the foundation for the research needed for Project IV.

Project IV: Researched Argument

For this project, you will write a research-based argument essay of 8 to 10 pages. The purpose of this assignment is to learn and practice the skills of

- synthesizing research materials
- establishing a claim
- organizing a research-based argument
- developing your own argument using evidence consisting of expert opinion, facts and statistics, your own experience and observations (if appropriate to the topic), and your analysis and evaluation of the ideas found in your research
- integrating and documenting research sources
- integrating your own ideas with those of others
- using visual tools such as tables, charts, graphs, and illustrations

Laboratory Projects: None

Assessment of Student Progress toward Course Objectives

Grades will be determined on a percentage basis. Major assignments will be graded on the standard letter-grade scale with plusses and minuses. Your overall grade and project grades are based on the following percentages:

= 100 – 92 %	- = 91 – 90 %	+ = 89 – 88 %	= 87 – 82 %	- = 81 – 80 %
+ = 79 – 78 %	= 77 – 72 %	- = 71 – 70 %	+ = 69 – 68 %	= 67 – 62 %
- = 61 – 60 %	= 0 %			

Class/Laboratory Schedule: Two 75 min lecture per session per week

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	3credit
d)	Others:	0 credits

Prepared By: **Date:**

ENG 231: World Literature I

Course Description (2010-2012 Catalog):

Introduces students to world masterworks from antiquity through the mid-seventeenth century.

Prerequisite Course:

Prerequisite by Topic:

Textbook:

Required: *The Longman Anthology of World Literature: The Ancient World, The Medieval Era, and the Early Modern Period: A Custom Edition for University of Nevada, Las Vegas,* David Damrosch and David L. Pike, General Editors (New York: Pearson Custom Publishing, 2009).

Other Reference Material: N/A

Course Coordinator: Prof. Anthony Guy Patricia (patricia@unlv.nevada.edu)

Course learning outcomes:

This course contributes to students':

- familiarity with world masterworks of literature from antiquity through the mid-seventeenth century
- ability to read closely, to think critically, and to communicate effectively and argue persuasively, especially in writing, in the academic environment

Topics Covered:

- Syllabus Review, Indo-Europeans Lecture
- *The Epic of Gilgamesh*
- *The Epic of Gilgamesh*,
- Genesis
- *The Odyssey*
- *Oedipus the King*,
- *The Ramayana of Valmiki*,
- *Śakuntalā and the Ring of Recollection*,
- "The Death of Atsumori,"
- *Atsumori, A Tale of Heike Play*,
- *The Qur'an*,
- "The Tale of the Porter and the Young Girls,"
- *Inferno*, Cantos
- *Othello*, Acts 1 and 2

Laboratory Projects: None

Class/Laboratory Schedule: Two 75 min lecture per session per week

Assessment of Student Progress toward Course Objectives

Attendance, Punctuality, and Participation	10%
10 1 full page Response Papers	15%
3 Quizzes	15%
3 Exams (2 Midterms and 1 Final)	30%
3 Essays (3 full to 4 pages)	30%
Total	100%

Grading of Assignments: Assignments will be graded on the standard A to F system with plusses and minuses.

Contribution of Course for meeting Professional Component:

a)	Mathematics and basic sciences:	0 credit
b)	Engineering Topics (Design/Science):	0 credit
c)	General Education:	3 credit
d)	Others:	0 credits

Prepared By: **Date:**

Philosophy 242-001: Ethics for Engineers and Scientists

Spring 2010 • Tuesday & Thursday 8:30 am – 9:45 am (WRI C305)

Course Instructor: Dr. Abigail Pfister Aguilar; contact information: office CDC 427 on Tuesdays and Thursdays, 11:30 – 12:30 and by appt, phone 895-3750, e-mail aguila26@unlv.nevada.edu (and on WebCampus).

Course Description: Ethical issues (e.g., whistle-blowing, the environment) that commonly arise in engineering and science practice. Ethical theory, followed by case-study centered discussions designed to hone students' abilities to recognize and articulate ethical problems and to utilize institutional supports for ethical behavior that already exists in the professional environment.

Course Objective: To have students examine ethical claims concerning issues specific to engineers and scientists, to examine case studies that illustrate these issues, to demonstrate the value of a healthy skepticism, and to evaluate ethical arguments about engineering and science in terms of logical consistency, validity, and cogency.

Required Texts: (1) Charles E. Harris, Jr., Michael S. Pritchard, Michael J. Rabins, *Engineering Ethics: Concepts and Cases*, Fourth Edition, Wadsworth Cengage Learning, 2009. (2) Abigail Aguilar, *Selected Readings in Ethical Theories*, Thomson, 2007.

Formal Requirements: There will be *300 points* total possible in the course, as follows:

- *15 points*: attendance (including examination days) and participation:

Days Attended	Points	Days Attended	Points	Days Attended	Points
29 – 31	15	19 – 20	10	9 – 10	5
27 – 28	14	17 – 18	9	7 – 8	4
25 – 26	13	15 – 16	8	5 – 6	3
23 – 24	12	13 – 14	7	3 – 4	2
21 – 22	11	11 – 12	6	1 – 2	1

- *40 points*: top four scores from six 10-point short synopses (one page) of selected readings from the textbook. These will be pop-quizzes given out at random in class during the semester, to be done in the beginning 15 minutes over a reading assigned for that class; there will be **NO** make-up synopses allowed.

- *90 points*: three 30-point case study essays (due: February 18, March 25, and April 22). These will be short take-home essays concerning issues raised in class; directions for each will be handed out in class and will subsequently be available on WebCampus.

- *100 points*: two 50-point midterm examinations (February 11 and March 18). Make-up exams will be given only for excused absences and will be more difficult than the regular exams.

- 55 *points*: Final examination (Thursday, May 6, 8:00 am - 10:00 am). This exam will be cumulative, but will emphasize the material of the last part of the course, that is, the material covered after the second midterm exam. There will be **NO** make-up final examinations given.

Extra Credit: Maximum *10 points* total possible (*5 points* maximum for each submission; last date for submissions is Thursday, May 6 at 8:00 am). Points will be given for contemporary examples of the engineering and scientific issues raised in class. Directions for how to do this extra credit can be found in the full syllabus on WebCampus.

Grading: Students should assume that the final grading scale for the course shall be a straight scale; with 300 points in the course, this means the following:

A = 93% = 279+ points
A– = 90% = 270–278.5 pts
B+ = 87% = 261–269.5 pts
B – 83% – 249–260.5 pts
B– = 80% = 240–248.5 pts
C+ = 77% = 231–239.5 pts
C = 73% = 219–230.5 pts
C– – 70% – 210–218.5 pts
D+ = 67% = 201–209.5 pts
D = 63% = 189–200.5 pts
D– = 60% = 180–188.5 pts
F – 179.5 points or less

N.b.: *Stultum est queri de adversis, ubi culpa est tua* (Publilius Syrus, *Sententiae*)

THE FOLLOWING POLICIES CAN BE FOUND ON WEBCAMPUS (on the UNLV website, at https://webcampus.nevada.edu), IN THE DOCUMENT TITLED "FULL SYLLABUS." All of these policies will be followed for this course; students should look up the policies, since they are responsible for following them. Any questions should be raised with the instructor, including questions about WebCampus.

Academic Misconduct
Copyright
UNLV Writing Center
Disability Resource Center (DRC)
Department Policy on Academic Dishonesty
Religious Holidays Policy
Tutoring
Rebelmail

Class Schedule: The following schedule is tentative and subject to change at the instructor's discretion; the full detailed (tentative) schedule is available on the full syllabus, although the actual schedule will be updated after each class on WebCampus under "Announcements." (Students who do not know how to access WebCampus should speak with the instructor.)

WEEK 1 (Jan 12, 14): Introduction to course; *Ethical Theories:* Mill, *On Liberty*
WEEK 2 (Jan 19, 21): *Ethical Theories:* Aristotle; *Ethical Theories:* Kant
WEEK 3 (Jan 26, 28): *Ethical Theories:* Mill, *Utilitarianism*; *Ethical Theories:* Locke
WEEK 4 (Feb 2, 4): Ch 1: Why Professional Ethics?; Ch 2: Responsibility in Engineering
WEEK 5 (Feb 9, 11): Ch 2, case studies; Exam Review; **MIDTERM EXAMINATION #1**
WEEK 6 (Feb 16, 18): Chapter 3: Framing the Problem; **TAKE-HOME ESSAY #1 DUE**
WEEK 7 (Feb 23, 25): Chapter 4: Resolving Problems
WEEK 8 (Mar 2, 4): Chapter 5: The Social and Value Dimensions of Technology, case studies
WEEK 9 (Mar 9, 11): Chapter 6: Trust and Reliability
WEEK 10 (Mar 16, 18): Chapter 6 case study; Exam Review; **MIDTERM EXAMINATION #2**
WEEK 11 (Mar 23,25): Ch 7: Risk & Liability in Engineering; **TAKE-HOME ESSAY #2 DUE**
WEEK 12 (Apr 6, 8): Chapter 7, case studies; Chapter 8: Engineers in Organizations
WEEK 13 (Apr 13, 15): Chapter 8
WEEK 14 (Apr 20, 22): Chapter 9: Engineers and the Environment, case studies; **TAKE-HOME ESSAY #3 DUE**
WEEK 15 (Apr 27, 29): Chapter 10: International Engineering Professionalism; Exam Review

FINAL EXAMINATION: Thursday, May 6, 8:00am–10:00am

Note: Thursday, May 6, 8:00am, is the last date and time for submission of any late assignments or extra credit; **none** will be accepted afterward.

APPENDIX B.1 FACULTY RESUMES

Name and Academic Rank:
Boehm, Robert
Distinguished Professor of Mechanical Engineering
Director of the Energy Research Center

Degrees (field/Institution/Date):

Ph.D.	Mechanical Engineering, University of California Berkeley, 1968
M.S.	Mechanical Engineering, Washington State University, 1964
B.S.	Mechanical Engineering, Washington State University, 1962

Years of Services: 20
Date of original appointment: July 1, 1990

Date of Advancement in Rank:
Professor, July 1, 1990.

Other Professional Experiences (Industrial/Academic): Department of Mechanical Engineering, University of Utah, Salt Lake City, 1968-1990..

Consulting, Patent, etc.: Limited

State(s) in which professionally licensed or certified: California

Selected Publications of the Last Five Years:

- L. Zhu, R. Hurt, D. Correia, and R. Boehm "Comprehensive Energy and Economic Analyses on a Zero Energy House Versus a Conventional House, ENERGY-THE INTERNATIONAL JOURNAL, Vol.33, 2009, pp. 1043-1053.
- L. Zhu, R. Hurt, D. Correa, and R. Boehm, "Detailed Energy Saving Performance Analyses on Thermal Mass Walls Demonstrated in a Zero Energy House" ENERGY AND BUILDINGS, Volume 41, Issue 3, March 2009, pp. 303-310.
- S. Rosta, R. Hurt, R. F. Boehm, M. Hale, "Monitoring of a Zero Energy House," JOURNAL OF SOLAR ENERGY ENGINEERING, 130, 021006, 2008
- Li Zhu, Rick Hurt, Daniel Correia, Robert Boehm, Validated Evaluation on Building Energy Conservation Features in a Zero Energy House, ASES2008 Conference. A. Sahm, K. Stone, R. Boehm, A. Gray, Modeling a High Concentration Photovoltaic System, ASES2008 Conference.
- Mark Campbell, Sachin Deshmukh, Robert Boehm, Rick Hurt, "Modeling Solar Impacts on Hydrogen Production from Electrolysis," Proceedings of Energy Sustainability Conference 2008.
- Huifang Deng and Robert Boehm, "An Estimation of the Performance Limits of Dry Cooling on Trough Type Solar Thermal Plant," Proceedings of ASME Energy Sustainability Conference 2008.
- Todd France, Eric Wiemers, Stephen Butterworth, Yahia Baghzouz, and Robert Boehm, "Renewable Energy for Federal Land Management Agencies in Southern Nevada," Proceedings of ASME Energy Sustainability Conference 2008.
- D. Correa, L. Zhu, R. Hurt, and R. Boehm, "Comprehensive Modeling on the Integral Collection Storage Unit Demonstrated in a Zero Energy House," Proceedings the 2008 American Solar Energy Society Conference, San Diego, California.
- L. Zhu, R. Hurt, D. Correa, and R. Boehm, "Real Energy Saving Performance of Thermal Mass Walls Demonstrated in a Zero Energy House," Proceedings the 2008 American Solar Energy Society Conference, San Diego, California.
- L. Zhu, R. Hurt, D. Correa, and R. Boehm, "Validated Evaluation on Building Energy Conservation Features in a Zero Energy House," Proceedings the 2008 American Solar Energy Society Conference, San Diego, California.
- S. S. Deshmukh, R. F. Boehm, "Review of Modeling Details Related to Renewably Powered Hydrogen Systems", RENEWABLE & SUSTAINABLE ENERGY REVIEWS, Vol. 12, No. 9, pp. 2301-2330, 2008
- S. B. Sadineni, R. Hurt, C. Halford, R. F. Boehm. "Theory and Experimental Results for Solar Still Operation." ENERGY-THE INTERNATIONAL JOURNAL, Vol. 33, Issue 1, January 2008, pp. 71-80.
- Y. Chen, J. Nie, B. Armaly, H. Hsieh, R. Boehm, "Developing Turbulent Forced Convection in Two-Dimensional Duct, JOURNAL OF HEAT TRANSFER, Vol. 129, 2007, pp. 1295-1299.

- K. Halford and R. F. Boehm, “Modeling of Phase Change Material Peak Load Shifting,” ENERGY AND BULDINGS, Volume 39, Issue 3, March 2007, Pages 298-305
- J. Nie, Y. Chen, S. Cohen, B. Carger, and R. Boehm, “Velocity and Temperature Distributions in Bipolar Plate of PEM Electrolysis Cell,” IMECE2007-42622, Proceedings of the 2007 ASME International Mechanical Engineering Congress and Exposition.
- Gray, K. Stone, and R. Boehm. "Modeling a Passive Cooling System for Photovoltaic Cells under Concentration." 2007 ASME-JSME Thermal Engineering Summer Heat Transfer Conference. July 8-12, 2007, Vancouver, British Columbia, Canada.
- Gray, K. Stone, G. Wood, R. Boehm, and K. Johnson. "Assisting in Matching Nevada Power Company's Electrical Load Profiles with High Concentration PV Systems." ASME Energy Sustainability 2007.
- R. Fifield, J. Gardner, R. Boehm, “Conversion and Performance Analysis of a Small Utility Vehicle Operating on Hydrogen Fuel” ES2007-36106, ASME, Energy Sustainability 2007
- S. Katukota, J. Nie, Y. Chen, R. Boehm, and H. Hsieh, “Numerical Modeling of a Electrochemical Process for Hydrogen Production from PEM Electrolyzer Cell, ES2007-36108, Proceedings of ASME Energy Sustainability 2007.
- R. Fifield, J. Gardner, R. Boehm, T. Kell, “Use of Direct Cylinder Injection in Hydrogen Engine Conversions.” Paper 3534 NHA Annual Hydrogen Conference, San Antonio, TX, 2007
- S. S. Deshmukh, R. F. Boehm, “Mathematical Modeling of Performance of a Grid Connected Solar-Hydrogen System for Residential Applications,” JOURNAL OF ENERGY AND CLIMATE CHANGE, vol. 1, no 2, pp. 113-125, 2006
- R. Boehm, J. Politano, and Z. Stefanoski, “Prediction of Gross Parameters During Enclosed Incineration of Energetic Materials,” JOURNAL OF THERMOPHYSICS AND HEAT TRANSFER, Vol. 20, No. 1, pp. 135-139, 2006
- Mahderekal, C. K. Halford, and R. Boehm “Simulation and Optimization of a Concentrated Photovoltaic System,” JOURNAL OF SOLAR ENERGY ENGINEERING, Vol 128, No. 2, pp 139-145. 2006
- R. Boehm, “Conduction Heat Transfer,” Section 4.1 in THE CRC HANDBOOK OF MECHANICAL ENGINEERING, SECOND EDITION (F. Kreith and Y. Goswami, eds), 2005.
- R. Boehm, “Pumps and Fans,” Chapter 41 in THE ENGINEERING HANDBOOK, SECOND EDITION (Richard Dorf ed.), CRC Publishing, 2005.
- L. Sanidad, Y. Baghzouz, R. Boehm, and E. Hodge, “Field Tests of a PV-Powered Air Monitoring System,” JOURNAL OF SOLAR ENERGY ENGINEERING, Vol. 125, pp. 203-206, May 2003, pp. 203-206.
- R. Boehm, “Direct Contact Heat Transfer,” Chapter 19 in HANDBOOK OF HEAT TRANSFER (edited by A. Bejan and A. Kraus), John Wiley and Sons Publishers, 2003.

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)
- American Society for Heating, Refrigerating and Air Conditioning Engineers (ASHRAE)
- American Solar Energy Society (ASES)
- Society of Automotive Engineers (SAE)

Honors and Awards:

- Distinguished Professor (only one in College of Engineering)
- Fellow ASME
- Nevada Renewable Energy Leadership Award, ASES
- Harry Reid Silver State Research Award
- Gunnerman Silver State Award for Excellence in Science and Technology

Institutional and Professional Services in the Last Five Years:

- Board of Directors, ASME Silver State Section
- Technical Editor, ENERGY THE INTERNATIONAL JOURNAL
- Nevada State Task Force for Renewable Energy
- ASME National Energy Committee

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:
Chen, Yitung
Professor, Mechanical Engineering

Degrees (field/Institution/Date):

Ph.D.	Mechanical Engineering, University of Utah, 1991
M.S.	Mechanical Engineering, University of Utah, 1988
B.S.	Chemical Engineering, Feng Chia University, Taiwan, 1983

Years of Services: 15
Date of original appointment: October 1, 1994

Date of Advancement in Rank:
Assistant Research Professor, October 1, 1994 (Non-tenure track)
Associate Research Professor, July 1, 1999 (Non-tenure track)
Associate Professor, July 1, 2003 (Tenure track and tenured since July 1, 2006)
Professor, July 1, 2009

Other Professional Experiences (Industrial/Academic):
Technical Director, Con-Aid Construction and Consulting Company, 1991-1993
Visiting Professor, National Chulalongkon University, Bangkok, Thailand, 1993

Consulting, Patent, etc.:
Kevin Kennedy Associates, "Heat Exchanger Modeling and Analysis" in 2009

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:
Book:
(1) Jichun Li and Yitung Chen, "Computational Partial Differential Equations using MATLAB," ISBN: 978-1-4200-8904-2, 2009 by Taylor & Francis Group, LLC.

Book Chapters: 5 book chapters have been published

Journal Articles: 48 journal articles have been published

Conference Proceedings – Refereed: 87 papers have been published

Scientific and Professional Societies Associated:
- American Society of Mechanical Engineers (ASME)
- American Nuclear Society (ANS)
- American Institute of Chemical Engineers (AIChE)

Honors and Awards:
- The 2008-2009 Best Paper Award from the Advanced Energy Systems Division of ASME
- Distinguished Researcher Award of Howard R. Hughes College of Engineering (2009)

Institutional and Professional Services in the Last Five Years:

A. (1) Advise senior project designs for undergraduate students. (2) ASME K-20 committee member. (3) Organized and Chair or Co-Chair ASME Summer Heat Transfer Conference and IMECE Conference. (4) Organized 2009 Inaugural US-EU-China Thermophysics Conference - Renewable Energy, May 28-30, 2009, Beijing, China. (5) Organized NSF-CBMS conference - Mathematical and Numerical Treatment of Fluid Flow and Transport in Porous Media. (6) Session Chairs of the 2nd COE-INES International Symposium on Innovative Nuclear Energy Systems, INES-2, Yokohama, Japan. (7) Paper reviewer for ASME, AIAA, and ANS journal and conference papers, Journal of Fluid Engineering, International Journal of Thermal Science, Applied Thermal Engineering, International Journal of Heat and Mass Transfer, Numerical Heat Transfer, Journal of Heat Transfer, Progress in Nuclear Engineering, Modern Physics Letters B, Chemical Engineering Science, Journal of Energy Engineering, International Journal of Heat and

Fluid Flow, Journal of Polymer Engineering & Science, and Energy. (8) Proposal reviewer for the DOE/NEUP program. (9) Proposal reviewer for the Earth Sciences and Engineering Program of Georgian National Science Foundation, Tbilisi, Georgia. (10) Proposal reviewer for the International Science and Technology Center (ISTC), the State of Department, Washington, D.C., U.S.A. (11) Invited speakers at twenty institutes in China, Japan, Hong Kong, and Taiwan. (10) Elected President of Chinese in America Thermal Engineering Association (CATEA) in 2009. (12) Advisor of Chinese Student Association (students from Taiwan, R.O.C.) at UNLV. (13) Advisor of Ambassador Christian Fellowship at UNLV. (14) Serve as Grievance Committee member in the Faculty Senator in 2007 and 2008. (15) Establish collaborations between UNLV and Feng Chia University in Taiwan, UNLV and National Yunlin University of Science and Technology in Taiwan, UNLV and National Cheng Kong University in Taiwan, UNLV and Zhejiang University in China, UNLV and Xi'an Jiaotong University in China, UNLV and Beijing University of Technology in China, UNLV and Harbin Engineering University in China, UNLV and National Taipei University of Technology in Taiwan, UNLV and Hong Kong Polytechnic University in Hong Kong. (16) Provided EIT or FE fluid mechanics or heat transfer and thermodynamics reviews in the spring and fall semesters. (17) Prepared fluid mechanics and numerical methods and mathematics subjects for the Ph.D. qualifying exam. (18) Proposal reviewer for Technische Universitaet Wien/Vienna University of Technology.

Percentage of time available for research or scholarly activities: 50%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Cook, Daniel
Assistant Professor, Mechanical Engineering
Coordinator, Entertainment Engineering and Design

Degrees (field/Institution/Date):

Ph.D.	Materials Science and Engineering, UC Berkeley, 1993
M.S.	Materials Science and Engineering, UC Berkeley, 1989
B.S.	Metallurgical Engineering, Ohio State University, 1986

Years of Services: 4

Date of original appointment: August 1, 2005

Date of Advancement in Rank:

Assistant Professor/Coordinator, August 1, 2005

Other Professional Experiences (Industrial/Academic):

Assistant Professor, Mechanical Engineering, Virginia Commonwealth University, 200-2003
Senior Research Engineer, Reynolds Metals Company, 1995-2000
Postdoctoral Researcher, University of Greenwich, UK, 1994
Postdoctoral Researcher, University of Greenwich, France, 1993

Consulting, Patent, etc.: N/A

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

- D. P. Cook: "Metallurgical Design Issues at Cirque du Soleil", Proc. TMS Annual Meeting, February, 2010, Seattle, WA, U.S.A., (accepted for publication).
- D. P. Cook, C. M. Thompson: "Modeling Pulsatile Blood Flow in End-to-Side Anastomoses", Proc. TMS Annual Meeting, February, 2010, Seattle, WA, U.S.A., (accepted for publication).
- D. P. Cook: "Solar-thermal power applied to metals production", Proc. TMS Annual Meeting, February, 2010, Seattle, WA, U.S.A., (accepted for publication).
- D. P. Cook, R. T. Robinson: "Analysis of large dynamic structures in the entertainment industry", Proc. ISEC-5, pp. 285-290, September, 2009, Las Vegas, NV, U.S.A.
- D. P. Cook, M. Antognozzi, A. Bottino, A. De Santi, V. Lera, M. Locatelli: ``Re-Living Las Vegas: a multi-user, mixed-reality, edutainment environment based on the enhancement of original archival materials", VECIMS 2009, May, 2009, Hong Kong, China.
- D. P. Cook and R. Wysocki: ``Creativity in Engineering: Entertainment Engineering and Design", Design Principles and Practices: An International Journal, Vol. 2, pp. 87-98, 2008.
- A. Wang, D. P. Cook and H. Hsieh, ``Molten Salts Property Measurement Techniques Review", Proc. 16th International Conference on Nuclear Engineering, ICONE 2008, 2008, Orlando, Florida, USA.
- D. P. Cook , ``Thermal Tug-O-War: A Competitive, Hands-on Approach to Learning Basic Heat Exchanger Design", 2007 ASME International Mechanical Engineering Congress and Exposition, Seattle, Washington, November, 2007.
- D. P. Cook and S. Desmukh, ``Modeling Permanent Mold Casting of Aluminum", 2007 ASME International Mechanical Engineering Congress and Exposition, Seattle, Washington, November, 2007.
- D. P. Cook, R. Robinson and M. Genova, ``Comparison of Analytical, Numerical, and Experimental Results for A Simplified CPU/Heatsink Model", 2007 ASME International Mechanical Engineering Congress and Exposition, Seattle, Washington, November, 2007.
- T. Beller, R. LeCounte, D. Cook, and D. Beller ``Analysis of Neutron Production in the High-Power RACE Target", AccApp'07, The Eighth International Topical Meeting on Nuclear Applications and Utilization of Accelerators, Pocatello, Idaho, 2007.
- R. LeCounte, T. Beller, D. Cook, and D. Beller ``Thermal Analysis of the High-Power RACE Target", AccApp'07, The Eighth International Topical Meeting on Nuclear Applications and Utilization of Accelerators, Pocatello, Idaho, 2007.

- D. P. Cook and R. Wysocki: ``Materials Science and Fabrication Techniques in the Entertainment Industry: A Collaboration Between Fine Arts and Engineering", Proceedings of IMECE06, ASME, 2006.
- D. P. Cook, Y. Chen, L. J. Ratliff, H. Chen, and J. Ma: ``Numerical Modeling of EM Pump Efficiency", Proceedings of IMECE06, ASME, 2006.

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME), 2000 - present
- The Minerals, Metals, and Materials Society (TMS), 1995 - present

Honors and Awards: N/A

Institutional and Professional Services in the Last Five Years:

- UNLV General Education Advisory Committee, 2007 – 2009.
- UNLV General Education Committee, 2007 – 2009.
- Editorial contributor, Entertainment Engineering Magazine, 2007 – present.

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank

Mauer, Georg F., Professor of Mechanical Engineering

Degrees

Ph. D. in Mechanical Engineering, Technical University of Berlin, West Germany, 1977

Dipl.-Ingenieur (roughly equivalent to M. Sc.). in Mechanical Engineering, Technical University of Berlin, Germany, 1970

Years of Service: 24

Date of original appointment: January 1, 1986

Date of Advancement in Rank:

Assistant Professor, July 1, 1982
Associate Professor, January 1, 1986
Professor, July 1, 1995

Professional Registration N/A

Professional Experience

Since 1996	Professor, Department of Mechanical Engineering, University of Nevada, Las Vegas.
1986-1996	Associate Professor, Department of Mechanical Engineering, University of Nevada, Las Vegas.
1982-1985	Assistant Professor, Department of Mechanical Engineering, University of Washington, Seattle

Consulting, Patents (Past Five Years)

2004	Philips Medical Systems, Inc.

Principal Publications (Past Five Years)

- Tobias Kotthauser, Georg F. Mauer "Vision-Based Autonomous Robot Control For Pick And Place Operations," Proc. IEEE AIM 2009, Singapore, August
- Georg F. Mauer (2007) "Accuracy Analysis of a Robotic Mapping System," Proc. ANS 2007 ANS Topical Meeting on Decommissioning, Decontamination, & Reutilization, Chattanooga, TN.
- Georg F. Mauer (2007) "Design Concepts And Process Analysis For Reliable, Automated Transmuter Fuel Manufacture," Proc. Accelerator Apps 2007, ANS
- Georg F. Mauer and Chris Kawa (2007) "Accuracy Analysis of a Robotic Radionuclide Inspection and Mapping System for Surface Contamination," Proc. Waste Management 2007 conference, February, Tucson, AZ.
- Georg F. Mauer (2006) "Equipment Redundancy and Plant Reliability in Robotic Hot Cells for Fuel Fabrication," Proc. ANS Winter Annual Meeting, Albuquerque, NM.
- Mauer Georg F. and Jamil Renno (2004) "Virtual Testing of Robotic Assembly Processes for Hot Cells," Proc. Of 10th International Conference on Robotics & Remote Systems for Hazardous Environments, March.
- Mauer, G. F. and J. Renno (2004) "Conceptual Workcell Design and Throughput Analysis for Robotic Transmuter Fuel Fabrication," Proc. American Nuclear Society Winter Annual Meeting, November.

Professional Affiliations

American Society of Mechanical Engineers

Honors and Awards: 2008 Honors convocation award, UNLV

Institutional and Professional Services in the Last Five Years:

Local Chair, ISVC Computer Vision Conference, Las Vegas, November 2009
Member, Technical Program Committee, 2007 ANS Meeting on decommissioning.
Professional service (mainly review of papers and proposals)

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Samir Moujaes
Professor , Mechanical Engineering

Degrees (field/Institution/Date):

Ph.D.	Mechanical Engineering, University of Pittsburgh, 1980
M.S.	Mechanical Engineering, American University in Beirut, Beirut, Lebanon 1975
B.S.	Mechanical Engineering, American University in Beirut, Beirut, Lebanon 1972

Years of Services: 26
Date of original appointment: August 17, 1984

Date of Advancement in Rank:
Assistant Professor, August 1984
Associate Professor, July 1, 1990
Professor, July 1, 2004

Other Professional Experiences (Industrial/Academic):

1. (1972-1975) various aspects of the HVAC industry, Beirut Lebanon, contracting, consulting and technical sales
2. (1981-1984) Senior Research Engineer, Air Products and Chenicals, Allentown, PA, worked on various aspects of R&D related to the Solvent Refined Coal (SRC-I) project funded by DOE.

Consulting, Patent, etc.: No patents, have consulted numerous times as a PE for various law firms in the Southern Nevada area and nationally. Also performed technical consulting on several energy conservation projects nationally

State(s) in which professionally licensed or certified: PE in NV in Mechanical Engineering No. 7215

Principal Publications of the Last Five Years:

- “A Study of Solid particle Flow Characterization in a Solar Receiver” K. Kim, S. Moujaes, Solar Energy, 2009, v 83, n 10, p 1784-1793
- Experimental and Simulation Study on Wind Affecting Particle Flow in a Solar Receiver Solar Energy”, K. Kim, S. Moujaes, Nov. 2009, accepted to Solar Energy
- “CFD Predictions and Experimental Comparisons of Pressure Drop Effects of Turning Vanes in 90 degree Duct Elbows”, S. Moujaes, S. Aekula, J. of Energy Engineering, will appear in December 2009 issue.
- “Improved Delta-Q Measurement Technique for Estimating the Total and Local Leakages in Residential Buildings” N. Nassif, S. Moujaes, accepted to the J. of Energy Engineering
- “Measurement techniques for Estimating Local and Total Duct Leakages in Residential Buildings”, N. Nassif, S. Moujaes, R. Gundavelli, D. Selvaraj, K. Teeters, 2009 , J. of Energy Engineering, vol. 135, no.1, pp. 3-11 .
- “Self-tuning dynamic models of HVAC system components” N. Nassif, S. Moujaes, M. Zaheeruddin, Energy and Buildings 40 (2008), pp. 1709-1720.
- “Comparison of Simulation and Experimental Data of a Zero Energy Home in an Arid Climate”, R. Madeja, S. Moujaes, J. of Energy Engineering,2008, Vol. 134, no. 3, pp. 102-108.
- “Development and Validation of a new Field Measurement Technique for Estimating the Local and Total Air Duct Leakage in Residential Buildings”, N. Nassif, S. Moujaes, J. of Energy Engineering, 2008, Vol. 134, no.3, pp.87-94.
- “3-D CFD Predictions and Experimental Comparisons of Pressure Drop in a Ball Valve at Different Partial Openings in Turbulent Flow”, S. Moujaes, J. Rayavarapu, J. of Energy Engineering, 2008 Vol. 134, Issue 1,pp. 24-28.
- "_A New Operating Strategy for Economizer Dampers of VAV System_", Nassif, N. and S. Moujaes, Energy and Buildings 2008, Volume 40, Issue 3, Pages 289-299.
- “Comparison of Simulation and Experimental Data of a Zero Energy Home in an Arid Climate”, S. Moujaes, R. Madeja, J. of Energy Engineering, 2008, will appear in the Sept. 08 issue of that Journal.
- "3D CFD Predictions and Experimental Comparison of Pressure Drop of Some Common Pipe Fittings in Turbulent Flow," S. Moujaes, S. Deshmuck, 2006, J. of Energy Engineering vol. 132, n2, pp. 61-66

- "Effect of Envelope on residential Cooling Load Coupled with Use of Solar/ Photovoltaic Panels," S. Moujaes, R. Madeja, J. of Energy Engineering, 2006, vol. 132 n2, pp.74-80
- "An Evaluation of a Residential Energy Conserving HVAC System and a Residential Energy Demand/Management System" S. Moujaes, S. Deschmukh, Energy Engineering: The J. of the A. of Energy Engineers, vol. 102, No. 6, pp. 39-57, 2005.
- "Preliminary Commissioning and Energy Audit of a UNLV Building", S. Moujaes,K. Teeters, Y. Baghzouz, R. Brickman, R. Madeja, Energy Engineering: Energy Engineering: Journal of the Association of Energy Engineering, v 103, n 1, January, 2006, p 27-58
- "CFD Study of Section Characteristics of Formula Mazda Race Car Wings", S. Moujaes, W. Kieffer, N. Armbya, J. of Mathematical and Computer Modeling, Volume 43, Issue 11-12, June 2006, p. 1275-1287

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)
- ASHRAE (TC4.4 corresponding member)

Institutional and Professional Services in the Last Five Years:

- Associate Editor for the Journal of Energy Engineering
- Invited technical talk to El Ain University Abu Dhabi- UAE
- Faculty advisor ASHRAE(till present)and ANS (2002-2005)
- Reviewer for Solar Energy, Energy, ASHRAE and J. of Energy Engineering

Percentage of time available for research or scholarly activities: 40%

Percentage of time committed to the program: 100%

Name and Academic Rank:

O'Toole, Brendan
Associate Professor, Mechanical Engineering
Director, Center for Materials and Structures

Degrees (field/Institution/Date):

Ph.D. Mechanical Engineering, University of Delaware, 1992
M.S. Mechanical Engineering, University of Delaware, 1989
B.S. Mechanical & Aerospace Engineering, University of Delaware, 1986

Years of Services: 17

Date of original appointment: August 15, 1992

Date of Advancement in Rank:

Assistant Professor, August 15, 1992
Associate Professor, July 1, 1998

Other Professional Experiences (Industrial/Academic):

President, Blast Containment Inc. LLC, Henderson NV, 2006 - present
Visiting Research Associate, U.S. Army Research Lab, Aberdeen MD, 2001 - 2002
Visiting Research Engineer, U.S. Army Research Lab, Aberdeen MD, 2000

Consulting, Patent, etc.: N/A

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

- B. O'Toole, M. Hawkins, E. Neumann, M. Warner, "Strain Analysis of a composite ankle-foot orthosis", accepted to the World Journal of Engineering, July 2009.
- S. Nelson, B. O'Toole, J. Thota, "Mechanical Characterization of a Porous State-Change Material for Water Soluble Tooling", accepted to World Journal of Engineering, July 2009.
- J. Thota, K. Clark, B. O'Toole, "Quasistatic and Vibration response of Prototype Composite Ducts for Aircraft Components", accepted to the World Journal of Engineering, July 2009.
- Jenifer C. Utz, Stacy Nelson, Brendan J. O'Toole, and Frank van Breukelen, "Bone strength is maintained after 8 months of inactivity in hibernating golden-mantled ground squirrels, *Spermophilus lateralis*", Accepted to Journal of Experimental Biology, May 2009.
- J. Thota, M. Trabia, B. O'Toole, and A. Ayyaswamy, "Optimization of Light-Weight Composite Blast Containment Vessel Structural Response", *Journal of Pressure Vessel Technology*, v131 n3, pp 031209: 1-9, April 2009.
- K. Harry, L. Frink, B. O'Toole, A. Charest, "How to Make an Unfired Clay Cooking Pot: Understanding the Technological Choices Made by Arctic Potters", *J. of Archaeological Method and Theory*, v16 n1, pp 33-50, March 2009, 10.1007/s10816-009-9061-4.
- Mathew L. Jones, James Mah, and Brendan O'Toole, "Retention of Thermoformed Aligners with Various Shapes and Orientations of Attachments", *Journal of Clinic Orthodontics*, v XLIII n 2, pp 113-117, February 2009.
- V. Chakka, M. Trabia, B. O'Toole, S. Sridharala, S. Ladkany, and M. Chowdhury, "Modeling and Reduction of Shocks on Electronic Components within a Projectile", *Int. J. of Impact Engineering*, v35, pp 1326-1338, 2008.
- R. Mohan, B. O'Toole, J. Malpica, D. Hatchett, G. Kodippili, J. Kinyanjui, "Processing Temperature on ReCrete Polyurethane Foam", *J. Cellular Plastics*, V44, n4, 2008.
- M. Trabia, B. O'Toole, J. Thota, and K. Matta, Finite Element Modeling of a Light-Weight Composite Containment Vessel", *Journal of Pressure Vessel Technology*, v. 130, n. 1, pp 011205 1-7, February 2008.

- B. O'Toole, S. Rahman, J. Malpica, J. Thota, S. Raagas, G. Calvert. K. Cao and L. Clements, "High Temperature Properties of State-Change Tooling Materials", *SAMPE Journal*, v. 44, n. 1, pp 42 – 52, January/February 2008.
- Q. Liu and B. O'Toole, "Behavior Pattern and Parametric Characterization for Low Density Crushable Foams", *Journal of Materials Processing Technology*, v 191, pp 73-76, 2007.
- B. O'Toole, M. Trabia, J. Thota, T. Wilcox, and K. Nakelswamy, "Structural Response of Blast Loaded Composite Cylinders", *SAMPE Journal*, v 42, n. 4, pp 6 -13, July/August 2006.
- M. Nelson, B. O'Toole, D. Jackovich, "Cell Morphology and Mechanical Properties of Rigid Polyurethane Foam", *Journal of Cellular Plastics*, v 41 n3, pp 267-285, May 2005.
- Ajit K. Roy, S. R. Kukatla, B. Yarlagadda, V.N. Potluri, M. Lewis, M. Jones, B.J. O'Toole, "Tensile Properties of Martensitic Stainless Steels at Elevated Temperatures", *Journal of Materials Engineering and Performance*, V 14, N 2, pp. 212-218, April 2005.

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)
- Society for the Advancement of Materials and Process Engineering (SAMPE)
- Society for Automotive Engineering (SAE)
- American Society for Engineering Education (ASEE)

Honors and Awards:

- State of Nevada Professor of the Year Award, Carnegie Foundation and CASE, 1996
- Spanos Distinguished Teaching Award, 1996
- Outstanding Faculty Award in Dept. of Mechanical Engineering (09, 08, 06, 04, 96, 94)
- Outstanding Mechanical Engineering Teacher from Tau Beta Pi (09, 08, 06, 00)
- Outstanding Teacher College of Engineering (08, 95)
- Board of Regent's Outstanding Faculty (1997)

Institutional and Professional Services in the Last Five Years:

- Session Chairman for SAMPE Conferences (2010, 2008)
- Conference Organizing Committee for AMPT (2006)
- UNLV Council of Centers, Institutes, Museums, and Labs Committee (since 2007)
- Science and Engineering Building (SEB) Steering Committee (since 2009)
- Faculty Advisor for Tau Beta Pi (since 2008), SAE (since 1994), SAMPE (since 2005)
- ME Department Graduate Program Coordinator, 2008 - present
- ME Department Undergraduate Coordinator, 2002 – 2008
- ME Dept. and College of Engineering Curriculum Committees (2002 – 2008)
- Nevada Space Grant Faculty Coordinator (since 1996)
- Science and Engineering Building (SEB) Planning Committee (03 - 07)

Percentage of time available for research or scholarly activities: 40%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Pepper, Darrell
Professor, Mechanical Engineering

Degrees (field/Institution/Date):

Ph.D. Mechanical Engineering, University of MO-Rolla, 1973
M.S. Aerospace Engineering, University of MO-Rolla, 1970
B.S. Mechanical Engineering, University of MO-Rolla, 1968

Years of Services: 17

Date of original appointment: July 1, 1992

Date of Advancement in Rank:

Associate Professor, July 1, 1992
Professor, July 1, 1996
Department Chairman, July 1, 1996-2002
Interim Dean, February 1, 2002-August 1, 2003

Other Professional Experiences (last 20 yrs) (Industrial/Academic):

- 1/96 - present: **Professor of Mechanical Engineering/ Director, Nevada Center for Advanced Computational Methods**, University of Nevada, Las Vegas, NV.
- 1/04 – 12/04: **ASME Congressional Fellow, US Senate, Washington, DC**. Legislative fellow in the office of Senator Dianne Feinstein (D-CA);
- 2/02 – 7/03: **Interim Dean, College of Engineering**, University of Nevada, Las Vegas, Las Vegas, NV.
- 6/96 – 2/02: **Chairman of Mechanical Engineering**, University of Nevada, Las Vegas, Las Vegas, NV.
- 8/92 - 6/96: **Associate Professor of Mechanical Engineering (tenure track)**, University of Nevada, Las Vegas, Las Vegas, NV.
- 9/88 - 8/92: **Professor of Mechanical Engineering (non-tenure position)**, California State University - Northridge (CSUN), Northridge, CA.
- 12/88-12/95: **Chairman and Chief Executive Officer**, Advanced Projects Research, Inc., Moorpark, CA. Co-founder and CEO of small research and development company;
- 6/87-6/90: **Chief Scientist, The Marquardt Company**, Van Nuys, CA. Member of the Executive Staff and Chief Scientist of the company;

Consulting, Patent, etc.:

- Cofounder and Executive Vice President, Nevada Energy and Environmental Systems – founded 2001
- Cofounder and President, CEO, Alexander Energy Resources International – founded 2008

Principal Publications of the Last Five Years:

BOOKS:

- Pepper, D. W., A. Kassab, and E. Divo (*to appear 2010*): An Introduction to Finite Element, Boundary Element, and Meshless Methods, ASME Press, NY, NY.
- Pepper, D. W. and D. B. Carrington (2009): Modeling Indoor Air Pollution, Imperial College Press, London, UK.
- Pepper, D. W. and J. C. Heinrich (2006): The Finite Element Method: Basic Concepts and Applications, Taylor and Francis, New York, NY, 2nd Ed., 312 p.

CONTRIBUTING CHAPTERS:

- Pepper, D. W. (2006), "Chapter 7: Meshless Methods," Handbook of Numerical Heat Transfer, 2nd Ed., W. J. Minkowycz et al (Eds.), John Wiley and Sons.
- Pepper, D. W. and J. M. Lombardo (2006), "Chapter 27: High Performance Computing for Heat Transfer," Handbook of Numerical Heat Transfer, 2nd Ed., W. J. Minkowycz et al (Eds.), John Wiley and Sons.
- Pepper, D. W. and D. B. Carrington (2005): "Chapter 14: Indoor Air Pollution Modeling," Air Pollution Modeling: Theories, Computational Methods, and Available Software, P. Zannetti (Ed.), Menlo Park, CA.

REFEREED PUBLISHED PAPERS:

- Pepper, D. W. and X. Wang (2009), "An h-adaptive Finite Element Technique for Constructing 3-D Wind Fields," J. Appl. Meteor. & Climatology, Vol. 48, No. 3, pp. 580-599.
- Wang, X. and D. W. Pepper (2009), "An Adaptive Numerical Model for Contaminant Dispersion in Air," Int. J. Num. Meth. in Fluids.
- Wang, X. and D. W. Pepper, D. W. (2008), "An hp-Adaptive Procedure for Modeling Indoor Contaminant Dispersion," Comput. Modeling in. Engr. and Sci., Tech Science Press.
- Pepper, D. W. and X. Wang (2008), "An hp-adaptive Finite Element Model for Heat Transfer within Partitioned Enclosures," Int. J. Num. Meth. Fluid Flow and Heat Transfer, Vol. 18, 7/8.
- Kalla, N. D. and D. W. Pepper (2008), "A Meshless Radial Basis Function Method for Fluid Flow with Heat Transfer," ICCES, Vol. 142, No. 1, pp. 1-6.
- Wang, X. and D. W. Pepper (2007), "hp-Adaptive Finite Element Simulations of Viscous Flow Including Convective Heat Transfer," Num. Heat Transfer, Part B, Vol. 51, pp. 491-513.
- Pepper, D. W. and X. Wang (2007), "A self-adapting model for assessing hazardous environmental releases," Natural Hazards, Jan. 2007, pp. 1-10.
- Wang, X. and D. W. Pepper (2007), "Numerical Simulation for Under-Floor Air Distribution System with Swirl Diffusers," J. Heat Transfer, Vol. 129, pp. 589-594.

- Wang, X. and D. W. Pepper (2007), "Application of an hp-Adaptive FEM for Solving Thermal Flow Problems," AIAA J. Thermophysics and Heat Transfer, Vol. 21, No. 1, pp. 190-198.
- Pepper, D. W. and X. Wang (2007), "Application of an h-adaptive finite element model for wind energy assessment in Nevada," Renewable Energy, Vol. 32, pp. 1705-1722.
- Pepper, D. W. and X. Wang (2007), "Modeling Indoor Contaminant Dispersion," ICCES, Vol. 1, No. 1, pp. 1-5, 2007.
- Pepper, D. W. and Y. Chen (2005), " Heat Transfer Analysis of Nuclear Waste Casks Stored in the Yucca Mountain Repository," Num. Heat Transfer, Part B .
- Pepper, D. W. and B. Sarler (2005), " Application of Meshless Methods for Thermal Analysis," Strojniski Vestnik – J. of Mech. Engr., Slovenia.
- Sarler, B. and D. W. Pepper (2005), "Momentum Transport Modeling including Solid Phase Movement and Nucleation for Direct Chill Casting Processes," J. Heat and Mass Transfer, Springer-Verlag.

Scientific and Professional Societies Associated:

2008 – present: **Commissioner**, ABET EAC
2003 - present: **Baldrige National Quality Award** Board of Examiners
1994 – present**: Fellow -** ASME; **Associate Fellow -** AIAA; **Member -** Sigma Xi; - USACM; - SIAM

Honors and Awards:

2008: **Eric Reissner Medal**, ICCES
1996: **Barrick Distinguished Scholar Award**; **College of Engineering Distinguished Scholar Award**
1997: **UNLV Board of Regent's Outstanding Faculty**
1995/1996: **American Western Universities Fellowships** (INEEL; LLNL)
1992: **AIAA Associate Fellow**
1994: **ASME Fellow**

Institutional and Professional Services in the Last Five Years:

2008 – present: **Editor** of J. of Thermodynamics
2008 – present: **Editor** of Thermopedia
2008 – present: **Associate Editor** of Computational Thermal Sciences
2007 – present: **Member**, Cosmos Club, Washington, DC
2006 - present: **Member**, Arthur C. Clarke Foundation
1986 - present: **Member** of Editorial Board J. Num. Heat Transfer; Comput. Modeling in Engr. & Sci.
1994 - 2007: **ABET Reviewer** for Mechanical Engineering programs

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Reynolds, Douglas D.

Professor of Mechanical Engineering; Director - Center for Mechanical & Environmental Systems Technology

Degrees (field/Institution/Date)

Ph.D.	Mechanical Engineering, Purdue University, 1972
M.S.	Mechanical Engineering, Purdue University, 1970
B.S.	Mechanical Engineering, Michigan State University, 1967

Years of Service at UNLV: 26

Date of appointment at UNLV: August 1, 1983

Date of Advancement in Rank at UNLV:

Professor, August 1, 1983

Academic Appointments:

The University of Texas at Austin, Assistant Professor, November 1971 - August 1977
The University of Pittsburgh, Associate Professor, September 1977 - May 1980
The University of Nevada, Las Vegas, Professor, August 1983 - Present

Industrial Experience:

Caterpillar Tractor Company, Engineer, June 1967 - August 1968
Pelton/Blum, Consultants in Acoustics, Senior Consultant, June 1980 - September 1981
Joiner-Pelton-Rose, Consultants in Acoustics, Vice Pres Environmental Technology Division, October 1981 - May 1983
DDR, Inc., Consultants in Acoustics, President, May 1984 - Present
ErgoAir, Inc., President, February 1995 - Present

Consulting, Patents, etc.:

- "Hand Covering with Vibration Reducing Bladder," (with T. C. Jetzer), Patent Number 5,537,688, July 23, 1996.
- "Hand and Handle Covering with Vibration Reducing Bladder," (with T. C. Jetzer), Patent Number 5,771,490, June 30, 1998.
- "Handle Covering with Vibration Reducing Bladder," Patent Number 5,987,705, November 23, 1999.
- "Hand Covering with Vibration Reducing Bladder," (with T. C. Jetzer), European Patent No. 800348, March 26, 2003.
- “Hand and Handle Covering with Vibration-Reducing Bladder,” (with T. C. Jetzer), Canadian Patent No. 2,206,514, June 6, 2006.
- “Seat System with Shock- and Vibration-Reducing Bladders,” (E. Wolf), US Patent Application Number 20080296946, December 4, 2008.
- “Seat System with Shock- and Vibration-Reducing Bladders,” (E. Wolf), PCT International Publication Number WO 2008/150926 A1, December 11, 2008.

State in which professionally license or certified: N/A

Principle Publication of the Last Five Years:

- “Mechanical Impedance Characteristics of the Hand and Arm” (with A.K. Moustafa), 10th International Conference on Hand-Arm Vibration, Las Vegas, Nevada, June 7-11, 2004.
- “Effective Intervention with Ergonomics, Antivibration Gloves, and Medical Surveillance to Minimize Hand-Arm Vibration Hazards in the Workplace.” (with T.C. Jetzer and P. Haydon), 10th International Conference on Hand-Arm Vibration, Las Vegas, Nevada, June 7-11, 2004.
- “Issues to be Considered in the Revision of ISO 10819.” (with E. Wolf), 10th International Conference on Hand-Arm Vibration, Las Vegas, Nevada, June 7-11, 2004.
- “Issues Associated with the Revision of ISO 10819.” (with E. Wolf), 39th Meeting of the UK Group of Human Response to Vibration, Ludlow, Shopshire, UK, September 15-17, 2004.
- “Evaluation of Antivibration Glove Test Protocols Associated with the Revision of ISO 10819,” (with E. Wolf), Industrial Health, National Institute of Industrial Health, Japan, Vol. 43, No. 3, July 2005.
- “Protection of Military Vehicle Occupants from Mine Blast Using an Air Bladder Seat Shock Isolation System,” with Q. Liu and T. Deeb, 76th Shock & Vibration Symposium, SAVIAC, October 30 – November 4, 2005, Destin, FL.

- “Revision of ANSI S3.34 (S270-2006) – Guide for the Measurement and Evaluation of Human Exposure to Vibration Transmitted to the Hand.” 1st American Conference on Human Vibration, Morgantown, WV, June 5-7, 2006.
- “Using an Air Bladder Seat Shock Isolation System to Protect Vehicle Occupants from Mine Blasts,” 1st American Conference on Human Vibration, Morgantown, WV, June 5-7, 2006.
- “New ANSI S3.34 (2.70-2006) - Guide for the Measurement and Evaluation of Human Exposure to Vibration Transmitted to the Hand,” 41st United Kingdom Group Meeting on Human Response to Vibration, Famborough, Hampshire, England, September 20-22 2006.
- “Using an Air Bladder Seat Shock Isolation System to Protect Military Vehicle Occupants from Mine Blast,” (with Q. Liu and T. Dib), 41st United Kingdom Group Meeting on Human Response to Vibration, Famborough, Hampshire, England, September 20-22 2006.
- “American National Standards Institute Approves ANSI S2.70 – Guide for the Measurement and Evaluation of Human Exposure to Vibration Transmitted to the Hand,” INTER-NOISE 2006, Honolulu, HA, December 3-6, 2006.
- “Air Bladder Seat Shock Isolation System,” (with E. Wolf), 42nd UK Conference on Human Responses to Vibration, Univ. of Southampton, Sept. 10-12, 2007.
- “Analytical Methods for Resolving Fan/Motor Vibration Problems in Air-Conditioning Units,” (with Q. Lui), ASHRAE Winter Meeting, Dallas, TX, January 28-31, 2007.
- “ANSI 2.70 – A new hand-arm vibration standard for the U.S.,” 11th International Hand-Arm Vibration Conference, Bologna, Italy, June 4-7, 2007**.**
- Engineering Principles of Mechanical Vibration, Trafford Publishing, 2009

Scientific and Professional Societies Associated:

- American Society of Heating, Refrigerating, and Air Conditioning Engineers
- American Society of Engineering Education

Honors and Awards:

- Tau Beta Pi
- Pi Tau Sigma
- Sigma Xi
- National Register's Who's Who in Executives and Professionals, 2000 Edition
- MARQUIS Who's Who in America, 64th Edition, 2010

Institutional and Professional Services in the Last Five Years:

- American Society of Heating, Refrigerating, and Air Conditioning Engineers, Technical Committee 2.6 – Sound and Vibration Control – Member
- American National Standards Institute (ANSI) – Working Group 2.39 – Human Exposure to Shock & Vibration – Chair (Working group is responsible maintaining, revising, and developing ANSI standards associated with human exposure to shock and vibration and reviewing, voting on, and developing the USA positions related to actions of international standards associated with human exposure to shock and vibration)
- U.S. Technical Advisory Group (TAG) for International Standardization Organization (ISO) Technical Committee (TC) 108, Subcommittee (SC) 4 – Human Exposure to Shock & Vibration – Chair (prepares USA position on work items and standards associated is ISO TC 108 – SC 4)
- Chief USA delegate to ISO TC 108 – SC 4 international meetings.

Percentage of time available for research or scholarly activities: 40 percent

Percentage of time committed to the program: 100 percent

Name and Academic Rank:
Trabia, Mohamed
Professor of Mechanical Engineering

Degrees (field/Institution/Date):

1987	Ph. D. in Mechanical Engineering, Arizona State University
1983	M. S. in Mechanical Engineering, Alexandria University, Alexandria, Egypt
1980	B. S. in Mechanical Engineering, Alexandria University, Alexandria, Egypt

Years of Services: 22
Date of original appointment: July 1, 1987

Date of Advancement in Rank:
Assistant Professor, July 1, 1987
Associate Professor, July 1, 1993
Professor, July 1, 2000
Department Chairman, 2002-2008
Academic Affairs Fellow, 2008-present

Other Professional Experiences (Industrial/Academic): N/A

Consulting, Patent, etc.:
Approved Patent
20070156147, Bone fixation device and method

Patent under Consideration:
20060235407, Apparatus and methods for bone fracture reduction and fixation

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

- S. Gutta, J. Lee, M. Trabia, and W. Yim, “Modeling of Ionic Polymer Metal Composite Actuator Dynamics using a Large Deflection Beam Model,” Smart Materials and Structures, Volume 18, 2009, pp. 1-9.
- K. A. F. Moustafa, M. B. Trabia, and M. N. Emira, S. Elnaggar, “Modeling and Simulation of a Three-Link Spatial Manipulator with One Flexible Link,” International Journal of Modelling and Simulation, Vol.29, No.4, 2009.
- J. Thota, M. Trabia, B. O’Toole and A. Ayyaswamy, “Structural Response Optimization of a Light-Weight Composite Blast Containment Vessel,” ASME Journal of Pressure Vessel Technology, Vol. 131, No. 3, 2009, 031209.
- K. A. F. Moustafa, M. B. Trabia, and M. I. Ismail, “Modeling and Control of an Overhead Crane with a Variable Length Flexible Cable,” International Journal of Computer Applications in Technology (IJCAT), Volume 34, No. 3 2009, pp. 216-228.
- V. Chakka, M. Trabia, B. O’Toole, S. Sridharala, S. Ladkany, and M. Chowdhury, “Modeling and Reduction of Shocks on Electronic Components within a Projectile,” International Journal of Impact Engineering, Volume 35, 2008, pp. 1326-1338. *The paper was reprinted as Army Research Laboratory Report, ARL-RP-217, August 2008.*
- V. Mudupu, M. Trabia, W. Yim, P. Weinacht, “Design and validation of a fuzzy logic controller for a smart projectile fin with a piezoelectric actuator,” Smart Materials and Structures, Volume 17, Number 3, 2008, pp. 1-12.
- M. Trabia, J. Renno, and K. Moustafa, “Generalized Design of an Anti-Swing Fuzzy Logic Controller for an Overhead Crane with Hoist,” Journal of Vibration and Control, Volume 14, Number 3, 2008, pp. 319-346.
- V. Ponyavin, Y. T. Chen, T. Mohamed, M. Trabia, A. E. Hechanova, M. Wilson, “Parametric Study of Sulfuric Acid Decomposer for Hydrogen Production,” Progress in Nuclear Energy, Volume 50, 2008, pp. 427-433.
- M. B. Trabia, B. O’Toole, J. Thota, and K. Matta, “Finite Element Modeling of a Light-Weight Composite Blast Containment Vessel,” ASME Journal of Pressure Vessel Technology, Volume 130, 011205, 2008, pp. 1-7.
- B. O’Toole, M. B. Trabia, J. Thota, T. Wilcox, K. K. Nakelswamy, “Structural Response Of Blast Loaded Composite Containment Vessels,” SAMPE Journal, Volume 42, n4, 2006, pp. 6-13.

- L. Shi, and M. Trabia, “Design and Tuning of Importance-Based Fuzzy Logic Controller for a Flexible-Link Manipulator,” Journal of Intelligent and Fuzzy Systems, Volume 17, Number 3, 2006, pp. 313 - 323.
- S. Mani, S. Singh, S. Parimi, W. Yim, and M. Trabia, “Adaptive Rotation of a Smart Projectile Fin Using a Piezoelectric Flexible Beam Actuator,” Journal of Vibration and Control, Vol. 11, No. 8, 2005, pp. 1085-1102.
- L. Shi, and M. Trabia, “Comparison of Distributed PD-Like and Importance-Based Fuzzy Logic Controllers for Two-Link Rigid-Flexible Manipulator,” Journal of Vibration and Control, Vol. 11, No. 6, 2005, pp. 723-748.

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)

Honors and Awards:

2009	Distinguished Service Award, Department of Mechanical Engineering Advisory Board.
2008	Service Award, Howard R. Hughes College of Engineering, UNLV.
2008	Outstanding Advancement of Engineering in Southern Nevada Award, ASME Silver State Section.
2004	Fellow, American Society of Mechanical Engineers.
2002	Tau Beta Pi Outstanding Teacher of the Year Award.
2001	Tau Beta Pi Outstanding Teacher of the Year Award.
1998	Outstanding Teacher, Department of Mechanical Engineering.
1998	Tau Beta Pi Outstanding Teacher of the Year Award.
1996	College of Engineering Distinguished Teaching Award.

Institutional and Professional Services in the Last Five Years:

- “Design of "Figure-8" Spherical Motion Flapping Wing for Miniature UAV,” Invited Presentation, Department of Mechanical Engineering, Villanova University, Pennsylvania, November, 2009.
- “Design of Military Vehicles for Ballistic Shocks,” Series of five lectures presented at the Korean Agency for Defense Development, Daejeon, South Korea, April 2009.
- “Design and Fuzzy Logic Control of a Smart Fin,” Keynote Speaker, The 3rd International Conference on Mechatronics (ICOM'08), Kuala Lumpur, Malaysia, December, 2008. Invited Judge, International Robot Olympiad (IRO 2008) http://www.iro2008.org/, Kuala Lumpur, Malaysia, December 2008.
- Member of Organizing Committee of “ASME International Design Engineering Technical Conferences & Computers and Information In Engineering Conference (IDETC 2007),” September 2007, Las Vegas, Nevada.
- Panelists in the (Design Education Committee) panel session entitled “What should be in a designer's toolbox: an industry perspective.” The panel was part of the ASME International Design Engineering Technical Conferences (IDETC 07).
- Hosted the ASME Essential Teaching Seminar on March 16-18, 2006.

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Wang, Zhiyong
Associate Professor, Mechanical Engineering

Degrees (field/Institution/Date):

Harbin Institute of Technology, China	Mechanical Engineering	B. Tech (1984)
Harbin Institute of Technology	Mechanical Engineering	M.S. (1987)
Harbin Institute of Technology	Mechanical Engineering	Ph.D. (1991)

Years of Services: 11

Date of original appointment: Aug 1, 1998

Date of Advancement in Rank:

Assistant Professor, Aug 1, 1998
Associate Professor, Aug 1, 2004-present

Other Professional Experiences (Industrial/Academic):

- Visiting Assistant Professor, Mechanical Engineering Department, Ohio Northern University, June 1997-August. 1998.
- Research Assistant Professor, NMRC, University of Nebraska-Lincoln, Jan. 1994-May.1996.
- Research Scientist, SUNY-Binghamton, Jan. 1993-Dec. 1993
- Post-doctoral Fellow in Mechanical Engineering, Aachen Technological University (RWTH/IPT), April 1991 – Dec. 1992.

Consulting, Patent, etc.:

- Received two U.S. patents on machining advanced materials and Lean Manufacturing, one patent in China on product design.
- Conducted consulting work for companies such as Honeywell Electronic Materials, MAP, KD International, and STI

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

- College-wide Senior Design Competition: A Motivating Approach", Proceedings of the National Capstone Design Course Conference, Boulder, Co, June, 2007
- Z.Y. Wang, Venkat, Q. S. Xie, 2006, "Development of a Lean Manufacturing System for Shop Floor Production," the 5th International Conference on e-Engineering & Digital Enterprise Technology, Guiyang, Augus16-18, 2006, pp. 116-125
- Z.Y. Wang, 2006, "Considerations in Plant Layout Design for Batch Production Environment," International Conference on Production System Development, Tai Zhou, Zhejiang, August 9-11, 2006
- Z.Y. Wang, (2005), book chapter - Computing infrastructure for e-manufacturing, for book entitled: "E-Manufacturing: Fundamentals and Application," *WIT Press*, Ashurst Lodge, Southampton, UK
- Z. Wang, R. S. Koripelli, S. Aekula**,** (2005), "Using system engineering approach to implement value stream mapping (vsm) tool in manufacturing service environment" Proceedings of ASME IMECE
- J. R. Naraparaju, R. A Karamcheti, and Z. Wang, (2005), "Mathematical Solution for the Determination of Optimal Warehouse Location and Optimal Distribution Route," Proceedings of ASME IMECE

Scientific and Professional Societies Associated:

- Society of Manufacturing Engineers (*SME*)
- American Society of Mechanical Engineers (*ASME*)
- North American Manufacturing Research Institute (*NAMRI*)

Institutional and Professional Services in the Last Five Years:

- Served as Review Panelist for the NSF Design Manufacture & Industrial Innovation (DMII) Division
- Served as session chair for the International Conference on Computers and Their
- Member of the international committee of the International Conference on e-Engineering & Digital Enterprise Technology

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Yim, Woosoon
Professor and Chairman, Mechanical Engineering

Degrees (field/Institution/Date):

Ph.D. Mechanical Engineering, University of Wisconsin-Madison, 1987
M.S. Mechanical Engineering, University of Wisconsin-Madison, 1984
B.S. Mechanical Engineering, Hanyang University, Seoul, Korea, 1981

Years of Services: 22

Date of original appointment: July 1, 1987

Date of Advancement in Rank:

Assistant Professor, July 1, 1987
Associate Professor, July 1, 1994
Professor, July 1, 2001
Department Chairman, July 1, 2008-present

Other Professional Experiences (Industrial/Academic): N/A

Consulting, Patent, etc.: N/A

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

- Shivakanth Gutta, Joon S. Lee, Mohamed Trabia, and Woosoon Yim, “ Modeling of ionic polymer metal composite actuator dynamics using a large deflection beam model,” Smart Materials and Structures, Volume 18, (2009).
- V. Mudupu, M. Trabia, W. Yim, P. Weinacht, “Design and validation of a fuzzy logic controller for a smart projectile fin with a piezoelectric actuator,” Smart Materials and Structures, Volume 17, Number 3, pp. 1-12, (2008).
- Il-Seok park, Joonsoo Lee, Kwang Kim, Jae-Do Nam, Woosoon Yim, “ Mechanical and Dielectric Properties of the Silicon Elastomer with Multi-Walled Carbon nanotubes as a Nanofiler,” Polymer Engineering and Science Vol. 47, pp. 1396-1405 (2007).
- Woosoon Yim, Joon S. Lee, Kwang J. Kim, “An Artificial Muscle Actuator for Biomimetic Underwater Propulsors,” Journal of Bioinspiration & Biomimetics, Vol 2, pp S31-S41 (2007).
- W. Yim and K. J. Kim, "Dynamic Modeling of Segmented IPMC Actuator," Chapter 10, in Electroactive Polymers for Robotic Applications, edited by Kwang J. Kim and S. Tadokoro, Springer, 2007..
- D. Dogruer, J.S. Lee, W. Yim, K. J. Kim, and W. Yim, "Fluid Interaction of Segmented Ionic Polymer-Metal Composites under Water" Smart Materials and Structures, Vol. 16, pp 220-226 (2007).
- S. Mani, S.N.Singh, S. Parimi, W. Yim, “Adaptive Servoregulation of a Projectile Fin using Piezoelectric Actuator,” ASME Transaction Dynamic System, Measurement, and Control, Vol. 129, pp 100-104, January (2007).
- Kwang J. Kim, Woosoon Yim, Jason W. Paquette and Doyeon Kim, “Ionic Polymer-metal Composite for Underwater Operation,” Journal of Intelligent Material Systems and Structure (JIMSS), Vol. 18, pp 123-131 (2007).
- J. W. Paquette, K. J. Kim, D. Kim, and W. Yim, "The Behavior of Ionic Polymer-Metal Composites in a Multi-Layer Configuration," Smart Materials and Structures, Vol. 14, 881-888, (2005).
- Sahjendra N. Singh and Woosoon Yim, “Nonlinear Adaptive Spacecraft Attitude Control Using Solar Radiation Pressure,” IEEE Transaction on Aerospace and Electronic Systems, Vol. 41, No. 3, July (2005).
- S. Gujjula, S.N. Singh, W. Yim, “Adaptive and Neural Control of a Wing Section using Leading and Trailing Edge Surface,” Aerospace Science and Technology, Vol. 9, pp 161-171, March (2005).
- S. Mani, S.N. Singh, W. Yim, and M. Trabia, “Adaptive Rotation of a Smart Projectile Fin Using a Piezoelectric Flexible Beam Actuator, “ Journal of Vibration and Control, Vol. 11(8): pp 1085-1102, (2005).

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)
- Institute of Electrical and Electronics Engineers (IEEE)

- International Council on Systems Engineering (INCOSE)

Honors and Awards:

- ASME Fellow
- Tau Beta Pi
- Outstanding Faculty Award in the Department of Mechanical Engineering (2005)
- Board of Regent’s Outstanding Faculty (1997)

Institutional and Professional Services in the Last Five Years:

- Board member of INCOSE Silver State Chapter
- Local Arrangement Co-chair for 2007 ASME Int. Design Engineering Technical Conferences & Computers and Information in Engineering (IDETC/CIE), September 4-7, 2007, Las Vegas, NV.
- Invited Speaker in 2006 International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Oct. 16-18, 2006, Seoul, Korea.
- Tutorial/workshop in 2004 IEEE Conference on Intelligent Robot and System (IROS), September, 2004, Sendai, Japan, K.J. Kim, S. Tadokoro, and W. Yim, IROS 2004, ½ day Tutorial on “Electro-Active Polymers for Use in Robotics,”

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

Name and Academic Rank:

Zhao, Hui
Assistant Professor, Mechanical Engineering

Degrees (field/Institution/Date):

Ph.D. Mechanical Engineering, University of Pennsylvania, 2008
M.S. Mechanical Engineering, Peking University, Beijing, China, 2003
B.S. Mechanical Engineering, Peking University, Beijing, China, 2000

Years of Services: 1

Date of original appointment: Jan. 5th, 2009

Date of Advancement in Rank:

Assistant Professor, Jan. 5th, 2009

Other Professional Experiences (Industrial/Academic): N/A

Consulting, Patent, etc.: N/A

State(s) in which professionally licensed or certified: N/A

Principal Publications of the Last Five Years:

(1) Zhao, H. and Bau, H. H., 2009, the Polarization of a Non-conducting Nano Spherical Particle in the presence of a thick Electric double layer, *Journal of Colloid and Interface Science,* **333**, 663-671.

(2) Zhao, H. and Bau, H. H., 2008, the Effect of Double Layer Polarization on the Forces that Act on a Nanosize Cylindrical Particle in an AC Electric Field, *Langmuir*, **24**, 6050-6059.

(3) Zhao, H. and Bau, H. H., 2007, the Effect of Secondary Flows on Taylor-Aris Dispersion, *Analytical Chemistry*, **79**, 7792-7798.

(4) Zhao, H. and Bau, H. H., 2007, a Microfluidic Chaotic Stirrer Utilizing Induced-Charge Electro-osmosis, *Physical Review E*, **75**, 066217. (selected for the July 9, 2007 issue of Virtual Journal of Nanoscale Science & Technology).

(5) Zhao, H. and Bau, H. H., 2007, on the Effect of Induced Electro-Osmosis on a Cylindrical Particle Next to a Surface, *Langmuir*, **23**, 4053-4063.

(6) Arsenault, M. E., Zhao, H., Purohit, P. K., Goldman, Y. E., and Bau, H. H., 2007, Confinement and Manipulation of Actin Filaments by Electric Fields, *Biophysical Journal Letter*. **93**, L42-L44.

(7) Remillieux, M. C., Zhao, H., and Bau, H. H., 2007, Suppression of Rayleigh- Bénard Convection with Proportional-Derivative (PD) Controller, *Physics of Fluids*, **19** (1): Art. No. 017102.

(8) Zhao, H. and Bau, H. H., 2006, Limitations of Linear Control of Thermal Convection in a Porous Medium, *Physics of Fluids*, **18** (7): Art. No. 074109.

(9) Zhao, H., Wu, J. Z., and Luo, J. S., 2004, Turbulent Drag Reduction by Traveling Wave of Flexible Wall, *Fluid dynamic research*, **34** (3): 175-198.

Scientific and Professional Societies Associated:

- American Society of Mechanical Engineers (ASME)
- American Physical Society

Honors and Awards: N/A

Institutional and Professional Services in the Last Five Years: N/A

Percentage of time available for research or scholarly activities: 30%

Percentage of time committed to the program: 100%

APPENDIX B.2 FACULTY PROFESSIONAL ACTIVITIES

Professional Development Activities for Robert Boehm (One page limit)

A. Research Activities:

Currently have approximately 15 research contracts where I am PI, total accumulative funding is near $20M.

B. Grant Proposals Submitted:

Many proposals have been submitted. There are too many to list here.

C. Education Related Publications:

Have not had educational related publications in the last 5 years. Other technical topics have taken my time.

D. Participation in Professional Societies and Organizations:

Active participant in ASME Solar Energy Division Conferences and activities are am active participant in ASES Conferences.

E. Curriculum and Laboratory Development:

Have developed courses for the solar energy minor at UNLV. Also developed a graduate course in Computational Aspects of Solar Energy. Developing a number of facilities in renewable energy topics.

F. Student Projects and Society Activities:

All research projects I have involve both graduate and undergraduate studies. Many of the undergraduates use their involvement in senior design projects as well as independent studies. All graduate students use their research work for theses and dissertations.

G. Teaching Workshops Attended:

None in the last 5 years.

Professional Development Activities for Yitung Chen (One page limit)

A. **Research Activities:** (1) Corrosion modeling using cellular automaton (CA) and molecular dynamics (MD) modeling, (2) Mathematical and numerical study of wave propagation in negative index materials (NIM) for solar cell development, (3) Solar and nuclear hydrogen production, (4) High temperature heat exchanger and decomposer design, (5) Lattice Boltzmann method, (6) Fuel cell and electrolyzer design and development, (7) Renewable energy, (8) Biomedical engineering, (9) CAD-UFAD HVAC modeling and design, (10) Unmanned aircraft vehicle modeling and design, (11) Computational fluid dynamics and numerical heat and mass transfer

B. **Grant Proposals Submitted:** More than 30 proposals with $25M requested budget have been submitted.

C. Education Related Publications: (1) One book of "Computational Partial Differential Equations using MATLAB" has been published in 2009. (2) Five book chapters have been published. (3) Forty eight professional journals have been published from 2005 to 2009. (4) Eighty seven peer reviewed conference proceedings have been published from 2005 to 2009.

D. Participation in Professional Societies and Organizations: (1) American Society of Mechanical Engineers (ASME). (2) American Nuclear Society (ANS). (3) American Institute of Chemical Engineers (AIChE).

E. Curriculum and Laboratory Development: (1) New course of "Transport Phenomena" development. (2) New course of "Fundamentals of Fuel Cell" development. (3) New course of "Process Analysis, Modeling, and Simulation" development. (4) New course of "Perturbation Methods in Fluid Mechanics and Heat Transfer" development.

F. Student Projects and Society Activities: (1) Advise senior project designs for undergraduate students. (2) ASME K-20 committee member. (3) Organized and Chair or Co-Chair ASME Summer Heat Transfer Conference and IMECE Conference. (4) Organized 2009 Inaugural US-EU-China Thermophysics Conference - Renewable Energy, May 28-30, 2009, Beijing, China. (5) Organized NSF-CBMS conference - Mathematical and Numerical Treatment of Fluid Flow and Transport in Porous Media. (6) Session Chairs of the 2nd COE-INES International Symposium on Innovative Nuclear Energy Systems, INES-2, Yokohama, Japan. (7) Paper reviewer for ASME, AIAA, and ANS journal and conference papers, Journal of Fluid Engineering, International Journal of Thermal Science, Applied Thermal Engineering, International Journal of Heat and Mass Transfer, Numerical Heat Transfer, Journal of Heat Transfer, Progress in Nuclear Engineering, Modern Physics Letters B, Chemical Engineering Science, Journal of Energy Engineering, International Journal of Heat and Fluid Flow, Journal of Polymer Engineering & Science, and Energy. (8) Proposal reviewers for DOE and NSF. (9) Invited speakers. (10) Elected President of Chinese in America Thermal Engineering Association (CATEA) in 2009.

G. Teaching Workshops Attended: (1) MATLAB workshop. (2) COMSOL workshop.

Professional Development Activities for Daniel Cook (One page limit)

A. **Research Activities:**

Conducted research in the areas of fluids, metallurgy, heat transfer, structural engineering, automation, application of virtual reality, and educational reform.

B. **Grant Proposals Submitted:**

- *Energy Efficient Roofs Using Natural Convection Cooling, NCEMBT, $254,913, not-funded*
- *Modeling and Design Algorithms for Electromagnetic Pumps, DOE, $101,596, funded*
- *Development of a knowledge-based resources management system for integrating experimental and simulation results of molten salt technologies (Molten Salt Information System, MOSIS), DOE, $254,104, funded*
- *Solar Powered, Mechanical Flowers, UNLV-NIA, $15,000, funded*
- *Thermal Management of Microelectronics Systems, UNLV-PRA, $50,000, funded*
- *Automation Bootcamp, NASA, $160,000, funded*
- *Hands-on Automation and Controls Laboratory Development, NASA, $14,500, funded*

C. **Education Related Publications:**

- *D. P. Cook and R. Wysocki: "Materials Science and Fabrication Techniques in the Entertainment Industry: A Collaboration Between Fine Arts and Engineering", Proceedings of IMECE06, ASME, 2006.*
- *D. P. Cook and R. Wysocki: ``Creativity in Engineering: Entertainment Engineering and Design'', Design Principles and Practices: An International Journal, Vol. 2, pp. 87-98, 2008.*
- *D. P. Cook, ``Thermal Tug-O-War: A Competitive, Hands-on Approach to Learning Basic Heat Exchanger Design'', 2007 ASME IMECE, Seattle, Washington, November, 2007.*
- *D. P. Cook, R. Robinson and M. Genova, ``Comparison of Analytical, Numerical, and Experimental Results for A Simplified CPU/Heatsink Model'', 2007 ASME IMECE, Seattle, Washington, November, 2007.*

D. **Participation in Professional Societies and Organizations:**

ASME, member, 2000-present, TMS, member, 1995-present

E. **Curriculum and Laboratory Development:**

- *Redesign of an Introductory Course in Entertainment Engineering*
- *Thermal Management of Entertainment Microelectronics Systems: An Applied Educational Experience*
- *Developed the curriculum and wrote the program/degree proposal for UNLV's Entertainment Engineering and Design program.*

F. **Student Projects and Society Activities:**

G. **Teaching Workshops Attended:**

- *"Essential Teaching Seminar", American Society of Mechanical Engineers, March 16-18, 2006.*
- *"Regents' Academy: Designing and Re-designing Academic Courses to Enhance Student Learning", Nevada Board of Regents, June 1-3, 2006.*
- *"Course Development and Redevelopment", UNLV Teaching and Learning Center, August 16-17, 2006.*
- *"Student Writing Assignments Across the Disciplines", UNLV Teaching and Learning Center, September 26, 2006.*

Professional Development Activities for Brendan O'Toole (One page limit)

A. **Research Activities:**
   - Published 18 journal papers and 50 conference proceedings since 2005
   - I have supervised 14 Ph.D. students and 35 M.S. students
   - I have been a member of 64 other thesis/dissertation committees

B. **Grant Proposals Submitted:**
   - I have 3 actively funded projects and have 5 proposals under review.
   - PI or Co-PI on 48 projects totaling over $ 11.6 million through December 2009
   - Funded by: DoD, DOE, NSF, NASA, Blast Containment Inc, Bechtel NV, McDonnell Douglas Corp., 2Phase Technologies, SPI, BOEING Corp., Hereditary Neuropathy Foundation, Nevada EPSCoR Program, UNLV Applied Research Initiative Program

C. **Education Related Publications:**
   - J. O'Toole, Ed., "Preparing Engineers for a Global Workplace", Proceedings of the Annual Meeting and Conference of the American Society for Engineering Education Pacific Southwest Section, Las Vegas, NV, March 1999.

D. **Participation in Professional Societies and Organizations:**
   - Member of American Society of Mechanical Engineers (ASME), Society for the Advancement of Materials and Process Engineering (SAMPE), Society for Automotive Engineering (SAE), American Society for Engineering Education (ASEE)
   - Session Chairman for SAMPE Conferences (2010, 2008)

E. **Curriculum and Laboratory Development:**
   - New Courses: ME 460/660 High School Mentoring for Engineering Design
   - Lab Development: Update lab manual for ME 302 Lab every semester

F. **Student Projects and Society Activities:**
   - Faculty Advisor for Tau Beta Pi (since 2008), SAE (since 1994), SAMPE (since 2005)
   - Participate in many student vehicle design projects including SAE Baja and ASME HPV
   - Senior Design Team Awards, Sp 2008 UAV Team, Fall 2008 Motorcycle Headlight Team.
   - ASME Human Powered Vehicle Team Awards: 1st Place in 2005 & 2004, 1st and 2nd Place in 2001, 2nd and 3rd Place in 2000 & 1999, 1st Place in Design in 1995; 1st Place collegiate team for the 1996 International HPV Competition (top speed of 62 mph).
   - COLLEGIATE RECORD and FIRST PLACE in the 1995 SAE West Coast Supermileage competition with a run of 3470 miles per gallon, co-advisor for this student project.

G. **Teaching Workshops Attended: N/A**

Professional Development Activities for Georg F. Mauer (One page limit)

A. Research Activities:

- Mobile Platform for Remote Hydraulic Demolition, DOE/NTS, $240,000, Dec. 2002 to Dec. 2004
- Automatic Target Recognition DoD EPSCoR, Office of Naval Research, $365,000, June 2001 to June 2004
- Design and Evaluation of Processes for Fuel Fabrication, DOE/ UNLV AAA project, $700,000, Aug. 2001 – Aug. 2007
- Design and Evaluation of Multi-Axis Shaker Concepts, Army Research Lab, $440,000, June 2003 – June 2007
- Design and Evaluation of a Remote Home Monitoring System, Intel Corp. and Jewish Fed. Of Nevada, $160,000, Jan. 2004 to May 2007

B. Grant Proposals Submitted:

- see above for funded proposals

C. Education Related Publications:

Georg F. Mauer (2007) "Mobile Robot Design in an Introductory Engineering Course," Proc. ASME Congress, Seattle, WA, Nov. 2007

D. Participation in Professional Societies and Organizations: ASME, ANS

E. Curriculum and Laboratory Development:

Redeveloped ME 421 Controls Laboratory and ME 100 Robot design lab

F. Student Projects and Society Activities:

ME 100 Robots lab, supervised five SR Design teams over the past 5 years.

G. Teaching Workshops Attended: n/a

Professional Development Activities for Samir Moujaes (One page limit)

A. Research Activities:

- Production of Hydrogen at high temperatures by using solar energy and nuclear energy
- research on pressure drop coefficients in various pipe and duct fittings
- research on improving methods to determine duct leakage locally In residential ducts
- research on comparison of zero energy homes energy consumption with simulation codes

B. Grant Proposals Submitted:

- proposal to investigate hydrogen production using solar energy as a source at high temperatures
- proposal to investigate hydrogen production using nuclear energy as a source at high temperatures
- proposal to develop a new method of measuring local/global duct leakage rtes from residential ducts
- several proposals to investigate the use of solid municipal waste streams to generate fuels

C. Education Related Publications: none

D. Participation in Professional Societies and Organizations:

A. ASME
B. ASHRAE (TC4.4 corresponding member)

E. Curriculum and Laboratory Development: none

F. Student Projects and Society Activities:

- “A novel concept in applying evaporative coolers in residences” Dec. 2007, the senior design project won 1st award within the College of Engineering UNLV
- Faculty advisor for the ASHRAE student chapter (till present) and for ANS (2002-2005)

G. Teaching Workshops Attended: none

Professional Development Activities for Darrell Pepper (One page limit)

A. Research Activities:

1/96 - present: **Professor of Mechanical Engineering/ Director, Nevada Center for Advanced Computational Methods**, University of Nevada, Las Vegas, NV. Conduct research on development and application of numerical methods in engineering; simulate indoor air flows; coordinate activities of multi-disciplinary team of faculty members from Computer Science, Mathematics, and Civil Engineering

B. Grant Proposals Submitted:

C. Education Related Publications:

D. Participation in Professional Societies and Organizations:

2008 – present: Commissioner, ABET EAC
2003 - present: Baldrige National Quality Award Board of Examiners
1994 – present: Fellow - ASME; Associate Fellow - AIAA; Member - Sigma Xi; - USACM; - SIAM
2008 – present: Editor of J. of Thermodynamics
2008 – present: Editor of Thermopedia
2008 – present: Associate Editor of Computational Thermal Sciences
2007 – present: Member, Cosmos Club, Washington, DC
2006 - present: Member, Arthur C. Clarke Foundation
1986 - present: Member of Editorial Board J. Num. Heat Transfer; Comput. Modeling in Engr. & Sci.
1994 - 2007: ABET Reviewer for Mechanical Engineering programs

E. Curriculum and Laboratory Development:

F. Student Projects and Society Activities:

G. Teaching Workshops Attended:

Professional Development Activities for Douglas Reynolds (One page limit)

A. Research Activities:

- Development of pneumatic cushion technology to protect military vehicle occupants from the effects of mine blasts and repetitive shocks
- Investigation of the effects of room air diffuser inlet conditions on diffuser air throw characteristics and noise
- Investigation of the effects acoustical liner length in ventilation ducts on the noise reduction associated with the acoustical liner
- Investigation of effects of K-12 indoor environment associated with thermal comfort, ventilation, acoustics and lighting on student learning performance

B. Grant Proposals Submitted:

- Seat Shock Isolation - US Army Research Laboratory - $348K
- Air Bladder Seat Shock Isolation for Warrior Troop Transport - QinetiQ - $59K
- International Study Program for Indoor Environmental Research - Seimens Building Technologies, E. H. Price, UNLV President's Award - $150K
- International Study Program for Indoor Environmental Research - ASHRAE - $130K
- NSF Partnership in International Research & Education (PIRE) - $2.6M
- Effects of Typical Inlet Conditions on Air Outlet Performance - ASHRAE - $126K
- The Effects of Lining Length on the Insertion Loss of Acoustical Duct Liner in Sheet Metal Ducts - ASRAE - $150K
- NSF Integrative Graduate Education Research Traineeship (IGERT) - $3M
- NSF Major Research Instrumentation Program (MRI-R2) - $1.96M
- Shock and Vibration Mitigation System for Patient Transport - US Army Aeromedical Research Laboratory - $720K
- Use of Air Bladder Technology in the Mining Industry - US Bureau of Mines - NIOSH -340K

C. Education Related Publications:

D. Participation in Professional Societies and Organizations:

- American Society of Heating, Refrigerating, and Air Conditioning Engineers, Technical Committee 2.6 – Sound and Vibration Control – Member
- American National Standards Institute (ANSI) – Working Group 2.39 – Human Exposure to Shock & Vibration – Chair (Working group is responsible maintaining, revising, and developing ANSI standards associated with human exposure to shock and vibration and reviewing, voting on, and developing the USA positions related to actions of international standards associated with human exposure to shock and vibration)
- U.S. Technical Advisory Group (TAG) for International Standardization Organization (ISO) Technical Committee (TC) 108, Subcommittee (SC) 4 – Human Exposure to Shock & Vibration – Chair (prepares USA position on work items and standards associated is ISO TC 108 – SC 4)
- Chief USA delegate to ISO TC 108 – SC 4 international meetings.

E. Curriculum and Laboratory Development:

F. Student Projects and Society Activities:

G. Teaching Workshops Attended:

Professional Development Activities for Zhiyong Wang (One page limit)

A. Research Activities:

- [1] RFID failure and long bump micro-riveting assembly study, 2009
- [2] Photo Chemical Machining (PCM) Processes, Project "Hydrogen Filling Station."(Task 6.0), 8/07
- [2] Machining/milling Processes, Project "Hydrogen Filling Station." (Task 6.0), 8/07
- [3] "Machining Tantalum," Honeywell Electronic Materials, Spokane Valley, WA 99216, PI: Z.Y. Wang, July 2006,

B. Grant Proposals Submitted:

- Venkatesh, Z Wang, "Machinability of Low Cost High Strength Free Machining Ti-54 Alloy," NSF, submitted 2009
- "Hydrogen Filling Station," Proton Energy Systems, Inc., PI: Bob Boehm, one of the Investigators: Z. Wang, 11/1/06-12/31/07, $500,000
- "Machining Tantalum," Honeywell Electronic Materials, Spokane Valley, WA 99216, PI: Z.Y. Wang, July 2005 - July 2006, Industry project, $18,000
- A Multidisciplinary Multi-Method Approach to Understanding the Casino Patronage and Game, Laximi Gewali, Anthony Lucas, Rama Venkat, Z.Y. Wang, 2006
- "Turning of Tantalum with Internal Cooling Technique, Suggestions and Recommendations" to Honeywell Electronic Materials, $100,000, October 2006

C. Education Related Publications:

- College-wide Senior Design Competition: A Motivating Approach", Proceedings of the National Capstone Design Course Conference, Boulder, Co, June, 2007

D. Participation in Professional Societies and Organizations:

- Served as Review Panelist for the NSF Design Manufacture & Industrial Innovation (DMII) Division
- Served as session chair for the International Conference on Computers and Their
- Member of the international committee of the International Conference on e-Engineering & Digital Enterprise Technology

E. Curriculum and Laboratory Development:

Modified senior design classes ME 497 and ME 498, condensed paper design to one semester in ME 497, require all ME 498 students to make prototype and modify their paper design according to actual model development.

F. Student Projects and Society Activities:

Supervise 5-10 undergraduate student projects every semester.

G. Teaching Workshops Attended:

Professional Development Activities for Woosoon Yim (One page limit)

A. Research Activities:

- RI: Intelligent Microwave Power Transmission and Control System for Artificial Muscle-Driven Biomimetic Robotic Systems (National Science Foundation, CISE, IIS-RI, Award number: 0713083, Aug., 2008-July, 2011, $250,001, Principal Investigator)
- Biologically Inspired Cilia-Driven Microscale Robots (National Science Foundation, CISE, Award number: 0328273, Aug 1., 2003 - July 2007, $197,275, Principal Investigator)
- NSF EPSCoR RING-TRUE III (National Science Foundation, EPSCoR Program, Cognitive Information Processing (CIP), July 2005-June 2008, $347,000, Principal Investigator)
- Control Algorithms for Smart Fin (Army Research Laboratory, SOldier FERST Program, May 1., 2003 - April 2008, $412,524, Principal Investigator)
- Shock Isolation Using Semi-Active Control Techniques (Army Research Laboratory, SOldier FERST, May 1., 2003 - April 2008, $443,367., Principal Investigator)
- Nuclear Information and Monitoring System Project (Sandia National Laboratory, May 2007-June 2009, $ 195,000, Principal Investigator)
- Measurement of the Forces and Moments Transmitted to Residual Limbs (US Army Medical Research Acquisition Activity, 07/01/2007 - 06/30/2008, $ 87,230, Co-PI)
- Design and control of a Flapping Wing for FWMAV (U.S. DoD-AFRL, 2007-2008, $ 108,749 , Co-PI)

B. Grant Proposals Submitted (Pending Proposals):

- Precision 3-D Manipulation and Steering Control of a Novel Ionic Polymer-Metal Composite Active Catheter, NSF IIS RI-Small, August 1-July 31, 2013, $149,144
- Robotic Catheterization Using Ionic Polymer-Metal Composite Actuator, NSF, CRI, 01/01/2010-12/31/201, $2351,998

C. Education Related Publications: N/A

D. Participation in Professional Societies and Organizations:

- Board member of INCOSE Silver State Chapter
- Local Arrangement Co-chair for 2007 ASME Int. Design Engineering Technical Conferences & Computers and Information in Engineering (IDETC/CIE), September 4-7, 2007, Las Vegas, NV.
- Invited Speaker in 2006 International Conference on Ubiquitous Robots and Ambient Intelligence (URAI), Oct. 16-18, 2006, Seoul, Korea.
- Tutorial/workshop in 2004 IEEE Conference on Intelligent Robot and System (IROS), September, 2004, Sendai, Japan, K.J. Kim, S. Tadokoro, and W. Yim, IROS 2004, ½ day Tutorial on “Electro-Active Polymers for Use in Robotics,”
- Organizing committee member of the First NSF RCA (Robotics and Computer Vision) PI Workshop and Exhibition, Las Vegas, NV., Oct, 2003.
- Organizing and programming committee member of IEEE IROS (Int. Conf. on Intelligent Robotics and Systems), 2003.
- Organizing Committee member of IEEE Conference on Decision and Control (CDC), Las Vegas, NV, December, 2002.

E. Curriculum and Laboratory Development:

Development of ME 337L (Engineering Measurement Lab), ME 319L(Programming for Mechanical Engineering)

F. Student Projects and Society Activities:

Involved as an advisor for senior design project

G. Teaching Workshops Attended: None

Professional Development Activities for Hui Zhao (One page limit)

A. Research Activities:

- Manipulation, separation and assembly nano particles or bio molecules using electric field
- Lab-on-a-chip technologies toward biomedical diagnostics and analysis
- Micro and nano fluid, heat and mass transport phenomena
- Mico and nano scale energy conversion

B. Grant Proposals Submitted:

- "Fundamental studies of dielectrophoresis-directed assembly," NSF, pending.
- "Collaborative research: actively controlling a single biomolecule through a resizable nanopore," NSF, pending.
- **"**Modeling Electrokinetic Flows through a Nano Membrane with Applications to Water Transport in Fuel Cell Technology," ACS, Petroleum Research Fund, pending.
- **"**Infrastructure improvement in support of interdisciplinary biomedical research programs utilizing micro/nanotechnologies in the state of Nevada and the Southwest region of the U.S," NIH, pending.

C. Education Related Publications: N/A

D. Participation in Professional Societies and Organizations:

- Member of American Physical Society (APS)
- Member of American Society of Mechanical Engineering (ASME)

E. Curriculum and Laboratory Development: N/A

F. Student Projects and Society Activities:

- Attended 2nd MGE@MSA Nevada Faculty Doctoral Mentoring Institute.
- Attend and presented papers in American Physical Society meeting.

G. Teaching Workshops Attended: N/A

APPENDIX C. LABORATORY EQUIPMENT

Laboratory	Location	Description	Major Equipment	Teaching Activities	Faculties
Thermal Engineering Lab	TBE B113	This laboratory contains a variety of experiments and equipment that can be used to demonstrate various aspects of courses in thermodynamics and heat transfer. In the formal laboratory class work, ME 315, emphasis is given to the analysis of errors that can occur in experiments in energy flow systems. A typical scenario for this laboratory is that experiments are performed by small groups of students.	P.A. Hilton R633 Refrigeration Cycle Demonstration Unit Armfield HT30X Heat Exchanger Service Unit with Shell & Tube Heat Exchanger DCC Corporation Hot Spot Thermocouple Welder Ohaus SPE402 Scout Pro 400g Scale Pasco Scientific TD-8561 Thermal Conductivity Apparatus Pasco Scientific TD-8553/8554A/8555 Thermal Radiation System Omega OM-2041 4 CH Thermocouple Data Logger Omega HH506RA 2 CH Thermocouple Data Logger Omega HHM31 Digital Multi-Meter Omega OS562 Infrared Thermometer CO2 Tank for Joule-Thompson experiment Chromalox ROPH-104 1000 W Hot Plate Copper Ball – 50 mm diameter Nalgene 4150-2000 Dewer Turbine Technologies Model RC-101 Rankine Cycler GDJ Model PT-100/130/150 PowerTek Single Cylinder Multi-Fuel Engine Dynamometer	ME 315	Yitung Chen
Micro and Nano Fluidics Lab	SEB 2155	The primary research interest is complex flow phenomena at the micro and nano scale. The applications include nanoparticle assembly, biosensing, lab-on-a-chip technologies toward biomedical diagnostics and analysis, and mico and nano scale energy conversion.	Thermal pressing machine; Chip PCR machine; Quad-core 3.2 GHz Dell workstation with 64 GB memory; Dual-core workstation with 32 GB memory.		
Under-graduate Robotics Lab	CBC C234	The lab is devoted for ME 100L	Dell Computer Workstations Lego Mindstorms NXT Educational Kits	ME 100L	Georg Mauer

Fluid Laboratory	TBE B150	This lab is shared with the Department of Civil and Environmental Engineering, and also selected equipment is used for teaching ME 380L.	• Wind Tunnels - Low turbulence subsonic wind tunnel, 18" x 18" cross section, Eiffel design, 35 hp fan, 110 MPH with 3-D boundary layer pitot tube traverse and force platform. The wind tunnel also has a smoke generator. A small instructional wind tunnel is also available in the laboratory for demonstrating streaklines past airfoils and cylinders with circulation; • Flume – 65 foot-long, 36 inch-wide, tilting flume with 1800 GPM capacity, 65 hp pump, filters, magnetic flowmeter, and the ability to flow and capture sand. The system includes additional twelve inch taps for future experiments. A small water turbine is also attached to the fluid loop; • Small Tilting Flume - 10 feet long, 6-inch cross section, 20 GPM capacity, clear cross section with attachments to demonstrate and visualize various forms of conduit and open channel flow phenomena, as well as wave phenomena; • PumpLab ®: PumpLab ® can model several operating conditions of pumps and is equipped with forward-curved, flat and backward-curved impellers. It is used in two fluid mechanics laboratories to help students understand pumped flow and to visualize cavitation phenomena; • Lab apparatus - A number of undergraduate fluid mechanics experimental devices are available in the laboratory. A small open channel flume, two pressure drop experiments, and a compressible flow bench are a part of the lab;	ME 380L	Hui Zhao
Engine Test Laboratory	TBE B159	This is a laboratory that supports the educational program, particularly through ME 315 Thermal Engineering Laboratory, as well as the research program. The ability to perform engine evaluations including overall efficiency tests as well as emissions determinations exist. In addition, various component evaluations can take place.	4-cylinder overhead cam engine with a water-cooled exchanger to remove heat, a hydraulic absorption dynamometer, emissions measuring equipment, and a full array of instrumentation to determine air and fuel flow rates, temperatures, and pressures. The system is coupled to a personal computer for logging of data.	ME 315	Yitung Chen
Engineering Measurement and Control Lab	TBE B121	While primarily used for undergraduate courses in mechanical measurements and control, this laboratory contains PC based data acquisition and control systems including calibration equipment for carrying out graduate level research in certain areas. A temperature probe calibration bath, miscellaneous motion measurement devices strain gages, instrument amplifiers, oscilloscopes, voltmeters, thermocouple amplifiers can be checked out from the laboratory by qualified students to conduct their research. Total of 12 PC based data acquisition and control system is operated with National Instrument's LabVIEW graphics based software.This space is dedicated exclusively to instruction: Measurement lab (ME 337L) and controls lab (ME 421L).	Dell Computer Workstations National Instruments ELVIS Stations IET Model RCS-500 Resistance-Capacitance Substituter Boxes Passive Components (resistors, capacitors & inductors) US Digital Model S1-500-250-I-B-D Optical Shaft Encoders DC Servo Motors Linear Inverted Pendulum Seesaw Module	ME 337L, ME 421L	Georg Mauer, Woosoon Yim

Compu-tational Laboratory	TBE B367	This room is used jointly by the Department of Civil and Environmental Engineering and the Department Mechanical Engineering. It is used as an educational facility for teaching software intensive courses. The room has thirty-one computers in addition to an instructor's station. It also has multimedia equipment to allow the instructor's screen to be displayed in the front of the class through an LCD project. The instructor can also bring up any student's screen on the instructor's computer to provide assistance to the student.	Microsoft Office suite of software and additional technical software including MathCad and Matlab. The computers have several CAD software packages including AutoCad (Introduction to AutoCad, ME 120), Pro/E (3D Modeling with Pro/E, ME 220), and SolidWorks (3D Modeling with SolidWorks, ME 240). The computers also have several finite element software packages (COMSOL).	ME 120, ME 220, ME 240, ME 319L	Woosoon Yim
Advanced Composite Materials Design and Fabrication Lab	SEB 2160 and TBE B-153	The facilities in this lab include a variety of general use equipment for supporting interdisciplinary materials processing and characterization research and instruction. The lab includes polymer and composites fabrication equipment, heat treatment facilities, Research and design projects have been supported by several different government agencies and industrial sponsors. The lab is predominantly used to support graduate student research and materials oriented undergraduate design projects. The lab is occasionally used for senior/graduate level laboratory classes.	**TBE B-153** • Thermoset Composites Autoclave (400 °F, 100 psi) • Fume Hoods **SEB 2160** • Polymeric Foam Processing Facility • Water bath, Sand Bath • Vacuum Bagging and VARTM Composites Processing • Heat Treatment Ovens (2000°F, 400°F) • Fiber reinforcement rolls and composite supplies • 2Phase Reconfigurable tooling system • Blue-M inert gas oven for long term aging studies of materials	None	Brendan O’Toole

Materials Processing & Charac-terization Laboratory	TBE B153	The facilities in this lab include a variety of general use equipment for supporting interdisciplinary materials processing and characterization research and instruction. The lab includes polymer and composites fabrication equipment, metallographic sample preparation and heat treatment facilities, quasi-static mechanical testing, and instrumented impact testing equipment. Research and design projects have been supported by several different government agencies and industrial sponsors. The lab is predominantly used to support graduate student research and materials oriented undergraduate design projects. The lab is occasionally used for senior/graduate level laboratory classes.	• **Material Processing** • Thermoset Composites Autoclave (400°F, 100 psi) • Fume Hood • Polymeric Foam Processing Facility • Water bath, Sand Bath • Vacuum Bagging and VARTM Composites **Processing** • Heat Treatment Ovens (2000°F, 400°F) • Sample Preparation (polishing stations, band saw, drill press, sanding wheels) **Testing Instrumentation** • Instron Dynatup 8250 Instrumented Drop Weight Impact Tower with: o Environmental Chamber (-50°C - 200°C) o Custom Tensile Impact Testing Fixture o Pneumatic clamping fixtureUnited SSTM-1 1000-lb Universal Testing Machine with: o Laser Extensometer o 4-channel Strain Gage conditioning o Tension, compression, shear, and flexure o Hardness Testing Machines o Photomicroscopy facility with microhardness testing • **Computational:** o 1 Dual processor 2.5 GHz Workstations for computational research o 1 Dual processor PIII 800 MHz Workstations for computational research o 3 computers for data acquisition systems o 1 P IV 1.5 MHz computer for graduate student use o Networked for personal notebook computer use at 3 desks	None	Brendan O'Toole

Intelligent Structures and Control Lab	SEB 2159	The lab capability of designing and fabricating the electro-active polymer based robotic actuation system and located in the new Science and Engineering Building (SEB).	• Micromanipulation station with microscope ($80K) • dSpace real-time controller ($6K) • Computer vision system ($10K) • NI PXI real-time vision based control system ($20K) • Quanser Wireless Ethernet Embedded Control System ($7K) • Bose 2 axis Electroforce DMA tester ($80K) • 2 Smart Material High Voltage Module ($5K) • APS Electro-Seis Large Stroke Shaker ($15K) • 3 Hokuto Denko (HA-151) Potentiostat/Galvanostat ($9K) • 8-10 GHz microwave system for remote power transmission and control ($50K)	None	Woosoon Yim
Mechanical Testing Lab	TBE B150	This laboratory is mainly for teaching ME 302L Material Testing Lab.	**Teaching Activities:** • Tinius Olson 30,000-lb universal testing machine; • Buckling Test System • Techmet strut testing system for laboratory experiments; • Torsion testing system for laboratory experiments **Research Activities:** • MTS 50,000-lb Servo Hydraulic Axial/Torsional Fatigue Rated Material Test System with: o ¾ - inch hydraulic collet grips rated for torsion and 50 kips tension/compression o Hydraulic wedge grips rated to 27 kips tension/compression o 8-channel Measurements Group strain gage conditioning system o 500°C Furnace with high temperature extensometry. o Test Fixtures: compression platens, 3- and 4-pt. flexure, puncture, and shear; • Blue-M inert gas oven for long term aging studies of materials; • Blue-M furnace for curing and aging of materials; • Concrete mixing equipment;	ME 302L	Brendan O'Toole
Solar Energy Lab	Taylor Hall	A variety of solar energy work takes place in this laboratory. On site are several examples of solar energy utilization equipment. Funded collaborative work with industrial partners has taken place over the years. Included are power generation aspects, building energy projects, hydrogen generation and utilization thrusts, and power utilization studies. In addition, this lab serves the educational program both through undergraduate and graduate student research, as well as being a living laboratory for academic classes in solar energy and environmental matters. While most of the operations take place around Taylor Hall, other facilities exist on the roof of the Thomas Beam Engineering Building complex and various locations in the area.	• 25 kW solar dish Stirling system • 23 kW dish photovoltaic system • 25 kW Fresnel lens concentrating photovoltaic system • hydrogen-electric hybrid bus • solar electric golf cart • side-by-side facility for evaluation of solar domestic water heating systems • zero energy house • solar trough evaluation facility.	None	Robert Boehm

Material Performance Lab	TBE B129	This space is used mainly for the Advanced Accelerator Applications (AAA) Materials Performance Laboratory. The front section of this laboratory houses the Materials Performance equipment for studying the effects of metallurgical and environmental variables on the mechanical and physical properties of metallic materials used in numerous engineering and energy applications. Rear half of the lab is used for the TC-1 Loop or lead-bismuth-eutectic (LBE) loop for the AAA program.	**Mechanical Testing and Corrosion (TBE B-129):** · Four Cortest 7500 lb load capacity Slow-Strain-Rate (SSR) Test Frames with: · Four 120°C Corrosion Resistant Environmental Chambers and · One 500°C Corrosion Resistant Pressure Vessel · Twelve Cortest Constant Load Proof Ring assemblies with 120°C Corrosion Resistant Chambers · Two EG&G Model 273A potentiostats, and one EG&G eight-channel multiple potentiostats for electrochemical polarization studies and stress corrosion cracking (SCC) tests under controlled electrochemical potentials · High-temperature water Bath, custom Luggin probe and glassware for electrochemical corrosion studies in many simulated test environments · One Blue-M 1200°C Heat Treatment Furnace · One Mettler electronic balance for precision measurements **Sample Preparation and Microscopy (TBE B-129):** · Buehler Isomet 4000 Linear Precision Saw · Buehler Abrasimet 2 Abrasive Cutter · Buehler Ecomet 6 Variable Speed Grinder/Polisher with Automet 2 Power Head · High Resolution Optical Microscope with Digital **Image Capture** **Creep Testing Systems (TBE B-115):** · Four ATS Series 2330 Lever Arm Creep testers **Fatigue and Fracture Mechanics (TBE B-150):** · Instron 22,500 pound single screw electromechanical test system for static and quasi-dynamic fatigue testing · A direct current potential drop system is attached on the Instron to monitor the crack growth process. · Satec Charpy pendulum impact machine	None	Brendan O'Toole
Acoustics & Vibration Lab	TBE B150	The lab consists of Anechotic room, Reverberation room, ventilation duct room, Throw room, Vibration test facility & Instrumentation, and SOund	• Anechoic Room: The anechoic room is used to characterize the sound radiation characteristics of reference sound sources and to determine the sound radiation patterns of multiple categories of sound sources;• Reverberation Rooms: There are two reverberation rooms in TBE 150. One has an interior volume of 9,400 ft3 and been qualified per ANSI S12.31 for broadband sound tests and per ANSI S12.32 for pure tone sound tests. The room is used to measure the overall sound energy that is radiated from sound sources, the sound attenuation of HVAC duct components, and the sound attenuation of walls and panels. The large reverberation room has adjacent	None	Douglas Reynolds

		instrumentation. All spaces are mainly for research activities in sound and vibration areas.	to it a small 4,300 ft3 reverberation room and attached to it two air distribution duct systems, one with a flow capacity up to 60,000 cfm and one with a flow capacity of up to 10,000 cfm; • Ventilation Duct Systems: There are two ventilation duct systems take can be used to conduct airflow and sound tests on HVAC duct and system components. Both duct systems are connected to the large reverberation room; • Throw Room: The throw room has dimensions of 31 ft x 22 ft and a ceiling height that can be automatically varied from 4 ft to 14 ft. This room is used to measure the throw characteristics of HVAC terminal units, such as air diffusers. Airflow and sound measurements are made in the room via a four-axis, computer-controlled traversing mechanism that can place a probe anywhere in the room with an accuracy of 0.1 in; • Vibration Test Facility and Instrumentation : The vibration test facility is used to make vibration measurements related to human exposure to vibration, hand-tool vibration, and unitary HVAC systems. The facility has an assortment of standard and shock-type accelerometers, an electromechanical shaker with a Vibration View vibration controller, several high-end two-channel sound and vibration frequency and real-time analyzers, and a four-channel Bruel-Kjaer Portable Pulse System; • Sound Instrumentation:The sound instrumentation includes an assortment of microphones, Bruel & Kjaer and Larson Davis precision sound level meters, a Bruel & Kjaer acoustic intensity probe, several high-end two-channel sound and vibration frequency and real-time analyzers, and a four-channel Bruel & Kjaer Portable Pulse System		
Machine Shop	TBE B177	The facility is administered jointly with the Department of Civil and Environmental Engineering. The shop complex consists of three rooms, a machine shop, a metals shop and a wood shop. Recenty, the new Mendenhall Innovation and Design Laboratory is located in the machine shop area through rennovation of the old facilities, and to provide students hands-on experiences as well as spaces for their senior design project and other student competition project.	Two milling machines, three lathes, a drill press and a fifty ton hydraulic press. The metals shop includes general use machines and equipment for supporting manufacturing and fabrication processes commonly found in manufacturing machine shops. The Metals processing shop area includes a sixteen gage finger brake, a sheet metal roller, a ten gage power shear, a hand shear, a miller welding station, a glass-bead blaster, a kick punch, a box corner notcher, a plasma cutter, a six inch belt sander, two drill presses, two band saws, a band saw blade welder and a pneumatic over hydraulic twelve ton brake. The wood preparation area has a ten inch radial arm saw, a twelve inch circular sander, six inch belt sander, router and a drill press. A three-axis CNC Turning Center, a CNC Milling Machine, and a prototyping machine are located in the shop.	ME 130 ME 230	Woosoon Yim, Kevin Nelson

APPENDIX D. INSTITUTIONAL SUMMARY

A. The Institution

Name and Address of the Institution:

The University of Nevada, Las Vegas
4505 S. Maryland Parkway
Las Vegas, Nevada 89154

Name and Title of the Chief Executive Officer of the Institution:

Dr. Neal J. Smatresk, President
University of Nevada, Las Vegas
Office of the President
Box 451001
4505 S. Maryland Parkway
Las Vegas, NV 89154-1001
Phone: 702-895-3201
Fax: 702-895-1088
E-mail: president@unlv.edu

Dr. Michael W. Bowers, Interim Executive Vice President and Provost
University of Nevada, Las Vegas
Box 451099
4505 S. Maryland Parkway
Las Vegas, NV 89154-1099
Phone - (702) 895-3303
Fax - (702) 895-3670
E-mail: michael.bowers@unlv.edu

B. Type of Control

UNLV administration is headed by the President who is responsible for the functioning of the university as shown in the Board of Regents Handbook. The President creates the administrative structure that best fits the mission of the institution. The President reports to the Chancellor, and through the Chancellor to the Board of Regents. In accordance with the NSHE Code, UNLV Bylaws, and Faculty Senate Bylaws, the university has an elected, representative Faculty Senate of fifty senators. The authority, purpose, and objectives of the Faculty Senate are defined in its Bylaws. Per Senate Bylaws, the Senate represents faculty members who hold at least a fifty-percent professional contract. The Faculty Senate meets monthly during the academic year in open meetings to which all faculty and staff are invited.

The president of each NSHE institution is selected and appointed by the Board of Regents to serve as the chief administrative officer. On day-to-day matters, the presidents report to the Chancellor. Presidents and the Chancellor serve at the pleasure of the Board of Regents. Periodically, there have been tentative discussions about ceding more control to the institutions' presidents on matters contained in the Board of Regents Handbook that could be considered more managerial than policy-related. Decisions about specific staffing levels and positions are made at the campus level, most frequently in conversations between the President's Cabinet and Dean's Council.

The number and types of state-funded positions is set according to a legislative formula that is based on a three-year weighted average of FTE student enrollments. Through representation by the Faculty Senate, UNLV faculty members (academic faculty and professional staff) hold a considerable, legislatively defined role in all matters affecting the university and the state system of higher education.

C. History of Institution

In 1951, when the post-war boom had swollen Las Vegas' metropolitan population to more than 50,000, the University of Nevada, Reno (UNR), established an extension program. Twenty-eight students began meeting for classes in the dressing rooms of Las Vegas High School's auditorium.

In 1954, the Nevada Board of Regents founded the Southern Regional Division of the University of Nevada, popularly known as Nevada Southern. Students adopted the Rebel name and mascot to reflect their desire to break free from UNR. After Las Vegas residents exerted pressure, the regents decided to acquire land for a campus, finally selecting an 80-acre parcel along the two-lane dirt road known as Maryland Parkway.

On September 10, 1957, the first classes were held on campus in a new 13,000-square-foot building, later named for Maude Frazier, a state assemblywoman and founding force behind Nevada Southern. A year later, the school received accreditation from the Northwest Association of Secondary and Higher Schools. To serve the growing enrollment, buildings went up in a flurry of construction, including a physical education and health center, a science and technology building, a classroom building named for regent Archie C. Grant, and the James R. Dickinson Library, named for the first director of the extension program.

In 1969, with the Board of Regents' approval, the university adopted its current name. By the following year, as Las Vegas's metropolitan population reached 275,000, UNLV enrolled more than 5,500 students. During the 1977-78 academic year, UNLV surpassed UNR in total enrollment.

Over the next three decades, UNLV continued this heady rate of development—erecting more than 100 buildings, developing dozens of graduate programs, creating partnerships with the community, fielding nationally ranked sports teams, founding an alumni association, promoting scholarship, establishing a fundraising foundation, and recruiting diverse and talented students from across the country.

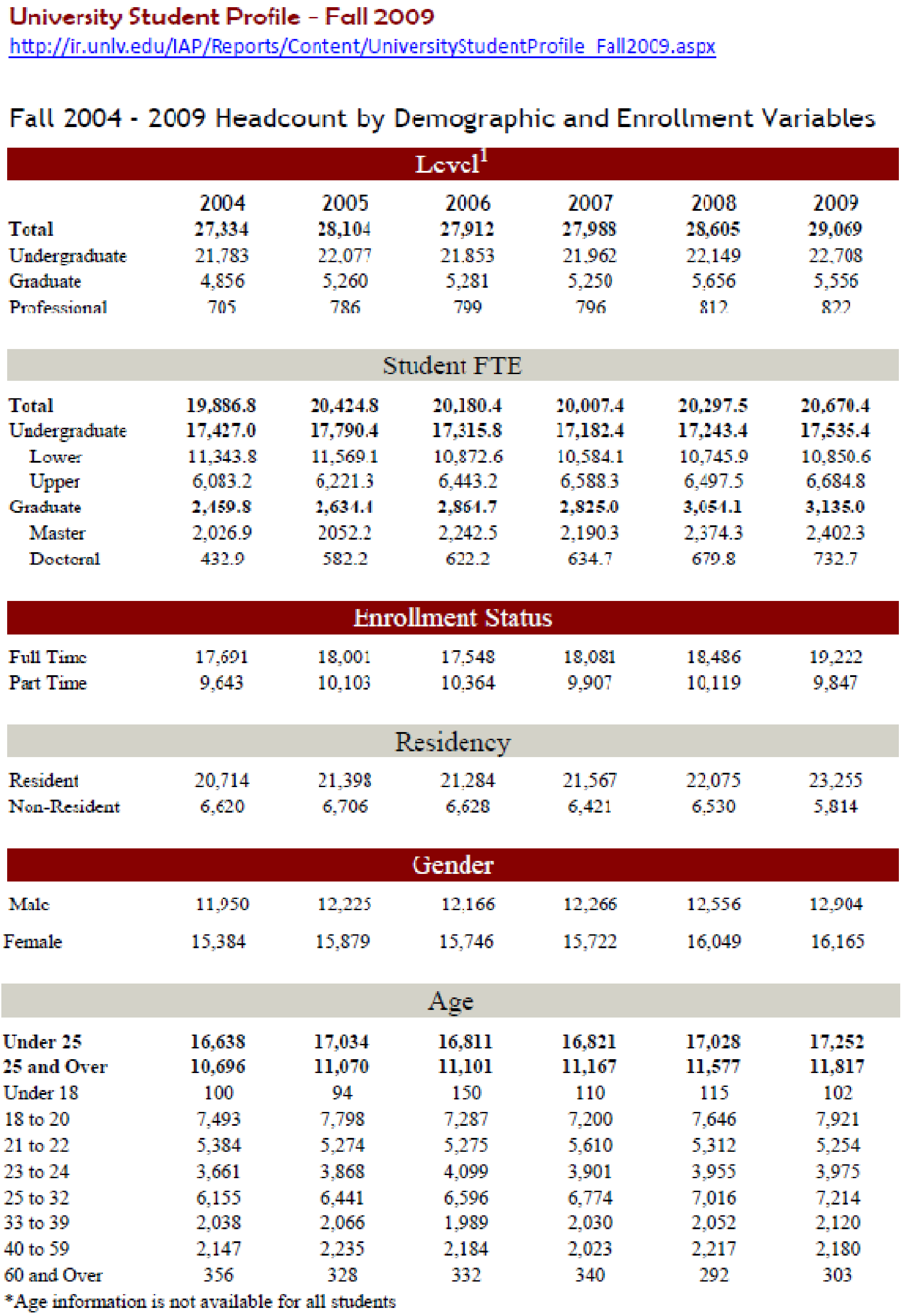
Today, UNLV has come a long way from the high school dressing rooms that once served as its classrooms. Thanks to the dedication of faculty, staff members, students, generous donors, and Las Vegas residents over the past half century, the university has much to celebrate:

- More than 1,000 full-time faculty teach 28,000-plus students, including 6,000 graduate and professional students.
- At its 44th commencement in May 2007, the university had a record number of graduates, more than 2,700.
- In 2006, UNLV received more than $94 million in total extramural funding, with about $68 million supporting research.
- The Carnegie Foundation for the Advancement of Teaching has placed UNLV in the prestigious category of Research Universities with High Research Activity.
- UNLV's first comprehensive fundraising campaign, Invent the Future, recently passed the $337 million mark.
- Students compete in 20 intramural sports and 16 sports at the NCAA/Division I intercollegiate level.
- The 350-acre campus includes branches specializing in biotechnology, dental medicine, and research and technology. In addition, UNLV recently established its first international campus in Singapore.

Source: http://celebrating50.unlv.edu/UNLVHistory.html

D. Student Body

The following table shows the university student profile for Fall 2009, and the undergraduate enrollment by state of origin. As shown in this table, the majority of students are from Nevada, and California follows the next.



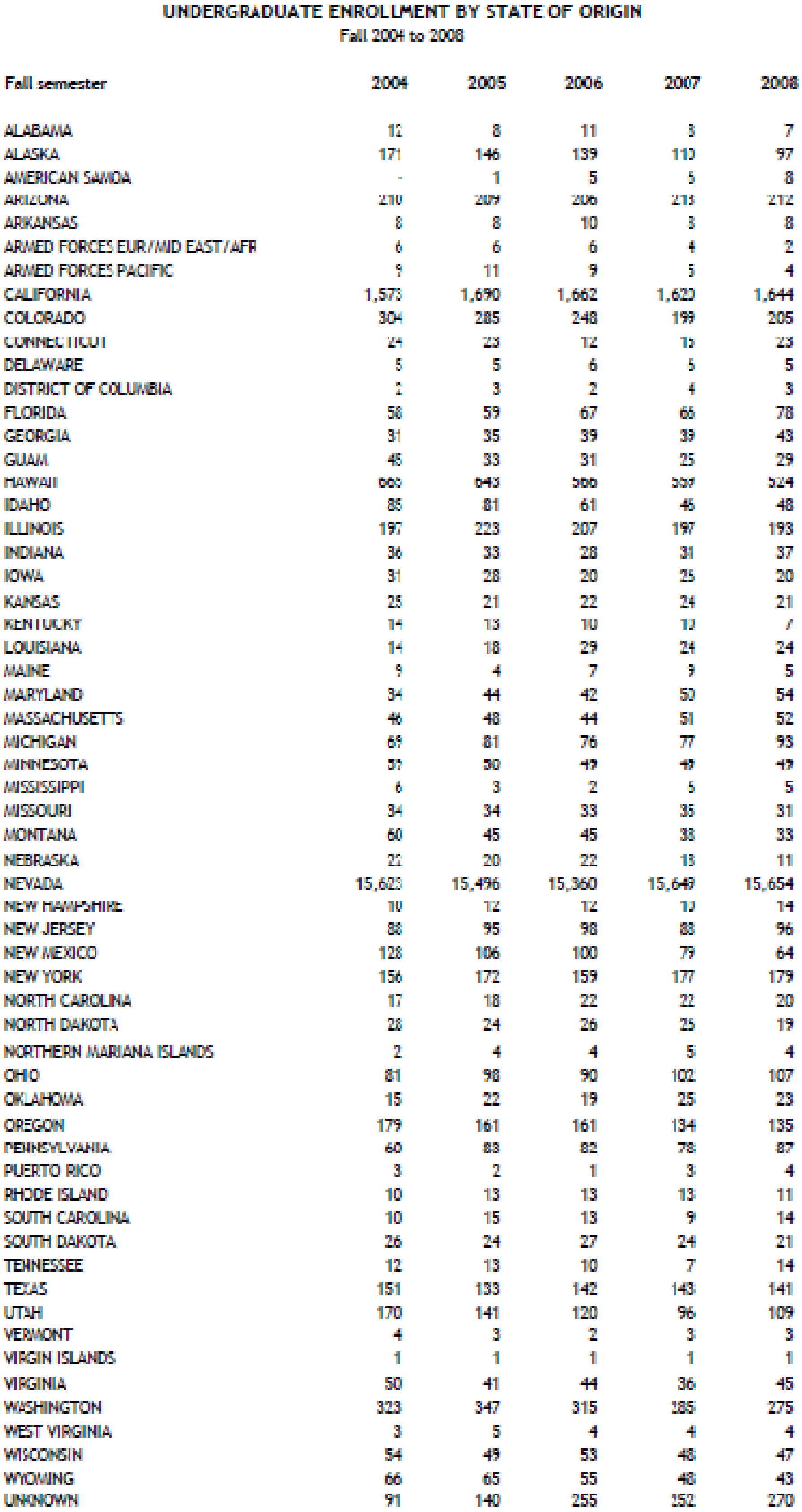
University Student Profile - Fall 2009

http://ir.unlv.edu/IAP/Reports/Content/UniversityStudentProfile_Fall2009.aspx

Fall 2004 - 2009 Headcount by Demographic and Enrollment Variables

Level[1]						
	2004	2005	2006	2007	2008	2009
Total	**27,334**	**28,104**	**27,912**	**27,988**	**28,605**	**29,069**
Undergraduate	21,783	22,077	21,853	21,962	22,149	22,708
Graduate	4,856	5,260	5,281	5,250	5,656	5,556
Professional	705	786	799	796	812	822
Student FTE						
Total	**19,886.8**	**20,424.8**	**20,180.4**	**20,007.4**	**20,297.5**	**20,670.4**
Undergraduate	**17,427.0**	**17,790.4**	**17,315.8**	**17,182.4**	**17,243.4**	**17,535.4**
Lower	11,343.8	11,569.1	10,872.6	10,584.1	10,745.9	10,850.6
Upper	6,083.2	6,221.3	6,443.2	6,588.3	6,497.5	6,684.8
Graduate	**2,459.8**	**2,634.4**	**2,864.7**	**2,825.0**	**3,054.1**	**3,135.0**
Master	2,026.9	2052.2	2,242.5	2,190.3	2,374.3	2,402.3
Doctoral	432.9	582.2	622.2	634.7	679.8	732.7
Enrollment Status						
Full Time	17,691	18,001	17,548	18,081	18,486	19,222
Part Time	9,643	10,103	10,364	9,907	10,119	9,847
Residency						
Resident	20,714	21,398	21,284	21,567	22,075	23,255
Non-Resident	6,620	6,706	6,628	6,421	6,530	5,814
Gender						
Male	11,950	12,225	12,166	12,266	12,556	12,904
Female	15,384	15,879	15,746	15,722	16,049	16,165
Age						
Under 25	**16,638**	**17,034**	**16,811**	**16,821**	**17,028**	**17,252**
25 and Over	**10,696**	**11,070**	**11,101**	**11,167**	**11,577**	**11,817**
Under 18	100	94	150	110	115	102
18 to 20	7,493	7,798	7,287	7,200	7,646	7,921
21 to 22	5,384	5,274	5,275	5,610	5,312	5,254
23 to 24	3,661	3,868	4,099	3,901	3,955	3,975
25 to 32	6,155	6,441	6,596	6,774	7,016	7,214
33 to 39	2,038	2,066	1,989	2,030	2,052	2,120
40 to 59	2,147	2,235	2,184	2,023	2,217	2,180
60 and Over	356	328	332	340	292	303

*Age information is not available for all students



UNDERGRADUATE ENROLLMENT BY STATE OF ORIGIN

Fall 2004 to 2008

Fall semester	2004	2005	2006	2007	2008
ALABAMA	12	8	11	3	7
ALASKA	171	146	139	110	97
AMERICAN SAMOA	-	1	5	5	8
ARIZONA	210	209	206	213	212
ARKANSAS	8	8	10	3	8
ARMED FORCES EUR/MID EAST/AFR	6	6	6	4	2
ARMED FORCES PACIFIC	9	11	9	5	4
CALIFORNIA	1,573	1,690	1,662	1,620	1,644
COLORADO	304	285	248	199	205
CONNECTICUT	24	23	12	15	23
DELAWARE	5	5	6	5	5
DISTRICT OF COLUMBIA	2	3	2	4	3
FLORIDA	58	59	67	66	78
GEORGIA	31	35	39	39	43
GUAM	45	33	31	25	29
HAWAII	665	643	566	559	524
IDAHO	85	81	61	45	48
ILLINOIS	197	223	207	197	193
INDIANA	36	33	28	31	37
IOWA	31	28	20	25	20
KANSAS	25	21	22	24	21
KENTUCKY	14	13	10	10	7
LOUISIANA	14	18	29	24	24
MAINE	9	4	7	9	5
MARYLAND	34	44	42	50	54
MASSACHUSETTS	46	48	44	51	52
MICHIGAN	69	81	76	77	93
MINNESOTA	57	50	49	49	49
MISSISSIPPI	6	3	2	5	5
MISSOURI	34	34	33	35	31
MONTANA	60	45	45	38	33
NEBRASKA	22	20	22	13	11
NEVADA	15,623	15,496	15,360	15,649	15,654
NEW HAMPSHIRE	10	12	12	10	14
NEW JERSEY	88	95	98	88	96
NEW MEXICO	128	106	100	79	64
NEW YORK	156	172	159	177	179
NORTH CAROLINA	17	18	22	22	20
NORTH DAKOTA	28	24	26	25	19
NORTHERN MARIANA ISLANDS	2	4	4	5	4
OHIO	81	98	90	102	107
OKLAHOMA	15	22	19	25	23
OREGON	179	161	161	134	135
PENNSYLVANIA	60	83	82	78	87
PUERTO RICO	3	2	1	3	4
RHODE ISLAND	10	13	13	13	11
SOUTH CAROLINA	10	15	13	9	14
SOUTH DAKOTA	26	24	27	24	21
TENNESSEE	12	13	10	7	14
TEXAS	151	133	142	143	141
UTAH	170	141	120	96	109
VERMONT	4	3	2	3	3
VIRGIN ISLANDS	1	1	1	1	1
VIRGINIA	50	41	44	36	45
WASHINGTON	323	347	315	285	275
WEST VIRGINIA	3	5	4	4	4
WISCONSIN	54	49	53	48	47
WYOMING	66	65	55	48	43
UNKNOWN	91	140	255	252	270

E. Regional or Institutional Accreditation

UNLV is accredited by the Northwest Commission on Colleges & Universities (NWCCU). We are currently preparing for our comprehensive decennial evaluation, which will culminate in the visit of the Accreditation Team in April 2010.

F. Personnel and Policies

F.1 The promotion and tenure system

Tenure: During the sixth year of appropriate service the candidate must undergo a careful screening of accomplishments, followed by a formal vote of the Departmental Tenure Committees. A file prepared by the candidate will be the basis for this evaluation, but other information as furnished by the committee and the Department Chair may be included. For example, the results of student exit interviews, testimonials of colleagues, and any other pertinent materials, can be included in the consideration. After consideration of the materials, a formal vote will be taken, and summary of the deliberations prepared. The criteria for tenure include teaching, research, service, and collegiality". Ratings of "unsatisfactory," "satisfactory," "commendable," or "excellent" will be assigned for each area. In order to be recommended for tenure, a faculty member must receive an excellent rating in either teaching or research, and at least satisfactory ratings in the remaining three areas.

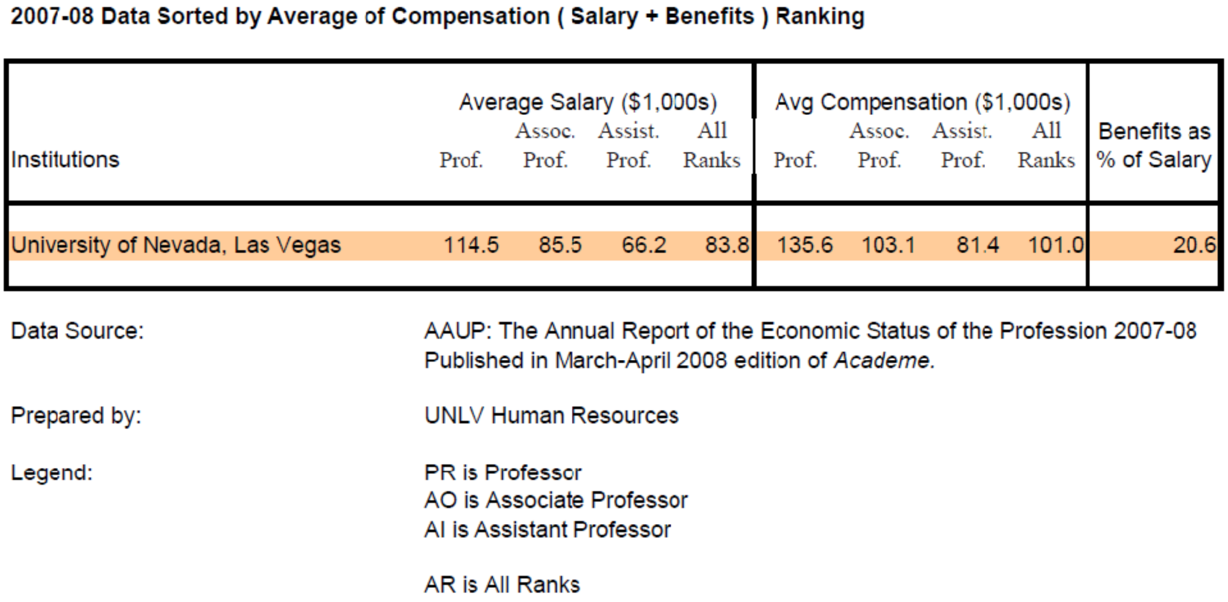
Promotion: Promotion is an act bestowed by the University on an individual in recognition of a certain level of accomplishment. For the promotion from Assistant Professor to Associate Professor, it will usually take place simultaneously with the award of tenure. Generally, the same criteria used for that award will be used. For promotion, however, a higher ranking (i.e. "commendable" or higher) is needed in research. Normally, tenure separate from promotion will not be considered. Elevation in rank from Associate Professor to Professor denotes a number of accomplishments and promises of continued high-level performance. Included are excellence in teaching, renown in research, and leadership roles within the Department and, possibly, the University. Excellence in teaching follows the same general guidelines as described in the tenure award. However, it is expected that someone at this promotion level will be able to demonstrate extremely good teaching evaluations, significant graduate student supervision, and substantial developmental accomplishments for classes and/or laboratories within the Department. Within the research realm, considerations will be given to the quantity and quality of the publication record as well as accomplishments in securing funded research independently. To substantiate the candidate's renown within the research sector, outside letters of evaluation will be required.

F.2 The process used to determine faculty salaries

All tenure-track and tenured faculty members in the program has a 9 month “B” contract. The department chair has a 11 month “A” contract. There is a merit evaluation process. The first recommendation is made by the Department Faculty Affairs Committee and the chair, and the final recommendation is made by the College Faculty Affairs Committee, and the Dean makes the final decision on the amount of the merit for each faculty member.

F.3 Faculty benefits

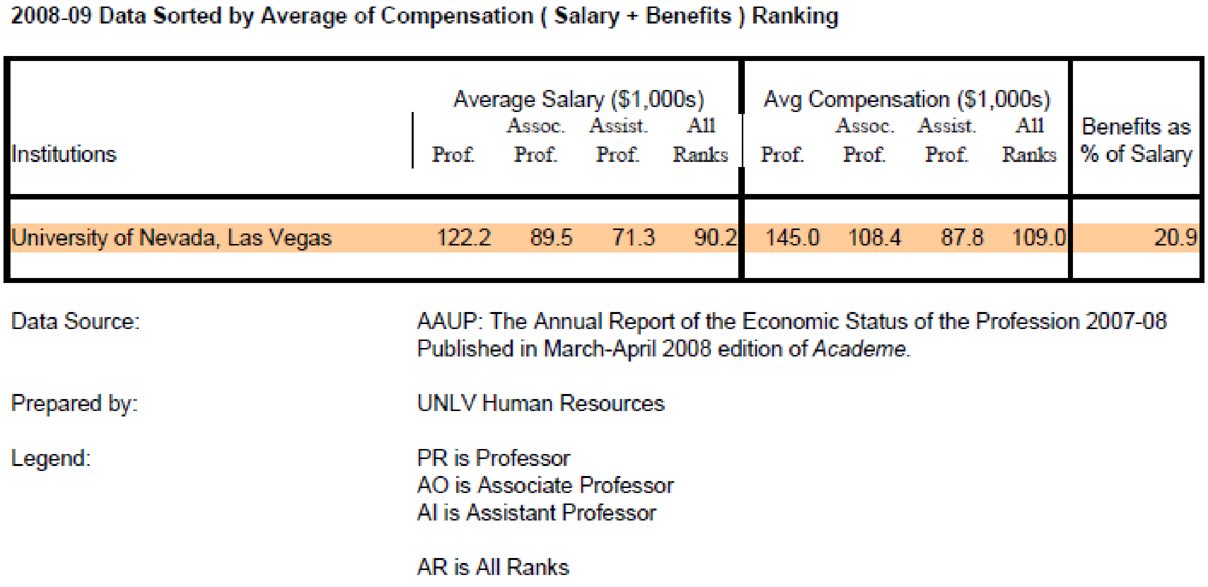
The following table shows the UNLV benefit packages for 2007-2008 and 2008-2009.



2007-08 Data Sorted by Average of Compensation (Salary + Benefits) Ranking

Institutions	Average Salary ($1,000s) Prof.	Assoc. Prof.	Assist. Prof.	All Ranks	Avg Compensation ($1,000s) Prof.	Assoc. Prof.	Assist. Prof.	All Ranks	Benefits as % of Salary
University of Nevada, Las Vegas	114.5	85.5	66.2	83.8	135.6	103.1	81.4	101.0	20.6

Data Source:	AAUP: The Annual Report of the Economic Status of the Profession 2007-08 Published in March-April 2008 edition of *Academe*.
Prepared by:	UNLV Human Resources
Legend:	PR is Professor AO is Associate Professor AI is Assistant Professor AR is All Ranks



2008-09 Data Sorted by Average of Compensation (Salary + Benefits) Ranking

Institutions	Average Salary ($1,000s) Prof.	Assoc. Prof.	Assist. Prof.	All Ranks	Avg Compensation ($1,000s) Prof.	Assoc. Prof.	Assist. Prof.	All Ranks	Benefits as % of Salary
University of Nevada, Las Vegas	122.2	89.5	71.3	90.2	145.0	108.4	87.8	109.0	20.9

Data Source:	AAUP: The Annual Report of the Economic Status of the Profession 2007-08 Published in March-April 2008 edition of *Academe*.
Prepared by:	UNLV Human Resources
Legend:	PR is Professor AO is Associate Professor AI is Assistant Professor AR is All Ranks

G. Educational Unit

Programs are administrated by department chairs and are organized within colleges. The Dean of each College reports to Executive Vice President and Provost Michael Bowers, who reports to President Neal Smatresk. The Provost is responsible for overseeing and aligning UNLV academic and budgetary policy, ensuring the quality of the faculty and student body, expanding the research enterprise and maintaining overall educational excellence. The College of Engineering is organized into eight different areas of interest, including two schools and six programs.

H. Credit Unit

In our program, one semester credit represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. Considering that the total credit required for a B.S. degree in our program is 127-129 credits, one year is equivalent to 31.75-32.25 semester hours, assuming that four years are required for graduation.

I. Instructional Modes

Our program is based on the traditional on-campus instruction.

J. Grade-Point Average

The following is the grade-point average required for graduation. There is no alternative instructional mode in the program.

- Grade of C (2.00) or higher must be earned in each engineering course (ME, CEE, EE, EGG) for graduation.
- Grades of C (2.00) or higher are required in all immediate prerequisites of all engineering, construction management, and computer science courses and in ENG 101 and 102.
- An overall 2.3 GPA and 2.5 GPA in engineering courses is required for probation, transfer, and graduation.

K. Academic Supporting Units

Department of Mathematical Science:	Dr. Derrick DuBose, Professor and Chair Email: derrick.dubose@unlv.edu Phone: (702) 895-4343
Department of Chemistry:	Dr. Dennis W. Lindle, Professor and Chair Email: lindle@unlv.nevada.edu Phone: (702) 895-4426
Department of Physics and Astronomy:	Dr. Tao Pang, Professor and Chair Email: pang@physics.unlv.edu Phone: (702) 895-4454

L. Non-Academic Supporting Units

Library:

University Library can be accessed from http://www.library.unlv.edu/, and the librarian who is in charge of the College of Engineering is Ms. Caroline Smith (phone: (702) 895-2139, email: caroline.smith@unlv.edu)

Engineering Advising Center:

The Howard R. Hughes College of Engineering Advising Center helps students throughout their undergraduate studies from registering for classes to choosing a career path. The center can be accessed through http://engineering.unlv.edu/advising/ , and the director of the center is Dr. Robert Abella (robertab@egr.unlv.edu). Under this advising center, there is the Tutoring/Writing Center where students can get help for their homework and class exams.

UNLV Career Services: (http://hire.unlv.edu/)

UNLV Career Service offers an abundance of resources to assist with developing a career and choosing a major. Receive career counseling and guidance on interviewing and resume building, access books and information, and much more. Executive Director is Ms. Eileen McGarry (*eileen.mcgarry@unlv.edu*)

M. Faculty Workload

A full-time load for all faculty members is defined in the College of Engineering Workload Policy (http://engineering.unlv.edu/pdf/COE-Workload-Policy-2007.pdf) approved by the University. The University workload policy can be accessed in http://oit.unlv.edu/nwccu/sites/default/files/Std%204/Supp.%20Doc/Req.%20Exhibits/RE.4.10%20Institutional%20policies%20re%20scholarship%20%26%20artistic%20creation/RE%204.10.m%20Workload%20Policy.pdf .

Faculty activities to the Mission of the University and College of Engineering are teaching, research, and service. The service includes advising, administrative and governance activities, professional development, maintaining currency in academic discipline, and public, professional, and institutional services. Any of these would serve as justification for requesting and/or being assigned workload reassignments and/or other teaching assignments.

A full-time teaching load for all faculties in the Mechanical Engineering program is three (3) courses. However, the following activities would serve as justification for requesting workload reassignment:

- Supervision/Teaching in Labs, Clinics, etc.
- Teaching Assignment Offset
- Teaching Large Sections
- Doctoral Program Involvement
- Master Program Involvement
- Course/Curriculum Development
- Innovation in Teaching
- Independent Teaching
- Scholarship
- Professional Development
- Research Development/Proposal development
- Research Activities
- Research Buy-out
- Department Chair
- Graduate or Undergraduate Coordinator
- Other Administrative Assignments
- Service to Profession
- Newly Hired Faculty
- Leave

N. Tables

Table D-1. Programs Offered by the Educational Unit

Program Title[1]	Modes Offered[2]				Nominal Years to Complete	Administrative Head	Administrative Unit or Units (e.g. Dept.) Exercising Budgetary Control	Submitted for Evaluation[3]		Offered, Not Submitted for Evaluation[4]	
	Day	Cooperative Education	Off Campus	Alternate Mode				Now Accredited.	Not Now Accredited	Now Accredited	Not Now Accredited
Civil and Environmental Engineering	X				4	Dr. Edward Neumann		X			
Computer Science (BS)	X				4	Dr. John Minor				X	
Computer Science (BA)	X				4	Dr. John Minor					X
Electrical Engineering	X				4	Dr. Henry Selvaraj		X			
Computer Engineering	X				4	Dr. Henry Selvaraj		X			
Construction Management	X				4	Dr. David Shields				X	
Informatics (BS)	X				4	Dr. Hal Berghel					X
Mechanical Engineering	X				4	Dr. Woosoon Yim		X			

List the titles of all degrees offered by the educational unit responsible for the programs being evaluated, undergraduate and graduate, granted by the institution. If there are differences in the degrees awarded for completion of cooperative education programs, these should be clearly indicated.

[1] Give program title as shown on a graduate's transcript
[2] Indicate all modes in which the program is offered. If separate accreditation is requested for an alternative mode, list on a separate line. Describe "Other" by footnote.
[3] Only those programs being submitted at this time for reaccreditation (now accredited) or initial accreditation (not now accredited) should be checked in this column.
[4] Programs not submitted for evaluation at this time should be checked in this column.

Table D-2. Degrees Awarded and Transcript Designations by Educational Unit

Program Title[1]	Modes Offered[2]				Name of Degree Awarded[3]	Designation on Transcript[4]
	Day	Co-op	Off Campus	Alternative Mode		
Mechanical Engineering	X				Bachelor of Science in Engineering-Mechanical Engineering	Bachelor of Science in Engineering-Mechanical Engineering (B.S.-EG)
	X				Master of Science in Mechanical Engineering	Master of Science in Mechanical Engineering (M.S.E)
	X				Master of Science in Biomedical Engineering	Master of Science in Biomedical Engineering (M.S.B.E.)
	X				Master of Science in Aerospace Engineering	Master of Science in Aerospace Engineering (M.S.A.E.)
	X				Master of Science in Materials and Nuclear Engineering	Master of Science in Materials and Nuclear Engineering (M.S.M.N.E.)
	X				Doctor of Philosophy in Engineering	Doctor of Philosophy in Engineering (Ph.D.)
Civil and Environmental Engineering	X				Bachelor of Science in Engineering-Mechanical Engineering	Bachelor of Science in Engineering-Mechanical Engineering (B.S.-EG)
	X				Master of Science in Engineering-Civil Engineering	Master of Science in Engineering-Civil Engineering (M.S.E)
	X				Master of Science in Engineering-Transportation	Master of Science in Engineering-Transportation (M.S.T)
	X				Doctor of Philosophy in Engineering	Doctor of Philosophy in Engineering (Ph.D.)
Computer Engineering	X				Bachelor of Science in Engineering-Computer Engineering	Bachelor of Science in Engineering-Computer Engineering (B.S.-EG)
Electrical Engineering	X				Bachelor of Science in Engineering-Electrical Engineering	Bachelor of Science in Engineering-Electrical Engineering (B.S.-EG)
	X				Master of Science in Engineering-Electrical Engineering	Master of Science in Engineering-Electrical Engineering (M.S.E.E.)
	X				Doctor of Philosophy in Engineering	Doctor of Philosophy in Engineering (Ph.D.)

Computer Science	X				Bachelor of Science in Computer Science	Bachelor of Science in Computer Science (B.S.-CS)
	X				Bachelor of Arts in Computer Science	Bachelor of Arts in Computer Science (B.A.-CS)
	X				Master of Science in Computer Science	Master of Science in Computer Science (M.S.C.S.)
	X				Doctor of Philosophy in Computer Science	Doctor of Philosophy in Computer Science (Ph.D.)
Construction Management	X				Bachelor of Science in Construction Management	Bachelor of Science in Construction Management (B.S.-CM)
	X				Master of Science in Construction Management	Master of Science in Construction Management (M.S.C.M.)
Informatics	X				Bachelor of Science in Informatics	Bachelor of Science in Informatics (B.S.)
	X				Master of Science in Informatics	Master of Science in Informatics (M.S.)
	X				Doctor of Philosophy in Informatics	Doctor of Philosophy in Informatics (Ph.D.)

[1] Give the program title as officially published in catalog.

[2] Indicate all modes in which the program is offered. If separate accreditation is requested for an alternative mode, list on a separate line. Describe "Other" by footnote.

[3] List degree awarded for each mode offered. If different degrees are awarded, list on separate lines.

[4] Indicate how the program is listed on transcript for each mode offered. If different designations are used, list on separate lines.

Table D-3. Support Expenditures (Mechanical Engineering)

Fiscal Year (*)	**Previous Year Fiscal Year 2009**				**Previous Year FY 2009**	**Current Year Fiscal Year 2010**				**Current Year FY 2010**	**Year of Visit Fiscal Year 2011**				**Year of Visit FY 2011**
Expenditure Category	State Funds	Special Course Fees	Self-Supporting Funds	Other Funds (COE, EVP&P)	Total	State Funds	Special Course Fees	Self-Supporting Funds	Other Funds (COE, EVP&P)	Total	State Funds	Special Course Fees	Self-Supporting Funds	Other Funds (COE, EVP&P)	Total
Operations (not including staff)	43,612	49,991	22,595		116,198	37,162	46,595	7,658		91,415	39,000	46,000	7,500		92,500
Travel	1,974		9,588		11,562	6,645		3,935		10,580	5,000		10,000		15,000
Equipment					-					-					-
a) Institutional Funds		6,188			6,188	20,737	2,212			22,949	20,000	5,000	5,000		30,000
b) Grants and Gifts					-					-					-
Graduate Teaching Assistants	235,613				235,613	237,648				237,648	237,648				237,648
Part-Time Assistance (other than teaching)					-			3,387		3,387					-
Part-Time Instructors	15,230				15,230	20,306				20,306	20,306				20,306
Faculty Salaries	1,803,883				1,803,883	1,763,477				1,763,477	1,763,477				1,763,477
Administrative Assistant/Classified Salary	34,332				34,332	39,408				39,408	39,408				39,408
Fringe Benefits	392,708				392,708	387,431				387,431	387,431				387,431
Mendenhall Lab (Space Renovation & Equipment)				201,380	201,380				71,260	71,260				50,000	50,000
Total	2,527,352	56,179	32,183	201,380	2,817,093	2,512,815	48,807	14,980	71,260	2,647,862	2,512,270	51,000	22,500	50,000	2,635,770

(*) Fiscal Year, 12-Month period beginning July 1st.

Report Department Level and Program Level data for each program being evaluated. Updated tables are to be provided at the time of the visit.

[1] Provide the statistics from the audited account for the fiscal year completed year prior to the current fiscal year.

[2] This is your current fiscal year (when you will be preparing these statistics). Provide your preliminary estimate of annual expenditures, since your current fiscal year presumably is not over at this point.

[3] Provide the budgeted amounts for your next fiscal year to cover the fall term when the ABET team will arrive on campus.

[4] Categories of general operating expenses to be included here.

[5] Institutionally sponsored, excluding special program grants.

[6] Major equipment, excluding equipment primarily used for research. Note that the expenditures (a) and (b) under “Equipment” should total the expenditures for Equipment. If they don’t, please explain.

[7] Including special (not part of institution’s annual appropriation) non-recurring equipment purchase programs.

[8] Do not include graduate teaching and research assistant or permanent part-time personnel.

Table D-4. Personnel and Students

Academic Year: 2009-2010 (Fall 2009 Data)

Mechanical Engineering Program

	HEAD COUNT[1]		FTE[2]	RATIO TO FACULTY[3]
	FT	PT		
Administrative[4]		1	0	
Faculty (tenure-track)	12		12	
Other Faculty (excluding student Assistants)	1		1	
Student Teaching Assistants	13	0	13	**1.1**
Student Research Assistants	12	0	12	**1.0**
Technicians/Specialists	2	0	2	**0.17**
Office/Clerical Employees	1	1	1.5	**0.125**
Others				
Undergraduate Student enrollment (Including Freshman and Sophomore)	244	68	113.4	**9.45**
Graduate Student enrollment	10	55	32.8	**2.73**

[1] Part-time student for undergraduate (<12 cr.), graduate student (<9 cr.).
Note that all graduate assistants in both M.S. and Ph.D. programs have full-time credit load of 6 cr.

[2] For student teaching assistants, 1 FTE equals 20 hours per week of work (or service).
For undergraduate student 1 FTE equals 15 cr.
For M.S. student 1 FTE equals 12 cr. and Ph.D. for 9 cr.
For faculty members, 1 FTE equals what your institution defines as a full-time load.

[3] Divide FTE in each category by total FTE Faculty without including administrative FTE.

[4] Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

Table D-5. Program Enrollment and Degree Data
Mechanical Engineering

	Academic Year		Enrollment Year				Total Undergraduate	Total Graduate	Degrees Conferred			
			Freshman	Sophomore	Junior	Senior			Bachelor	Master**	Doctor	Other
CURRENT	2009-2010	FT*										
		PT										
1	2008-2009	FT	82	59	39	87	268	37	35	20	6	
		PT	16	11	7	17	50	15				
2	2007-2008	FT	80	46	39	81	246	46	25	22	10	
		PT	18	10	8	17	53	10				
3	2006-2007	FT	64	34	48	69	214	65	20	17	1	
		PT	15	8	11	16	51	9				
4	2005-2006	FT	57	50	37	50	193	63	16	33	2	
		PT	12	10	8	11	42	8				
5	2004-2005	FT	69	39	27	43	178	61	12	30	4	
		PT	10	6	4	6	26	12				

*Full-time for undergraduate students is defined for 12 or more credit hours, and 6 or more credits for graduate students.

** Master degree include MSE-ME, MSBE, MSMNE, MSAE

FT--full time PT--part time

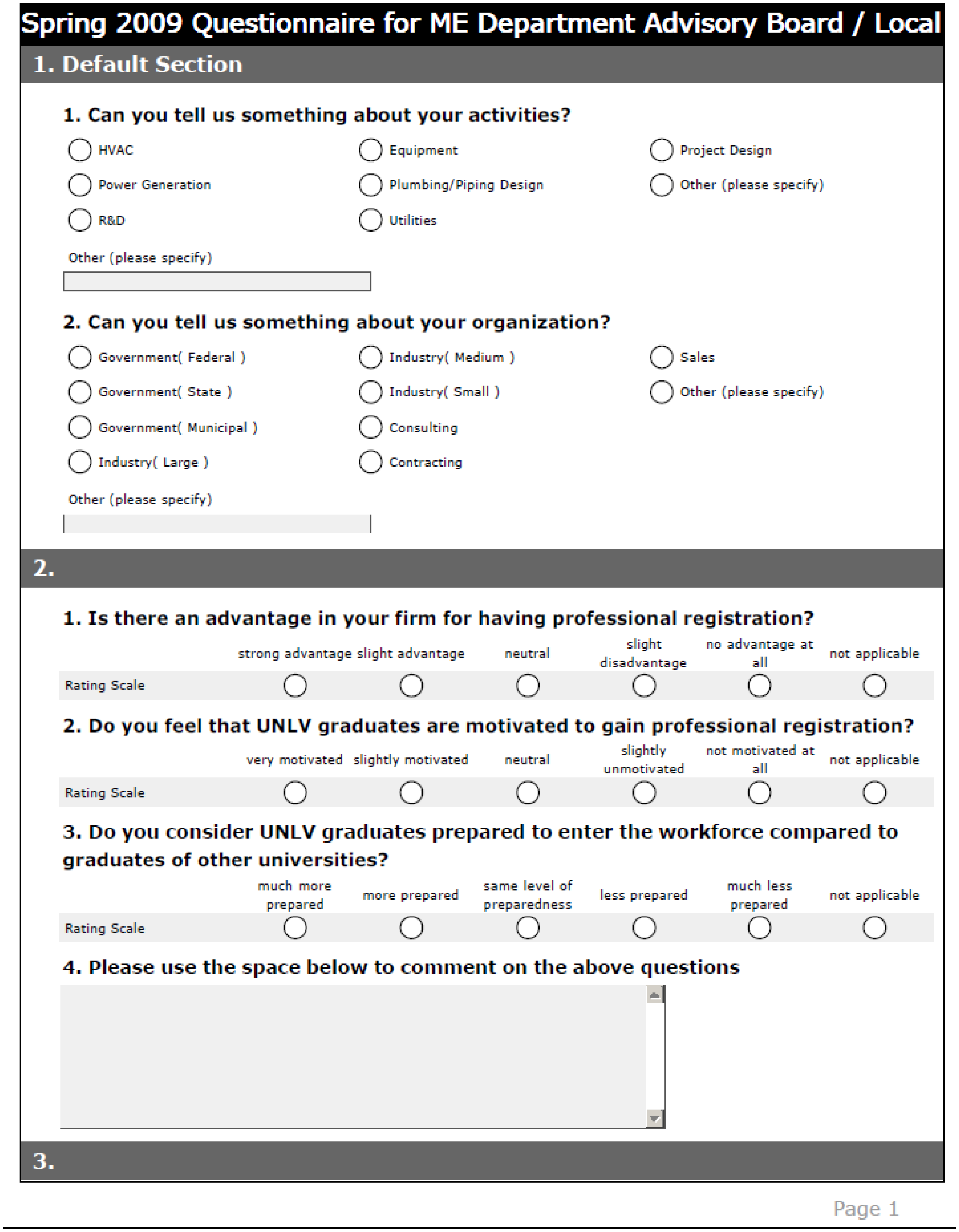
Table D-6. Faculty Salary Data[1]
Mechanical Engineering (Academic Year 2009-2010)

	Professor	Associate Professor	Assistant Professor	Instructor
Number	8	3	2	0
High	$179,864	$119,655	$85,290	
Mean	$133,294	$105,727	$80,145	
Low	$115,881	$91,925	$75,000	

APPENDIX E. OTHER SUPPORTING DOCUMENTS

The following sections have sample survey results. Past five year survey data is available in the department website at http://me.unlv.edu/GeneralInfo/ABETData.html.

E.1 Sample Industry Survey Form and Results (Spring 2009) (Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)



Spring 2009 Questionnaire for ME Department Advisory Board / Local

1. Default Section

1. Can you tell us something about your activities?

○ HVAC
○ Power Generation
○ R&D
○ Equipment
○ Plumbing/Piping Design
○ Utilities
○ Project Design
○ Other (please specify)

Other (please specify)

2. Can you tell us something about your organization?

○ Government(Federal)
○ Government(State)
○ Government(Municipal)
○ Industry(Large)
○ Industry(Medium)
○ Industry(Small)
○ Consulting
○ Contracting
○ Sales
○ Other (please specify)

Other (please specify)

2.

1. Is there an advantage in your firm for having professional registration?

	strong advantage	slight advantage	neutral	slight disadvantage	no advantage at all	not applicable
Rating Scale	○	○	○	○	○	○

2. Do you feel that UNLV graduates are motivated to gain professional registration?

	very motivated	slightly motivated	neutral	slightly unmotivated	not motivated at all	not applicable
Rating Scale	○	○	○	○	○	○

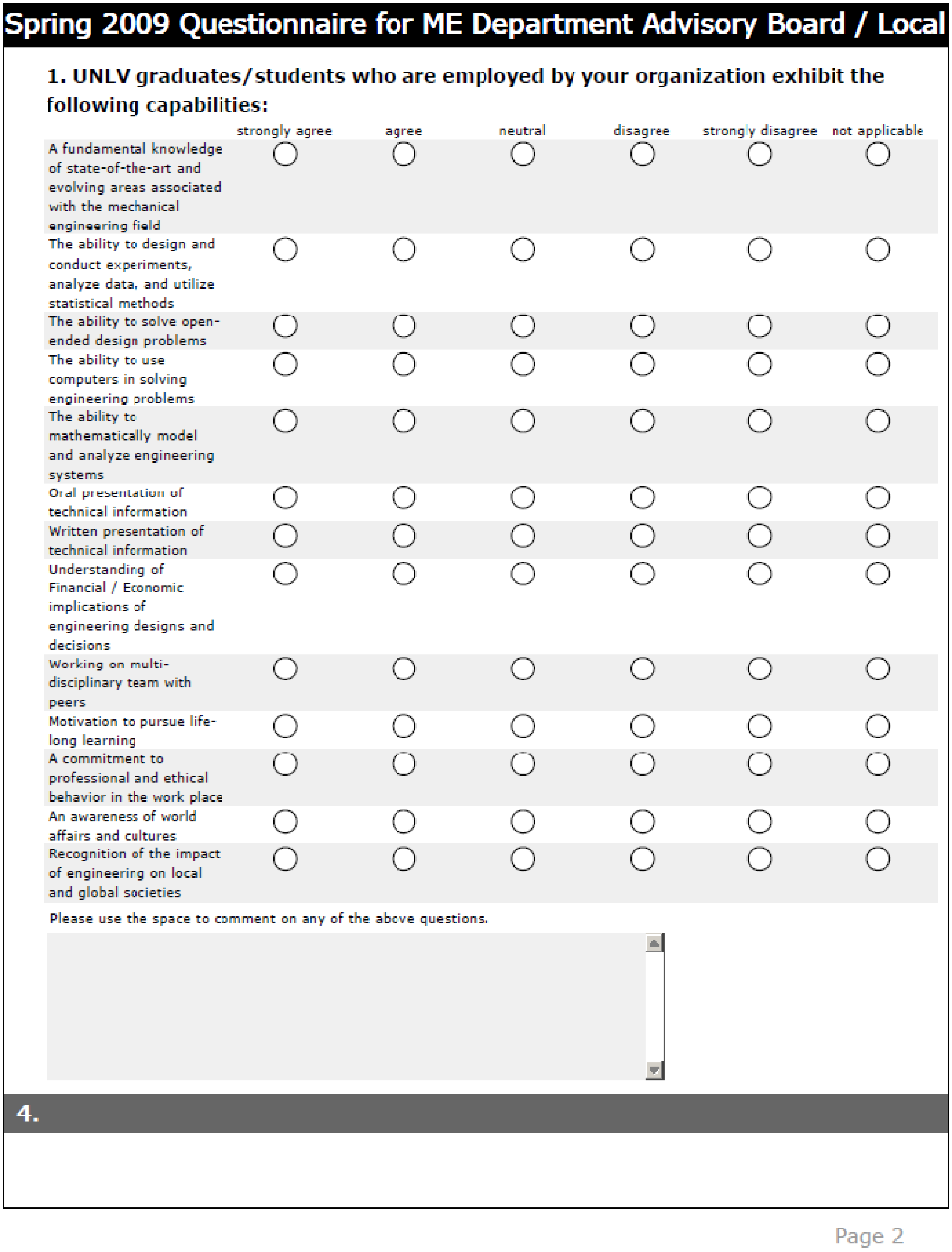
3. Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities?

	much more prepared	more prepared	same level of preparedness	less prepared	much less prepared	not applicable
Rating Scale	○	○	○	○	○	○

4. Please use the space below to comment on the above questions

3.

Page 1



Spring 2009 Questionnaire for ME Department Advisory Board / Local

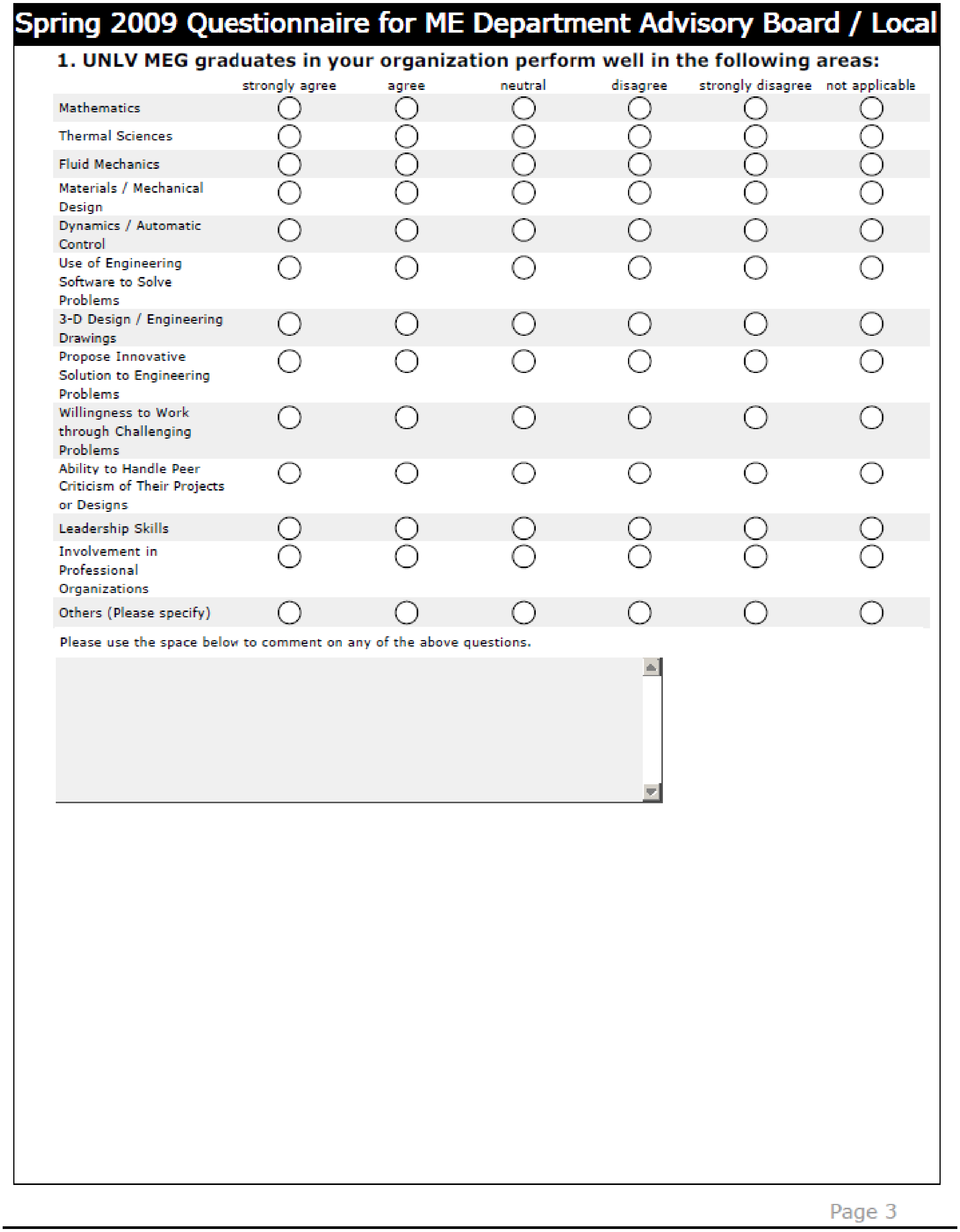
1. UNLV graduates/students who are employed by your organization exhibit the following capabilities:

	strongly agree	agree	neutral	disagree	strongly disagree	not applicable
A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	○	○	○	○	○	○
The ability to design and conduct experiments, analyze data, and utilize statistical methods	○	○	○	○	○	○
The ability to solve open-ended design problems	○	○	○	○	○	○
The ability to use computers in solving engineering problems	○	○	○	○	○	○
The ability to mathematically model and analyze engineering systems	○	○	○	○	○	○
Oral presentation of technical information	○	○	○	○	○	○
Written presentation of technical information	○	○	○	○	○	○
Understanding of Financial / Economic implications of engineering designs and decisions	○	○	○	○	○	○
Working on multi-disciplinary team with peers	○	○	○	○	○	○
Motivation to pursue life-long learning	○	○	○	○	○	○
A commitment to professional and ethical behavior in the work place	○	○	○	○	○	○
An awareness of world affairs and cultures	○	○	○	○	○	○
Recognition of the impact of engineering on local and global societies	○	○	○	○	○	○

Please use the space to comment on any of the above questions.

4.

Page 2



Spring 2009 Questionnaire for ME Department Advisory Board / Local

1. UNLV MEG graduates in your organization perform well in the following areas:

	strongly agree	agree	neutral	disagree	strongly disagree	not applicable
Mathematics	○	○	○	○	○	○
Thermal Sciences	○	○	○	○	○	○
Fluid Mechanics	○	○	○	○	○	○
Materials / Mechanical Design	○	○	○	○	○	○
Dynamics / Automatic Control	○	○	○	○	○	○
Use of Engineering Software to Solve Problems	○	○	○	○	○	○
3-D Design / Engineering Drawings	○	○	○	○	○	○
Propose Innovative Solution to Engineering Problems	○	○	○	○	○	○
Willingness to Work through Challenging Problems	○	○	○	○	○	○
Ability to Handle Peer Criticism of Their Projects or Designs	○	○	○	○	○	○
Leadership Skills	○	○	○	○	○	○
Involvement in Professional Organizations	○	○	○	○	○	○
Others (Please specify)	○	○	○	○	○	○

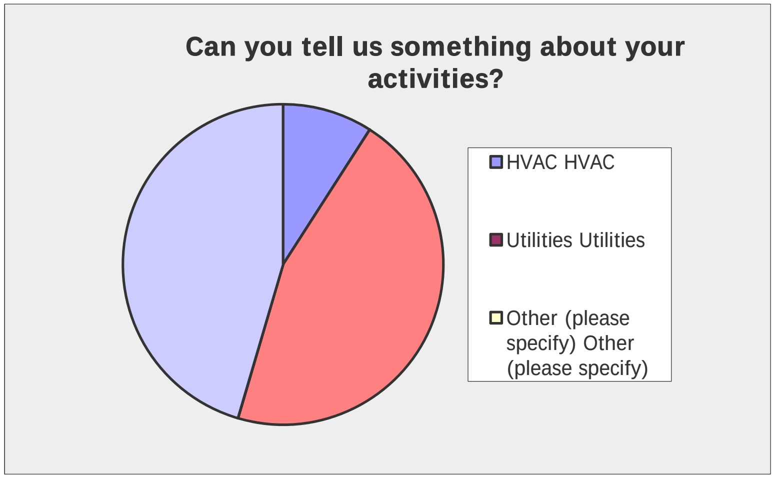
Please use the space below to comment on any of the above questions.

Page 3

Spring 2009 Questionnaire for ME Department Advisory Board / Local Industry

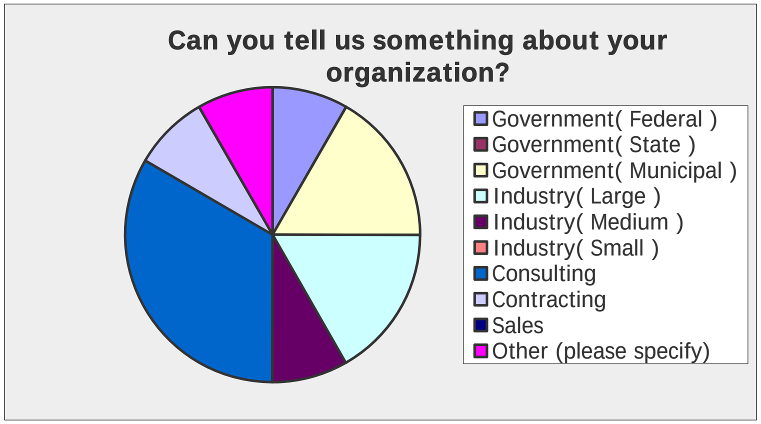
Can you tell us something about your activities?

Answer Options	**Response Percent**	**Response Count**
HVAC	9.1%	1
Power Generation	0.0%	0
R&D	0.0%	0
Equipment	0.0%	0
Plumbing/Piping Design	0.0%	0
Utilities	45.5%	5
Project Design	0.0%	0
Other (please specify)	45.5%	5
Other (please specify)		7
	answered question	**11**
	skipped question	**3**



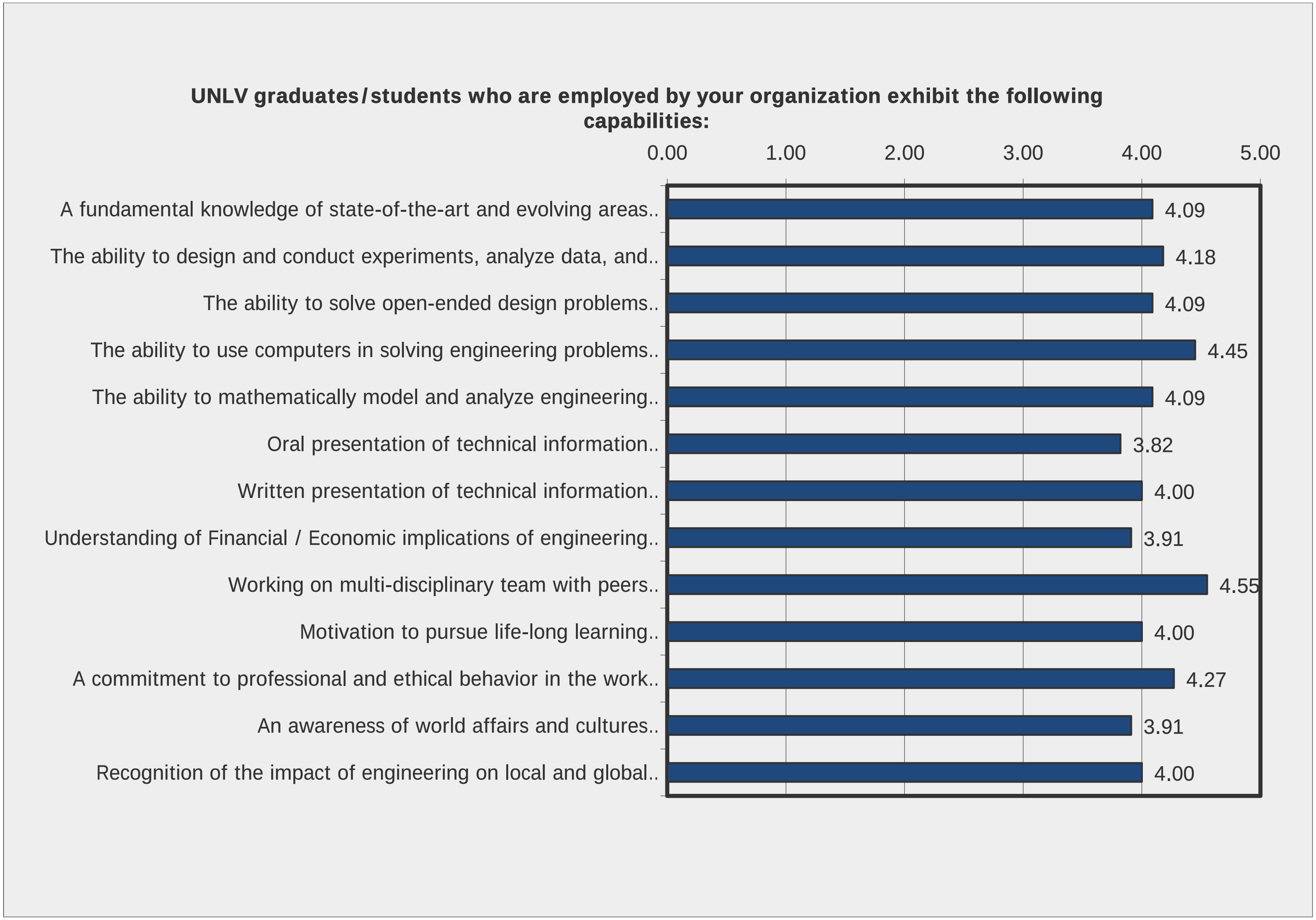
Can you tell us something about your organization?

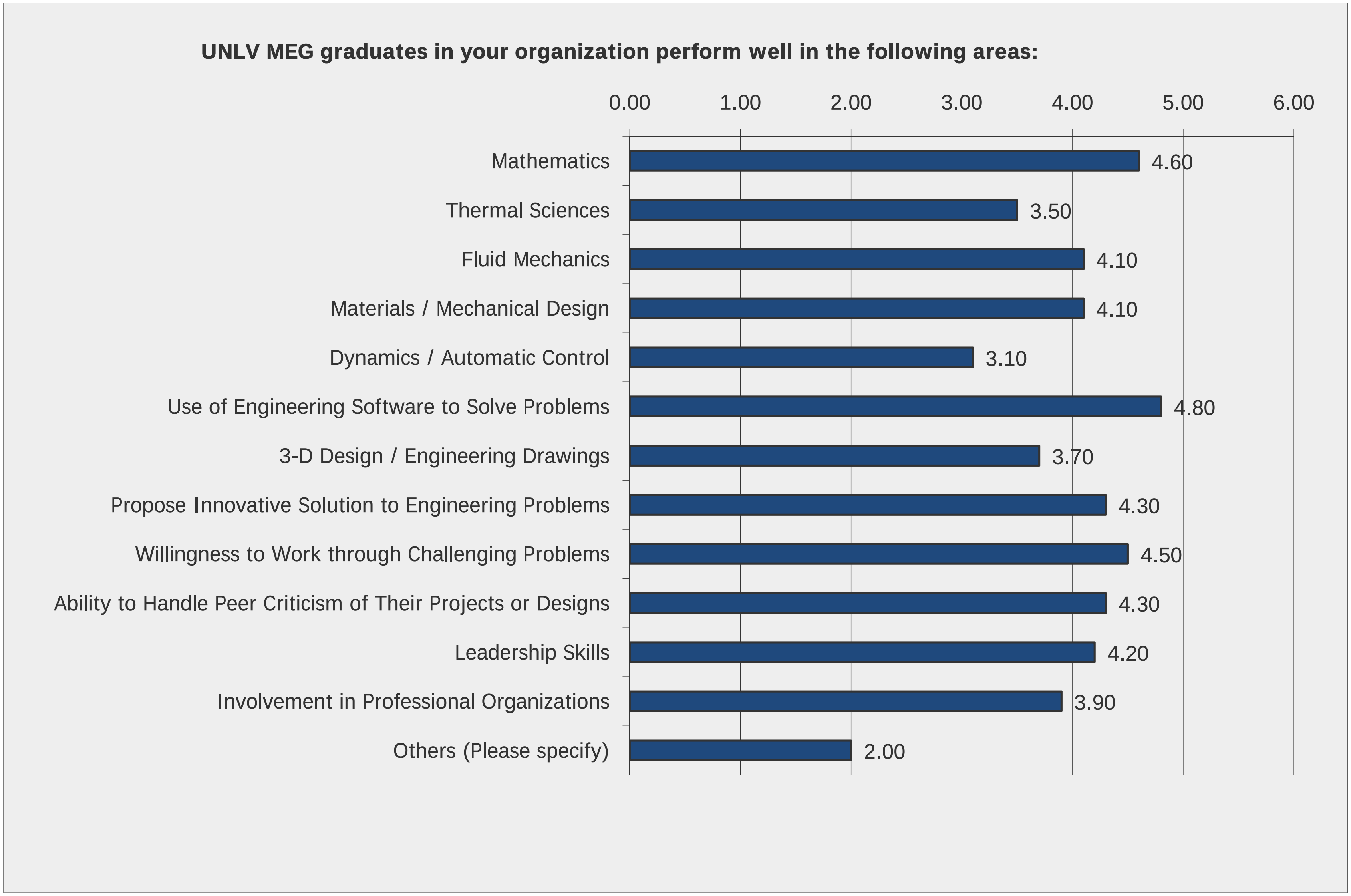
Answer Options	**Response Percent**	**Response Count**
Government(Federal)	8.3%	1
Government(State)	0.0%	0
Government(Municipal)	16.7%	2
Industry(Large)	16.7%	2
Industry(Medium)	8.3%	1
Industry(Small)	0.0%	0
Consulting	33.3%	4
Contracting	8.3%	1
Sales	0.0%	0
Other (please specify)	8.3%	1
Other (please specify)		2
answered question		**12**
skipped question		**2**



Answer Options	strong advantage	slight advantage	neutral	slight disadvantage	no advantage at all	not applicable	Rating Average	Response Count
Is there an advantage in your firm for having professional registration?	4	4	3	1	0	1	4.62	13
Do you feel that UNLV graduates are motivated to gain professional registration?	3	5	4	0	0	1	4.62	13
Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities?	0	2	8	1	0	2	3.62	13
							answered question	**13**
							skipped question	**1**

Answer Options	strong advantage	slight advantage	neutral	slight disadvantage	no advantage at all	not applicable	Rating Average	Response Count
Is there an advantage in your firm for having professional registration?								
Rating Scale	4	4	3	1	0	1	4.62	13
Do you feel that UNLV graduates are motivated to gain professional registration?								
Rating Scale	3	5	4	0	0	1	4.62	13
Do you consider UNLV graduates prepared to enter the workforce compared to graduates of other universities?								
Rating Scale	0	2	8	1	0	2	3.62	13


UNLV graduates/students who are employed by your organization exhibit the following capabilities:
0.00
1.00
2.00
3.00
4.00
5.00
A fundamental knowledge of state-of-the-art and evolving areas..
4.09
The ability to design and conduct experiments, analyze data, and..
4.18
The ability to solve open-ended design problems..
4.09
The ability to use computers in solving engineering problems..
4.45
The ability to mathematically model and analyze engineering..
4.09
Oral presentation of technical information..
3.82
Written presentation of technical information..
4.00
Understanding of Financial / Economic implications of engineering..
3.91
Working on multi-disciplinary team with peers..
4.55
Motivation to pursue life-long learning..
4.00
A commitment to professional and ethical behavior in the work..
4.27
An awareness of world affairs and cultures..
3.91
Recognition of the impact of engineering on local and global..
4.00


UNLV MEG graduates in your organization perform well in the following areas:
0.00
1.00
2.00
3.00
4.00
5.00
6.00
Mathematics
4.60
Thermal Sciences
3.50
Fluid Mechanics
4.10
Materials / Mechanical Design
4.10
Dynamics / Automatic Control
3.10
Use of Engineering Software to Solve Problems
4.80
3-D Design / Engineering Drawings
3.70
Propose Innovative Solution to Engineering Problems
4.30
Willingness to Work through Challenging Problems
4.50
Ability to Handle Peer Criticism of Their Projects or Designs
4.30
Leadership Skills
4.20
Involvement in Professional Organizations
3.90
Others (Please specify)
2.00

E.2 Alumni Survey Form and Results (Fall 2008)

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

December 8, 2008

RE: F08 Questionnaire for MEG Alumni

Dear MEG Alumni,

We are proud of the success that many of you have achieved since graduation. We are continuously undergoing changes to improve the quality of the program. In addition to attempting to keep the course contents up to date, our educational labs have gone through major changes recently. We strongly feel that we cannot continue this process of continuous improvement without your input. Please find enclosed a survey that we conduct every three years, which attempts to meet two objectives:

- Monitor the quality of the mechanical engineering program and,
- Help us tune the program to better respond to the needs of our constituents.

We appreciate your help in filling this survey. Your participation will help make the results of this survey meaningful to us. You can either mail the survey to the department or fax it to (702)895-3936. Please note that from this year you can also finish the same survey from the following website at:

http://www.me.unlv.edu/survey.htm

Results of earlier surveys can be viewed at:
http://www.me.unlv.edu/Undergraduate/assessment.html

Please feel free to contact the department (702-895-0956 or woosoon.yim@unlv.edu) if you have any question or suggestion regarding the program.

Sincerely,

Woosoon Yim, PhD
Professor and Chairman
Phone: (702) 895-0956
Email: wy@me.unlv.edu
http://www.me.unlv.edu/~wy

Department of Mechanical Engineering
4505 Maryland Parkway • Box 454027 • Las Vegas, Nevada 89154-4027
(702) 895-1331 • Fax: (702) 895-3936
http://www.me.unlv.edu

Fall 2008 Alumni Survey Results (Both web-based and mail survey) (Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)

When did you graduate?

2006-2008	*2003-2005*	*2000-2002*	*1997-1999*	*1994-1996*	*1991-1993*	*Prior to 1988*	
4	5	3	4	3	1	7	mail
3	5	3	1	1	2	1	web

What type of position do you currently hold?

Technical	*Technical / Project Management*	*R&D*	*Management*	*Student (Full-Time)*	*Other*	
9	11		5	1	2	mail
4	6	1	3	1	1 (Assistant Prof. of engineer)	web

Can you tell us something about your organization?

Municipal	*Federal*	*State*[1]	*Large Industry*[2]	*Small Industry*	*Other (please specify)*[3]	
0	4	2	12	3	6	mail
1	4	1	4	3	4	web

[1] Colorado, UNLV-Pueblo

[2] Abbott Laboratories, Pharmaceuticals, Medical Diagnositcs, Boeing Commercial airlines, Defense Contracts

[3] Government Contractor, Consulting Enginneer HVAZ, Private Utility, University consulting

Can you tell us something about your activities?

HVAC	*Power Generation*	*R&D*	*Equipment*	*Plumbing*	*Other*[1] *(Please specify)*	
5	1	10	4	4	10	mail
1		3	1		10	web

[1] Academic, Transportation consulting, Gaming Design/Manufacturing, Utility, Pipeline, Sensor Packaging, Project Management, System Operations, Academic Research, Hi Tech

Where are you currently located?

Southern Nevada	*Nevada (other)*	*Pacific*	*Mountain*	*Central*	*East*	*International*	
11	1	5	5	4	1		mail
7	0	1	2	1	5		web

Educational Outcomes (Both web based and mail survey are combined)

Your studies in UNLV helped you develop the following capabilities:	*strongly agree*	*agree*	*neutral*	*disagree*	*Strongly Disagree*	*Not applicable*		*Rat Ave*
A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	10	27	5	1	1	0		
The ability to design and conduct experiments, analyze data, and utilize statistical methods	10	23	6	1	1	1		
The ability to solve open-ended design problems	15	19	7	1	0	0		
The ability to use computers in solving engineering problems	14	22	5	1	1	0		
The ability to mathematically model and analyze engineering systems	15	21	4	0	2	0		
Oral and written presentation of technical information	12	19	11	1	0	0		
Introductory knowledge of economics	7	19	11	5	0	1		
Working on multi-disciplinary team with peers	7	20	15	2	1	0		
Motivation to pursue life-long learning	12	17	12	2	0	0		
A commitment to professional and ethical behavior in the work place	10	22	10	1	0	0		
An awareness of world affairs and cultures	2	10	23	4	3	1		
Recognition of the impact of engineering on local and global societies	4	16	17	5	0	1		
Seeking professional licensure	6	19	13	3	1	1		

- In my graduate studies and at work, matlab is the gold standard. Back in the early 2000's UNLV ME Dept. wasn't really pushing matlab. I Hope you are now.
- Excellent school led to an excellent career
- Limited teaching for absent professors as well as grading helped me make transition from knowing material well as a student to level of knowledge required to teach the same material.
- Please note that my graduating class was 1988. The new college of engineering was still a concept and we were still seeking accreditation. The labs were small and not well-equipped. I enjoyed my time there, but the current college is way beyond anything we had.

Preparation(Both web based and mail survey are combined)

	much more prepared	*more prepared*	*same level of preparedness*	*less prepared*	*much less prepared*	*not applicable*
Do you consider that studying at UNLV made you prepared to enter the workforce compared to graduates of other universities?	2	10	25	1	1	1

- Most UNLV graduates are not worth hiring even as entry level engineers.
- Experience w/ UNLV Grads is that they are as, if not more, competent as those from other institutions.
- Better prepared to tackle diverse problems & methods applications. Few probably could be as adapt from other Universities, some of course.
- A project management class (even one semester) as part of the curriculum would have prepared me more, giving me tools on "how" to apply knowledge/skills.
- Keep in mind that I graduated in the late 80's when the program was changing continuously.
- Prior to academics, I worked vibration issues on the DOG-1000 for bath Iron works, a general Dynamics Corp. and interacted with other vibration people Northrup Grumman Ship Systems, Rolls Royce & Raytheon.
- I have minimal contact with grads of other schools, so I wouldn’t be able to compare this.
- Already in works force for engineering.

Motivation

(Both web based and mail survey are combined)

	very motivated	*slightly motivated*	*neutral*	*slightly unmotivated*	*not motivated at all*	*not applicable*
Do you feel that studying at UNLV made you motivated to gain professional registration?	8	13	14	0	4	3

- I think my motivation to gain license would be due to my industry needing it or not. I am currently in the gaming industry which does not associate with PE's very often.
- Studies at UNLV convinced me to not work in engineering. It was a good thing though. I make 20% more than my peers.
- EIT was the Closest I'll get! Not interested in industries where this is prevalent.
- Although you may not have motivated me to take the test the graduate education (both the material and self motivation to study that you required) allowed me to take and pass both tests the first time and six months apart. I am licensed in two states.
- Mtoivated, however my work does not require or reward professional licensing so there is no benefit other than personal satisfaction.
- My job does not require professional registration
- Professional registration is not required or suggested in my field
- Registered PE in Electrical Engineering and currently working on Mechanical
- No one ever emphasized that professional registration/P.E. was important or valuable

General Performance

(Both web based and mail survey are combined)

	Your studies in UNLV helped you gain proficiency in the following areas:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*	*not applicable*
1	Mathematics	12	26	5	0	0	1
2	Thermal Sciences	14	21	5	1	0	2
3	Fluid Mechanics	13	16	11	2	0	2
4	Materials / Mechanical Design	11	22	4	0	1	3
5	Dynamics / Automatic Control	12	12	13	1	1	5
6	Computer Skills	11	23	7	2	1	0
7	3-D Design / Engineering Drawings	2	18	15	4	3	2
8	Evaluation of Engineering Systems	3	28	8	2	1	2
9	Propose Innovative Solution to Engineering Problems	7	26	10	1	0	0
10	Communication Skills	8	17	16	3	0	0
11	Willingness to Work through Challenging Problems	12	22	10	0	0	0
12	Effectiveness in Teams	7	22	12	3	0	0
13	Ability to Handle Peer Criticism of Their Projects or Designs	6	20	14	3	0	1
14	Leadership Skills	7	14	20	3	0	0
15	Involvement in Professional Organizations	7	17	14	4	0	2
16	Others (Please specify)	0	1	2	0	0	2

- UNLV ME allowed me to integrate many of the isolated skills I acquired through my first two degrees. Training/classes for more updated/advanced programs for drafting would help (at least for familiarity of systems). Training/classes for team-working and leadership; communication skills; valuable feedback (giving and receiving) would help (even as available electives).
- CAD was not a major part of the curriculum at that time. Other: Honors Program & Engineering fit very well together. Dynamics/Automatic Control:
- Dr. Mauer's 400 level controls class launched me on a trajectory to my current career, but I'm sure "that class" provides real inspiration is different for everybody.
- Avid Mechanics materials and teaching was very poor. It did not apply to everyday day challenges in this area. It was too scientific research based and focused

Do you feel that studying at UNLV made you motivated to gain professional registration?

(Both web based and mail survey are combined)

Very Motivated	Slightly Motivated	Neutral	Slightly Unmotivated	Not Motivated	Not Applicable	Rating Average	
8	13	14	0	4	3		

2005 and 2008 Alumni Survey Results for Educational Outcomes

2008 Alumni Survey Results for Education Outcomes (* 5 (strongly agree) and 1 (strongly Disagree))

	Your studies in UNLV helped you develop the following capabilities:	*strongly agree (5)*	*agree(4)*	*neutral (3)*	*disagree(2)*	*Strongly Disagree (1)*	*Not applicable*	*Rating Average **	*Response Count*
Educational Objective 1	1.a A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	10	27	5	1	1	0	**4.0**	44
	1.b The ability to design and conduct experiments, analyze data, and utilize statistical methods	10	23	6	1	1	1	**3.9**	42
	1.c The ability to solve open-ended design problems	15	19	7	1	0	0	**4.1**	42
	1.d The ability to use computers in solving engineering problems	14	22	5	1	1	0	**4.1**	43
	1.e The ability to mathematically model and analyze engineering systems	15	21	4	0	2	0	**4.1**	42
Educational Objective 2	2.a Oral and written presentation of technical information	12	19	11	1	0	0	**4.0**	43
	2.b Introductory knowledge of economics	7	19	11	5	0	1	**3.6**	43
	2.c Working on multi-disciplinary team with peers	7	20	15	2	1	0	**3.7**	45
	2.d Motivation to pursue life-long learning	12	17	12	2	0	0	**3.9**	43
Educational Objective 3	3.a A commitment to professional and ethical behavior in the work place	10	22	10	1	0	0	**4.0**	43
	3.b An awareness of world affairs and cultures	2	10	23	4	3	1	**3.0**	43
	3.c Recognition of the impact of engineering on local and global societies	4	16	17	5	0	1	**3.4**	43
	3.d Seeking professional licensure	6	19	13	3	1	1	**3.5**	43

2005 Alumni Survey Results for Education Outcomes (* 5 (strongly agree) and 1 (strongly Disagree)**)**

	Your studies in UNLV helped you develop the following capabilities:	*strongly agree (5)*	*agree(4)*	*neutral (3)*	*disagree(2)*	*Strongly Disagree (1)*	*Not applicable*	***Rating Average ****	*Response Count*
Educational Objective 1	1.a A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	8	33	14	2	0	1	**3.8**	58
	1.b The ability to design and conduct experiments, analyze data, and utilize statistical methods	15	34	7	2	0	0	**4.1**	58
	1.c The ability to solve open-ended design problems	13	40	4	1	0	0	**4.1**	58
	1.d The ability to use computers in solving engineering problems	16	34	7	1	0	0	**4.1**	58
	1.e The ability to mathematically model and analyze engineering systems	18	26	12	1	0	1	**4.0**	58
Educational Objective 2	2.a Oral and written presentation of technical information	14	31	10	2	1	0	**3.9**	58
	2.b Introductory knowledge of economics	13	25	15	3	0	2	**3.7**	58
	2.c Working on multi-disciplinary team with peers	14	28	9	6	1	0	**3.8**	58
	2.d Motivation to pursue life-long learning	16	23	17	0	1	0	**3.9**	57
Educational Objective 3	3.a A commitment to professional and ethical behavior in the work place	17	28	11	1	0	1	**4.0**	58
	3.b An awareness of world affairs and cultures	6	16	22	8	3	2	**3.1**	57
	3.c Recognition of the impact of engineering on local and global societies	8	20	19	8	2	0	**3.4**	57
	3.d Seeking professional licensure	10	24	16	2	1	4	**3.5**	57

2008 Alumni Survey Results for Academic Knowledge and Engineering Skills

Your studies in UNLV helped you gain proficiency in the following areas:	*strongly agree (5)*	*agree (4)*	*neutral (3)*	*disagree (2)*	*strongly disagree (1)*	*not applicable*	avg. ranking	*Response Counted*
Mathematics	12	26	5	0	0	1	4.1	44
Thermal Sciences	14	21	5	1	0	2	4.0	43
Fluid Mechanics	13	16	11	2	0	2	3.8	44
Materials / Mechanical Design	11	22	4	0	1	3	3.8	41
Dynamics / Automatic Control	12	12	13	1	1	5	3.4	44
Computer Skills	11	23	7	2	1	0	3.9	44
3-D Design / Engineering Drawings	2	18	15	4	3	2	3.1	44

Average: 3.7

Your studies in UNLV helped you gain proficiency in the following areas:	*strongly agree (5)*	*agree (4)*	*neutral (3)*	*disagree (2)*	*strongly disagree (1)*	*not applicable*	avg. ranking	*Response Counted*
Evaluation of Engineering Systems	3	28	8	2	1	2	3.5	44
Propose Innovative Solution to Engineering Problems	7	26	10	1	0	0	3.9	44
Communication Skills	8	17	16	3	0	0	3.7	44
Willingness to Work through Challenging Problems	12	22	10	0	0	0	4.0	44
Effectiveness in Teams	7	22	12	3	0	0	3.8	44
Ability to Handle Peer Criticism of Their Projects or Designs	6	20	14	3	0	1	3.6	44
Leadership Skills	7	14	20	3	0	0	3.6	44
Involvement in Professional Organizations	7	17	14	4	0	2	3.5	44

Average: 3.7

2005 Alumni Survey Results for Academic Knowledge and Engineering Skills

Your studies in UNLV helped you gain proficiency in the following areas:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*	*not applicable*	avg. ranking	*Response Counted*
Mathematics	22	31	4			1	4.2	58
Thermal Sciences	17	27	11	2		1	4.0	58
Fluid Mechanics	16	28	8	2		4	3.8	58
Materials / Mechanical Design	15	34	7			2	4.0	58
Dynamics / Automatic Control	8	30	11	6	1	2	3.6	58
Computer Skills	18	24	12	4		0	4.0	58
3-D Design / Engineering Drawings	5	15	18	13	4	3	2.9	58

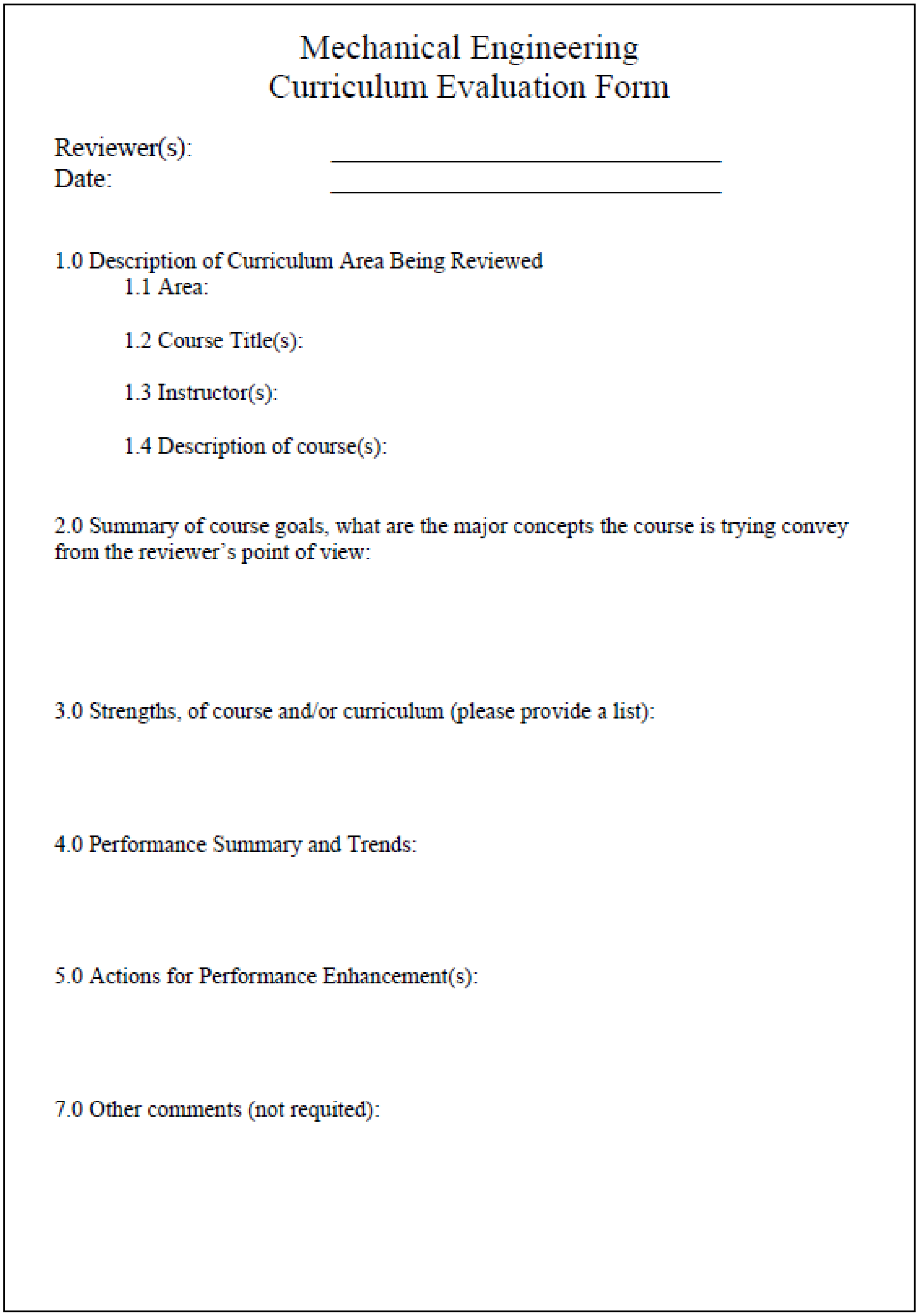
Average: 3.8

Your studies in UNLV helped you gain proficiency in the following areas:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*	*not applicable*	avg. ranking	*Response Counted*
Evaluation of Engineering Systems	10	23	19	5		1	3.6	58
Propose Innovative Solution to Engineering Problems	8	30	17	2	1		3.7	58
Communication Skills	8	27	17	6			3.6	58
Willingness to Work through Challenging Problems	16	36	5	1			4.2	58
Effectiveness in Teams	13	29	11	4		1	3.8	58
Ability to Handle Peer Criticism of Their Projects or Designs	12	27	11	5	1	2	3.7	58
Leadership Skills	7	22	18	8	1	2	3.3	58
Involvement in Professional Organizations	11	25	15	6	1		3.7	58

Average: 3.7

E.3 Fall 2009 ME Advisory Board / Local Engineers Reports for ME Curriculum/Courses

Industry Review Form:



Mechanical Engineering
Curriculum Evaluation Form

Reviewer(s): ______________________________
Date: ______________________________

1.0 Description of Curriculum Area Being Reviewed

1.1 Area:

1.2 Course Title(s):

1.3 Instructor(s):

1.4 Description of course(s):

2.0 Summary of course goals, what are the major concepts the course is trying convey from the reviewer's point of view:

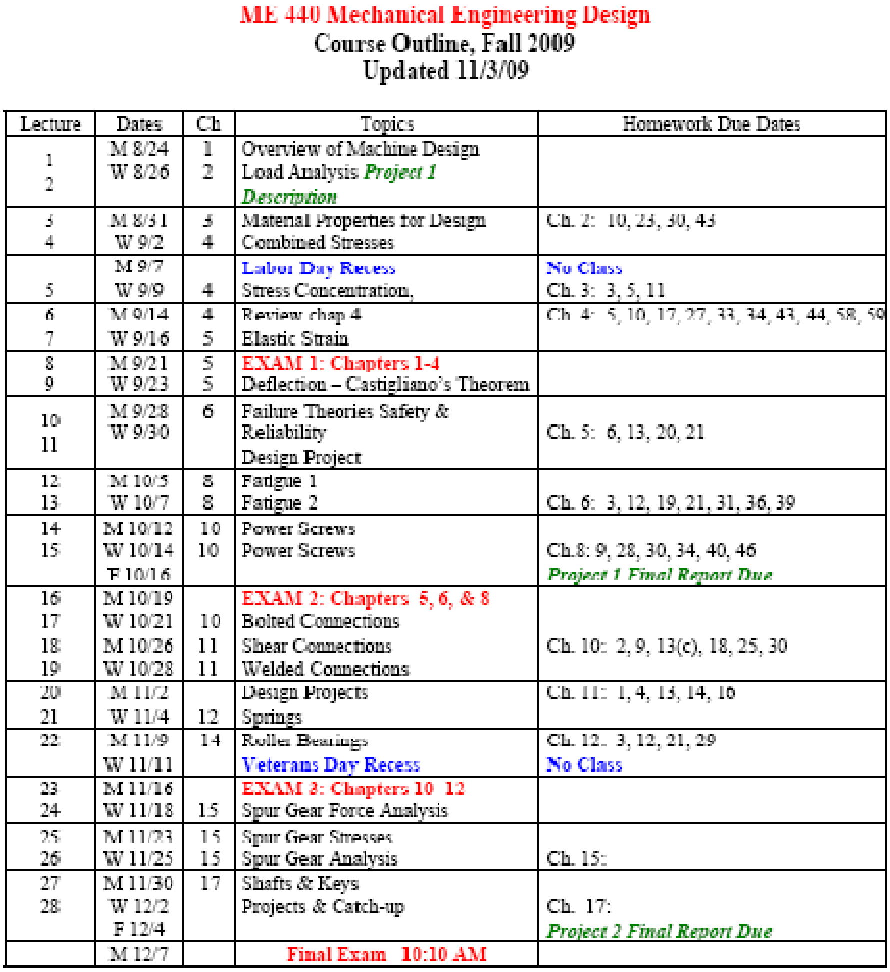
3.0 Strengths, of course and/or curriculum (please provide a list):

4.0 Performance Summary and Trends:

5.0 Actions for Performance Enhancement(s):

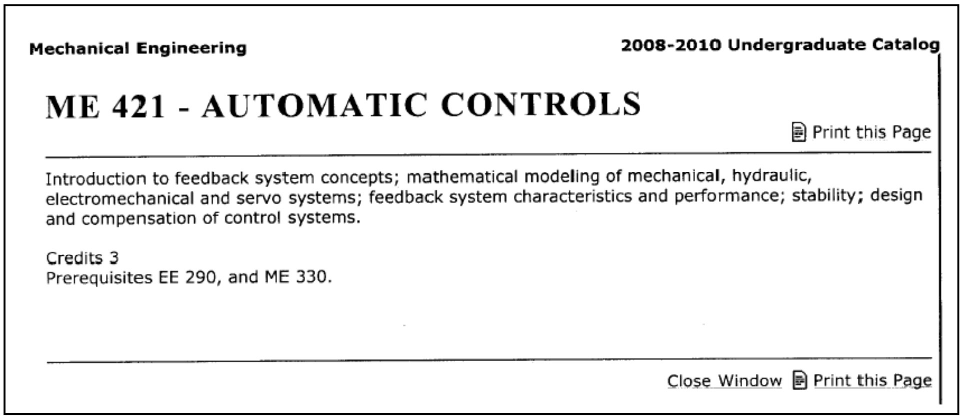
7.0 Other comments (not requited):

The followings are sample reports provided by the ME Advisory Board members for the evaluation of ME 440 (Mechanical Engineering Design), ME 421(Automatic Control), and ME 380 (Fluid Mechanics).



ME 440 Mechanical Engineering Design
Course Outline, Fall 2009
Updated 11/3/09

Lecture	Dates	Ch	Topics	Homework Due Dates
1 2	M 8/24 W 8/26	1 2	Overview of Machine Design Load Analysis *Project 1 Description*	
3 4	M 8/31 W 9/2	3 4	Material Properties for Design Combined Stresses	Ch. 2: 10, 23, 30, 43
 5	M 9/7 W 9/9	 4	**Labor Day Recess** Stress Concentration,	**No Class** Ch. 3: 3, 5, 11
6 7	M 9/14 W 9/16	4 5	Review chap 4 Elastic Strain	Ch 4: 5, 10, 17, 27, 33, 34, 43, 44, 58, 59
8 9	M 9/21 W 9/23	5 5	EXAM 1: Chapters 1-4 Deflection – Castigliano's Theorem	
10 11	M 9/28 W 9/30	6	Failure Theories Safety & Reliability Design Project	Ch. 5: 6, 13, 20, 21
12 13	M 10/5 W 10/7	8 8	Fatigue 1 Fatigue 2	Ch. 6: 3, 12, 19, 21, 31, 36, 39
14 15	M 10/12 W 10/14 F 10/16	10 10	Power Screws Power Screws	Ch.8: 9, 28, 30, 34, 40, 46 *Project 1 Final Report Due*
16 17 18 19	M 10/19 W 10/21 M 10/26 W 10/28	 10 11 11	EXAM 2: Chapters 5, 6, & 8 Bolted Connections Shear Connections Welded Connections	Ch. 10: 2, 9, 13(c), 18, 25, 30
20 21	M 11/2 W 11/4	 12	Design Projects Springs	Ch. 11: 1, 4, 13, 14, 16
22	M 11/9 W 11/11	14	Roller Bearings **Veterans Day Recess**	Ch. 12: 3, 12, 21, 29 **No Class**
23 24	M 11/16 W 11/18	 15	EXAM 3: Chapters 10 12 Spur Gear Force Analysis	
25 26	M 11/23 W 11/25	15 15	Spur Gear Stresses Spur Gear Analysis	Ch. 15:
27 28	M 11/30 W 12/2 F 12/4	17	Shafts & Keys Projects & Catch-up	Ch. 17: *Project 2 Final Report Due*
	M 12/7		**Final Exam 10:10 AM**	



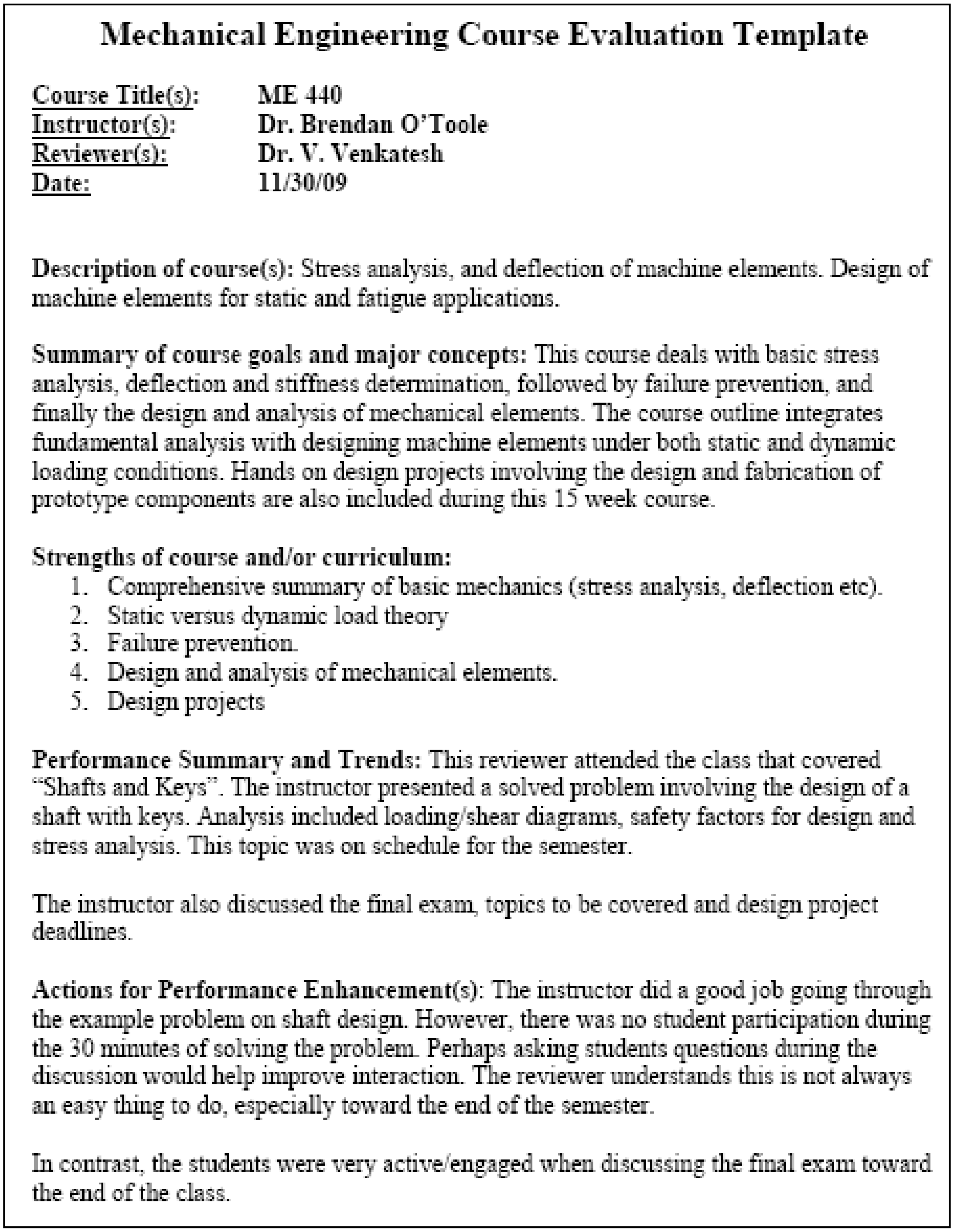
Mechanical Engineering **2008-2010 Undergraduate Catalog**

ME 421 - AUTOMATIC CONTROLS

Print this Page

Introduction to feedback system concepts; mathematical modeling of mechanical, hydraulic, electromechanical and servo systems; feedback system characteristics and performance; stability; design and compensation of control systems.

Credits 3
Prerequisites EE 290, and ME 330.



Mechanical Engineering Course Evaluation Template

Course Title(s): **ME 440**
Instructor(s): **Dr. Brendan O'Toole**
Reviewer(s): **Dr. V. Venkatesh**
Date: **11/30/09**

Description of course(s): Stress analysis, and deflection of machine elements. Design of machine elements for static and fatigue applications.

Summary of course goals and major concepts: This course deals with basic stress analysis, deflection and stiffness determination, followed by failure prevention, and finally the design and analysis of mechanical elements. The course outline integrates fundamental analysis with designing machine elements under both static and dynamic loading conditions. Hands on design projects involving the design and fabrication of prototype components are also included during this 15 week course.

Strengths of course and/or curriculum:

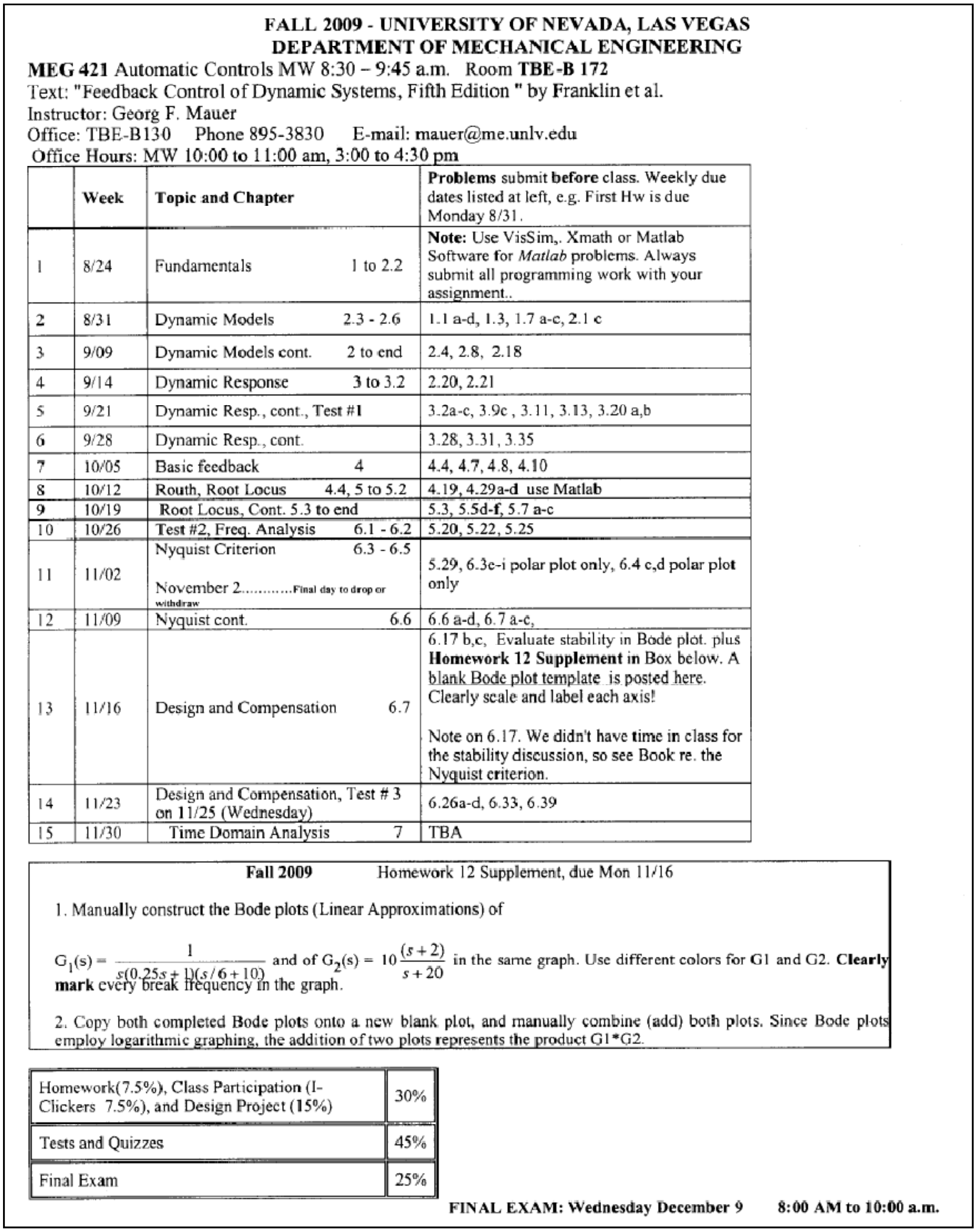
1. Comprehensive summary of basic mechanics (stress analysis, deflection etc).
2. Static versus dynamic load theory
3. Failure prevention.
4. Design and analysis of mechanical elements.
5. Design projects

Performance Summary and Trends: This reviewer attended the class that covered "Shafts and Keys". The instructor presented a solved problem involving the design of a shaft with keys. Analysis included loading/shear diagrams, safety factors for design and stress analysis. This topic was on schedule for the semester.

The instructor also discussed the final exam, topics to be covered and design project deadlines.

Actions for Performance Enhancement(s): The instructor did a good job going through the example problem on shaft design. However, there was no student participation during the 30 minutes of solving the problem. Perhaps asking students questions during the discussion would help improve interaction. The reviewer understands this is not always an easy thing to do, especially toward the end of the semester.

In contrast, the students were very active/engaged when discussing the final exam toward the end of the class.



FALL 2009 - UNIVERSITY OF NEVADA, LAS VEGAS
DEPARTMENT OF MECHANICAL ENGINEERING

MEG 421 Automatic Controls MW 8:30 – 9:45 a.m. Room **TBE-B 172**
Text: "Feedback Control of Dynamic Systems, Fifth Edition " by Franklin et al.
Instructor: Georg F. Mauer
Office: TBE-B130 Phone 895-3830 E-mail: mauer@me.unlv.edu
Office Hours: MW 10:00 to 11:00 am, 3:00 to 4:30 pm

	Week	**Topic and Chapter**	**Problems** submit **before** class. Weekly due dates listed at left, e.g. First Hw is due Monday 8/31.
1	8/24	Fundamentals 1 to 2.2	**Note:** Use VisSim,. Xmath or Matlab Software for *Matlab* problems. Always submit all programming work with your assignment..
2	8/31	Dynamic Models 2.3 - 2.6	1.1 a-d, 1.3, 1.7 a-c, 2.1 c
3	9/09	Dynamic Models cont. 2 to end	2.4, 2.8, 2.18
4	9/14	Dynamic Response 3 to 3.2	2.20, 2.21
5	9/21	Dynamic Resp., cont., Test #1	3.2a-c, 3.9c , 3.11, 3.13, 3.20 a,b
6	9/28	Dynamic Resp., cont.	3.28, 3.31, 3.35
7	10/05	Basic feedback 4	4.4, 4.7, 4.8, 4.10
8	10/12	Routh, Root Locus 4.4, 5 to 5.2	4.19, 4.29a-d use Matlab
9	10/19	Root Locus, Cont. 5.3 to end	5.3, 5.5d-f, 5.7 a-c
10	10/26	Test #2, Freq. Analysis 6.1 - 6.2	5.20, 5.22, 5.25
11	11/02	Nyquist Criterion 6.3 - 6.5 November 2...........Final day to drop or withdraw	5.29, 6.3e-i polar plot only, 6.4 c,d polar plot only
12	11/09	Nyquist cont. 6.6	6.6 a-d, 6.7 a-c,
13	11/16	Design and Compensation 6.7	6.17 b,c, Evaluate stability in Bode plot. plus **Homework 12 Supplement** in Box below. A blank Bode plot template is posted here. Clearly scale and label each axis! Note on 6.17. We didn't have time in class for the stability discussion, so see Book re. the Nyquist criterion.
14	11/23	Design and Compensation, Test # 3 on 11/25 (Wednesday)	6.26a-d, 6.33, 6.39
15	11/30	Time Domain Analysis 7	TBA

Fall 2009 Homework 12 Supplement, due Mon 11/16

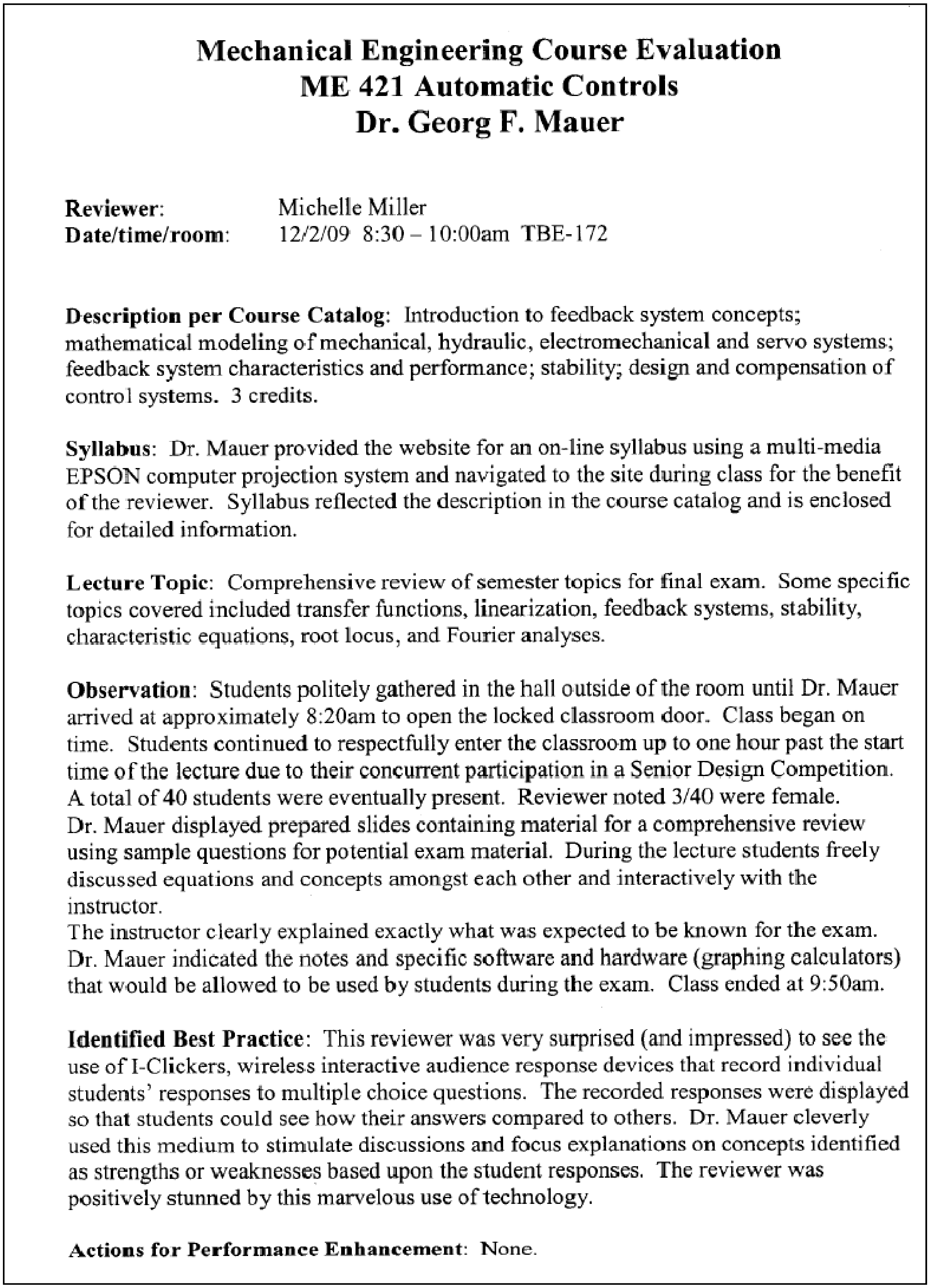
1. Manually construct the Bode plots (Linear Approximations) of

$G_1(s) = \frac{1}{s(0.25s+1)(s/6+10)}$ and of $G_2(s) = 10\frac{(s+2)}{s+20}$ in the same graph. Use different colors for G1 and G2. **Clearly mark** every break frequency in the graph.

2. Copy both completed Bode plots onto a new blank plot, and manually combine (add) both plots. Since Bode plots employ logarithmic graphing, the addition of two plots represents the product G1*G2.

Homework(7.5%), Class Participation (I-Clickers 7.5%), and Design Project (15%)	30%
Tests and Quizzes	45%
Final Exam	25%

FINAL EXAM: Wednesday December 9 8:00 AM to 10:00 a.m.



Mechanical Engineering Course Evaluation
ME 421 Automatic Controls
Dr. Georg F. Mauer

Reviewer: Michelle Miller
Date/time/room: 12/2/09 8:30 – 10:00am TBE-172

Description per Course Catalog: Introduction to feedback system concepts; mathematical modeling of mechanical, hydraulic, electromechanical and servo systems; feedback system characteristics and performance; stability; design and compensation of control systems. 3 credits.

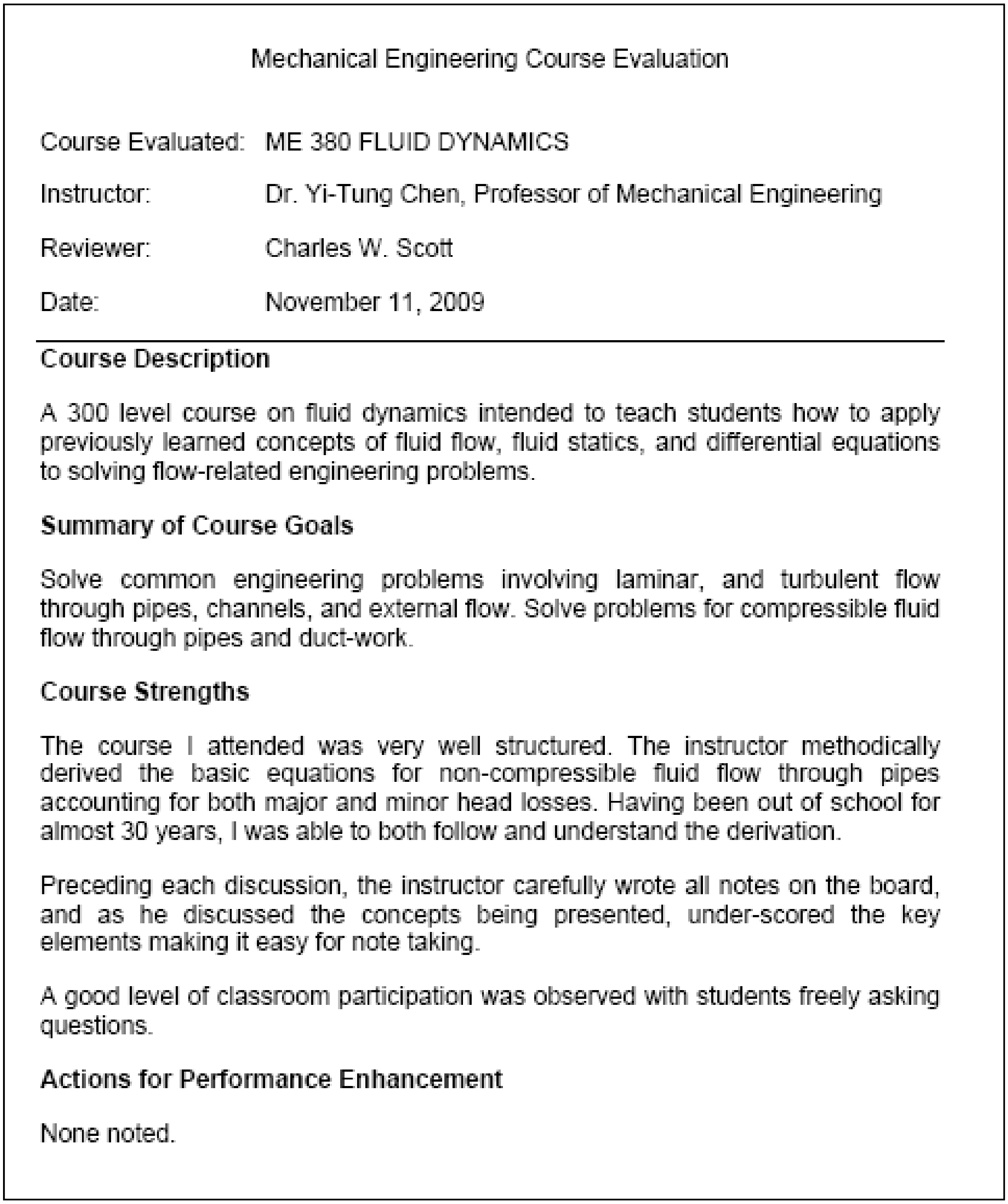
Syllabus: Dr. Mauer provided the website for an on-line syllabus using a multi-media EPSON computer projection system and navigated to the site during class for the benefit of the reviewer. Syllabus reflected the description in the course catalog and is enclosed for detailed information.

Lecture Topic: Comprehensive review of semester topics for final exam. Some specific topics covered included transfer functions, linearization, feedback systems, stability, characteristic equations, root locus, and Fourier analyses.

Observation: Students politely gathered in the hall outside of the room until Dr. Mauer arrived at approximately 8:20am to open the locked classroom door. Class began on time. Students continued to respectfully enter the classroom up to one hour past the start time of the lecture due to their concurrent participation in a Senior Design Competition. A total of 40 students were eventually present. Reviewer noted 3/40 were female.
Dr. Mauer displayed prepared slides containing material for a comprehensive review using sample questions for potential exam material. During the lecture students freely discussed equations and concepts amongst each other and interactively with the instructor.
The instructor clearly explained exactly what was expected to be known for the exam. Dr. Mauer indicated the notes and specific software and hardware (graphing calculators) that would be allowed to be used by students during the exam. Class ended at 9:50am.

Identified Best Practice: This reviewer was very surprised (and impressed) to see the use of I-Clickers, wireless interactive audience response devices that record individual students' responses to multiple choice questions. The recorded responses were displayed so that students could see how their answers compared to others. Dr. Mauer cleverly used this medium to stimulate discussions and focus explanations on concepts identified as strengths or weaknesses based upon the student responses. The reviewer was positively stunned by this marvelous use of technology.

Actions for Performance Enhancement: None.



Mechanical Engineering Course Evaluation

Course Evaluated: ME 380 FLUID DYNAMICS

Instructor: Dr. Yi-Tung Chen, Professor of Mechanical Engineering

Reviewer: Charles W. Scott

Date: November 11, 2009

Course Description

A 300 level course on fluid dynamics intended to teach students how to apply previously learned concepts of fluid flow, fluid statics, and differential equations to solving flow-related engineering problems.

Summary of Course Goals

Solve common engineering problems involving laminar, and turbulent flow through pipes, channels, and external flow. Solve problems for compressible fluid flow through pipes and duct-work.

Course Strengths

The course I attended was very well structured. The instructor methodically derived the basic equations for non-compressible fluid flow through pipes accounting for both major and minor head losses. Having been out of school for almost 30 years, I was able to both follow and understand the derivation.

Preceding each discussion, the instructor carefully wrote all notes on the board, and as he discussed the concepts being presented, under-scored the key elements making it easy for note taking.

A good level of classroom participation was observed with students freely asking questions.

Actions for Performance Enhancement

None noted.

E.4 Laboratory Survey

The following is a sample Laboratory Survey done in Spring 2010. This survey is conducted in each semester after students finish two-third of semester to assess all undergraduate laboratory courses.

Dear Mechanical Engineering Student,

As part of our efforts to make your educational experiences a valuable one, please take few minutes to complete this lab survey. You don't need to supply your name. Please do state your approximate GPA. The main purpose of this survey is to find out how the lab courses are proceeding and, if necessary, identify areas that need improvement. We will try to implement reasonable changes as soon as we can. If you would like to discuss these or any of other issues with me, please stop by. Thanks for your time.

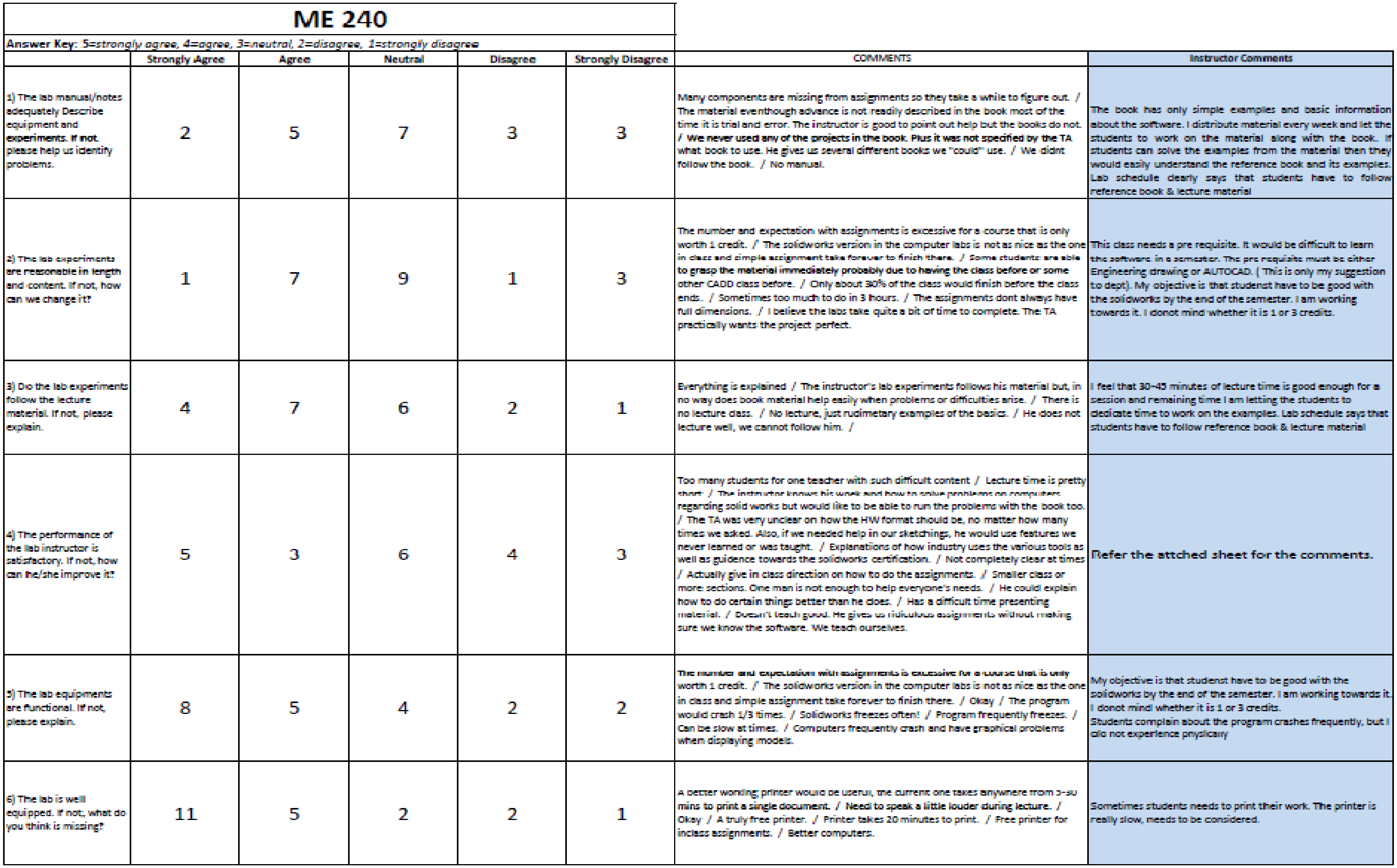
Woosoon Yim,
Professor and Chairman

Mechanical Engineering Lab Survey

Spring 2010

<table>
<tr><th colspan="9">Choose your Lab (please circle one)</th></tr>
<tr><td>ME 100L</td><td>ME 120</td><td>ME 130</td><td>ME 240</td><td>ME 302L</td><td>ME 315</td><td>ME 319L</td><td>ME 337L</td><td>ME 380L</td></tr>
<tr><td colspan="4">Approximate GPA (please circle one)</td><td>< 2.5</td><td>2.5-2.7</td><td>2.7-3.0</td><td>3.0-3.3</td><td>> 3.3</td></tr>
<tr><td colspan="4"></td><td><i>strongly agree</i></td><td><i>agree</i></td><td><i>neutral</i></td><td><i>disagree</i></td><td><i>strongly disagree</i></td></tr>
<tr><td colspan="4">1. The lab manual/notes adequately describe equipment and experiments. If not, please help us identify problems.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
<tr><td colspan="4">2. The lab experiments are reasonable in length and content. If not, how can we change it?</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
<tr><td colspan="4">3. The lab experiments follow the lecture material. If not, please explain.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
<tr><td colspan="4">4. The performance of the lab instructor is satisfactory. If not, how can he/she improve it?</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
<tr><td colspan="4">5. The lab equipments are functional. If not, please explain.</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
<tr><td colspan="4">6. The lab is well equipped. If not, what do you think is missing?</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td colspan="9">Comments:</td></tr>
</table>

Sample Lab Survey Results for Spring 2010 (Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)



ME 240

Answer Key: 5=*strongly agree,* 4=*agree,* 3=*neutral,* 2=*disagree,* 1=*strongly disagree*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	COMMENTS	Instructor Comments
1) The lab manual/notes adequately Describe equipment and experiments. If not. please help us identify problems.	2	5	7	3	3	Many components are missing from assignments so they take a while to figure out. / The material eventhough advance is not readily described in the book most of the time it is trial and error. The instructor is good to point out help but the books do not. / We never used any of the projects in the book. Plus it was not specified by the TA what book to use. He gives us several different books we "could" use. / We didnt follow the book. / No manual.	The book has only simple examples and basic information about the software. I distribute meterial every week and let the students to work on the material along with the book. If students can solve the examples from the material then they would easily understand the reference book and its examples. Lab schedule clearly says that students have to follow reference book & lecture material
2) The lab experiments are reasonable in length and content. If not, how can we change it?	1	7	9	1	3	The number and expectation with assignments is excessive for a course that is only worth 1 credit. / The solidworks version in the computer labs is not as nice as the one in class and simple assignment take forever to finish there. / Some students are able to grasp the material immediately probably due to having the class before or some other CADD class before. / Only about 30% of the class would finish before the class ends. / Sometimes too much to do in 3 hours. / The assignments dont always have full dimensions. / I believe the labs take quite a bit of time to complete. The TA practically wants the project perfect.	This class needs a pre requisite. It would be difficult to learn the software in a semester. The pre requisite must be either Engineering drawing or AUTOCAD. (This is only my suggestion to dept). My objective is that studenst have to be good with the solidworks by the end of the semester. I am working towards it. I donot mind whether it is 1 or 3 credits.
3) Did the lab experiments follow the lecture material. If not, please explain.	4	7	6	2	1	Everything is explained / The instructor's lab experiments follows his material but, in no way does book material help easily when problems or difficulties arise. / There is no lecture class. / No lecture, just rudimetary examples of the basics. / He does not lecture well, we cannot follow him. /	I feel that 30-45 minutes of lecture time is good enough for a session and remaining time I am letting the students to dedicate time to work on the examples. Lab schedule says that students have to follow reference book & lecture material
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	5	3	6	4	3	Too many students for one teacher with such difficult content / Lecture time is pretty short / The instructor knows his work and how to solve problems on computers regarding solid works but would like to be able to run the problems with the book too. / The TA was very unclear on how the HW format should be, no matter how many times we asked. Also, if we needed help in our sketchings, he would use features we never learned or was taught. / Explanations of how industry uses the various tools as well as guidence towards the solidworks certification. / Not completely clear at times / Actually give in class direction on how to do the assignments. / Smaller class or more sections. One man is not enough to help everyone's needs. / He could explain how to do certain things better than he does. / Has a difficult time presenting material. / Doesn't teach good. He gives us ridiculous assignments without making sure we know the software. We teach ourselves.	Refer the attched sheet for the comments.
5) The lab equipments are functional. If not, please explain.	8	5	4	2	2	The number and expectation with assignments is excessive for a course that is only worth 1 credit. / The solidworks version in the computer labs is not as nice as the one in class and simple assignment take forever to finish there. / Okay / The program would crash 1/3 times. / Solidworks freezes often! / Program frequently freezes. / Can be slow at times. / Computers frequently crash and have graphical problems when displaying models.	My objective is that studenst have to be good with the solidworks by the end of the semester. I am working towards it. I donot mind whether it is 1 or 3 credits. Students complain about the program crashes frequently, but I do not experience physically
6) The lab is well equipped. If not, what do you think is missing?	11	5	2	2	1	A better working printer would be useful, the current one takes anywhere from 5-30 mins to print a single document. / Need to speak a little louder during lecture. / Okay / A truly free printer. / Printer takes 20 minutes to print. / Free printer for inclass assignments. / Better computers.	Sometimes students needs to print their work. The printer is really slow, needs to be considered.

302L 001

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	COMMENTS	Instructor Comments
1) The lab manual/notes adequately Describe equipment and experiments. If not, please help us identify problems.	5	10	0	1	0	The lab manual is given online; differs slightly from the class. / The directions don't always match the lab manual.	We update the lab manual every semester to address differences and problems that occur each semester.
2) The lab experiments are reasonable in length and content. If not, how can we change it?	7	9	0	0	0		
3) Do the lab experiments follow the lecture material. If not, please explain.	5	10	1	0	0	Class tends to be purely theoretical.	We don't have enough equipment for every student to run an experiment; so they sometimes only get to listen to the description of experiments and then watch the experiment being run.
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	7	8	1	0	0		
5) The lab equipments are functional. If not, please explain.	8	7	1	0	0		
6) The lab is well equipped. If not, what do you think is missing?	7	8	1	0	0		

302L 002

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	COMMENTS	Instructor Comments
1) The lab manual/notes adequately Describe equipment and experiments	2	6	1	1	0	Somewhat vague. / There's no details on some of the labs, for example the torsion lab was a little confusing in the manual.	There were some problems with the force sensor this semester because it is not very repeatable.
2) The lab experiments are reasonable in length and content. If not, how can we change it?	3	3	3	1	0	Experiments are reasonable in length but discussions may sometimes be lengthy. / We don't conduct any experiments we just watch.	There needs to be some discussion of the experiments so the studentss fully understand the procedures and data analysis. We don't have enough equipment for every student to run an experiment.
3) Do the lab experiments follow the lecture material. If not, please explain.	4	4	2	0	0		
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	1	4	5	0	0	May benefit from being more thorough with explanations. / Not lecture as long before lab is conducted. It's hard to pay attention for 2 hours straight. / Hard to understand sometimes; language barrier. / Quiz questions are bad. / He's not the best person to answer questions as asked, he sometimes thinks we're asking something differently and doesn't address the question.	The instructor is aware that there is a languauge barrier but he continuously asks if the students understand and makes an effort to try and be clear. The quiz questions are based on the lab lecture and the on-line manual, and the course textbook.
5) The lab equipments are functional. If not, please explain.	4	2	2	2	0	Most of the equipement is janky. Like the torsion machine.	We make an effort to maintain, repair and upgrade the equipment as much as possible.
6) The lab is well equipped. If not, what do you think is missing?	2	4	3	1	0	We ran out of strain gages when each of us needed to apply one. It was not cool.	This is the first time in several years that we did not have strain gaged specimens completely ready. There were 8 strain gaged specimens ready at the beginning of the class. An additional 8 were ready by the end of the class. This caused a 10-15 minute wait but the class still finished 15-20 minutes early.

319L 01

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	COMMENTS	Instructor Comments
1) The lab manual/notes adequately Describe equipment and experiments. If not, please help us identify problems.	9	13	3	1	0	This is good for MATLAB. However it does not seem to give much aid for other programming languages. / There is no lab manual. / There weren't really any notes except for in class examples, powerpoint and the textbook. I am fine with this.	Our primary programming language is MATLAB, and the course is not responsible for teaching C++ for example./ I teach the book assigned by the department, which besides other sources should be enough.\ I think in class examples beside powerpoint slides and the book are adequate material.
2) The lab experiments are reasonable in length and content.	10	12	4	0	0	One lab had us do unecessary busy work exporting/importing data to excel for 19 problems. This took 6 hours. / We usually get out early. I don't like that it is all on Friday though. / Some were long but some were short so happy medium.	
3) Do the lab experiments follow the lecture material. If not, please explain.	16	8	1	1	0	They are one after another so we get intro then we get to apply in the lab.	I usually start the day with a powerpoint that simplifies the book material, I also include some commands and applications to clarify the goal of the lecture.
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	12	7	3	3	2	Tests do not reflect assignments. Level of expected knowledge is more than some students possess. / Tests are unclear. / The lab instructor needs to be more encouraging. He has a pretty cold personality. / The quizzes and tests are focused too harshly on things not fully explained. / He could cover some issues seen on tests in the HW, lab time. 1 or 2 problems on test were not covered in practices. / Very well prepared. / He explains well however sometimes he forgets to send out the homework which can be annoying. / He gave out huge homework assignment by email a dy or two before due date instead of beginning of week because he forgot!! / Instructor is not helpful and seems to be indifferent to student's problems. Instructor never encouraged me to do better in the course.	The midterm was a sample of the problems we covered in the lab./ The language of the test can't be easier. / I closely monitor everyone's performance during the lab, and I always encourage them to ask if they need help./ The email issue happened once and it seems the negative things never go easily. / The only way to master MATLAB is to practice, also I encourage them to start using MATLAB for their other HW as well. / I am always available to listen for their problems, but they should raise it first.
5) The lab equipments are functional.	18	8	0	0	0		
6) The lab is well equipped. If not, what do you think is missing?	20	6	0	0	0	To the contrary he made me develop s negative attitude towards the course.	

337L 01

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

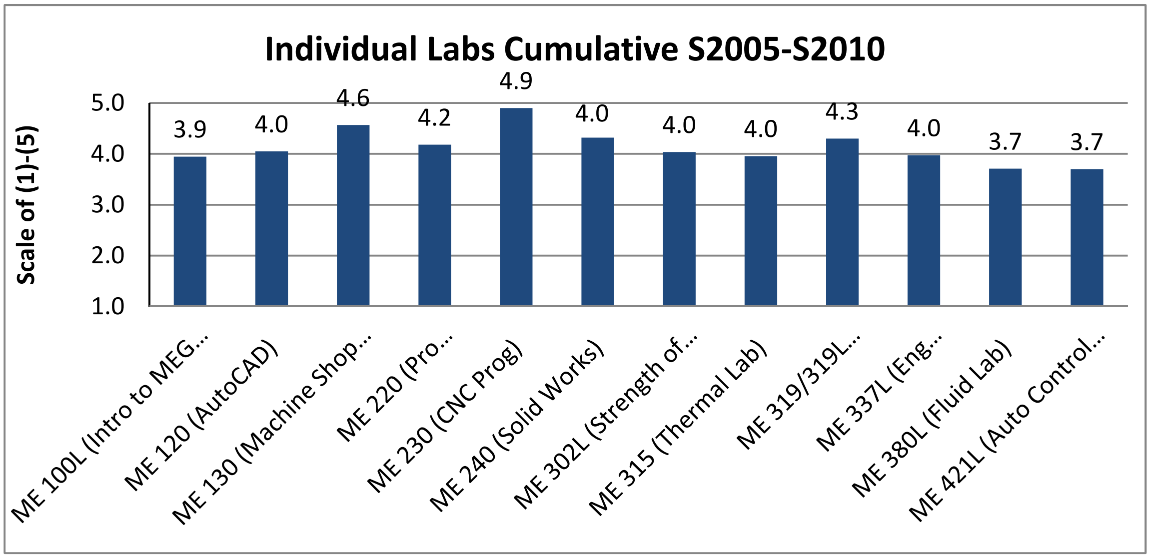
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	COMMENTS	Instructor Comments
1) The lab manual/notes adequately Describe equipment and experiments	5	6	3	2	0	Certain procedures are vague. / Some labs should contain more background information, or perhaps references. / Unclear on what needs to be done. / They did at the start of the semester but as the labs went on the explanation decreased. / There is way too much gray area the manual needs more pictures.	
2) The lab experiments are reasonable in length and content.	3	9	1	3	0	The labs are short enough that they could be combined; thus reducing number of meetings or increasing material covered is an option. / Too much content, not enough time to understand everything. / Most of the time spent trying to find out what to do. / The labs can be extended or time can be shortened, we always finish early. / A bit lengthy.	
3) Do the lab experiments follow the lecture material. If not, please explain.	2	7	5	2	0	Teacher's new and we do not learn much; but that is another survey.	
4) The performance of the lab instructor is satisfactory.	6	9	1	0	0	He's good but lab is too large, he has to help too many people. / I wish there was more group instruction instead of writing for a little question and answer period.	
5) The lab equipments are functional. If not, please explain.	9	6	1	0	0	Most of the time.	
6) The lab is well equipped. If not, what do you think is missing?	11	3	2	0	0	Keg!. / I don't believe anything is missing, other than equipement for every student. / Has every thing we need.	

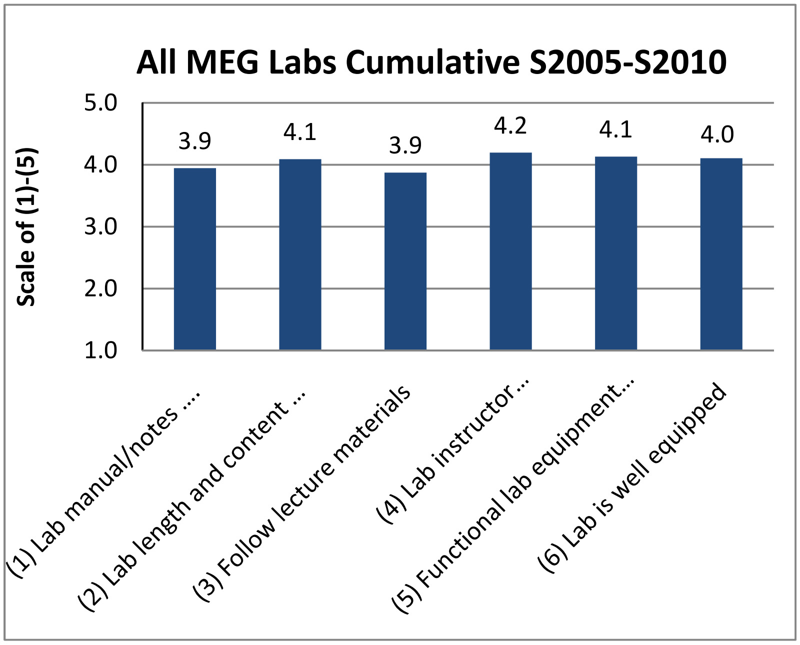
337L-002

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

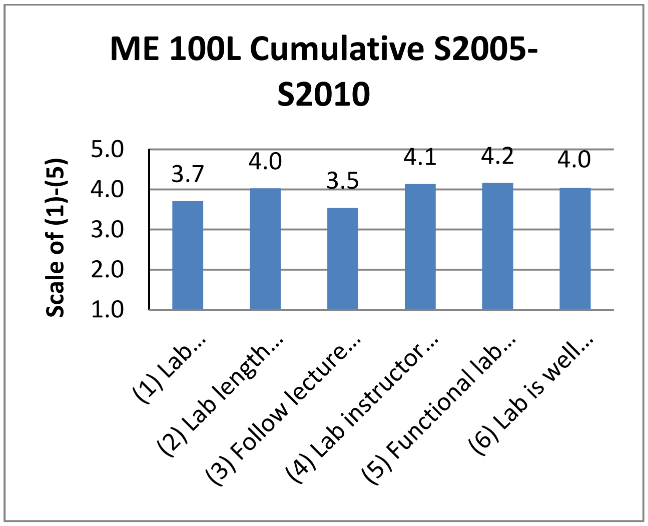
	Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	COMMENTS	**Instructor Comments**
1) The lab manual/notes adequately Describe equipment and experiments.	5	9	0	0	0	They have some mistakes. / Most labs are well described, some are lacking.	
2) The lab experiments are reasonable in length and content.	4	7	2	1	0	Lab #2 is too long. / Labs are too long. / Labs sometimes go too long. / Seems a little bit tedious at times. Easy to lose interest. / Most length and content did not fit in any given time (too much in too little time).	
3) Do the lab experiments follow the lecture material. If not, please explain.	2	4	3	3	2	It takes a while for the class to catch up. / First couple of labs were only about programming, which wasn't discussed in class. / Lecture is very different from lab. / Somewhat. / Lab lectures were not covered in class; thus we were basically learning new material before initiating labs. / Not really related.	The course is designed such that LabVIEW programming is not covered in the lecture
4) The performance of the lab instructor is satisfactory.	9	4	1	0	0	Ahmad is exceptional. / He is thorough. / Always helpful.	
5) The lab equipments are functional. If not, please explain.	5	8	1	0	0	Computer station #3 is faulty. / Computers get a little slow sometimes. / On our second lab, one of the connector inserts broke. / Lab equipment were all functional. But please fix router!!! There was never functional wireless internet that was accessible.	
6) The lab is well equipped. If not, what do you think is missing?	8	5	0	1	0	Need faster computers. / Maybe cushioned chairs? / More time needed, materials needed to cover prior lab so lab can be done more efficiently.	

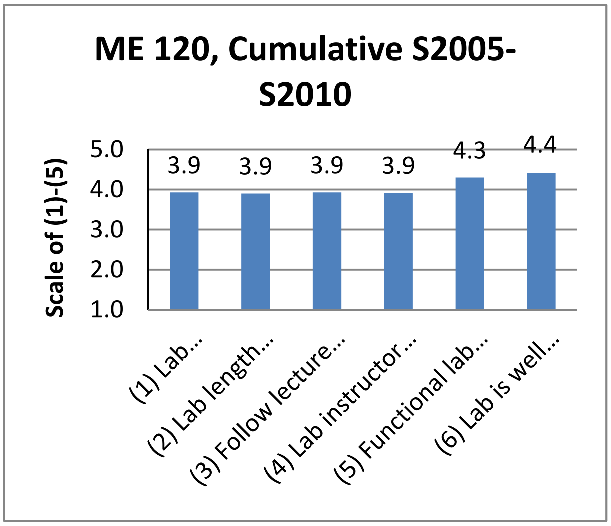
Cumulative Averaged Data for ME Laboratories from Spring 2005 to Fall 2010

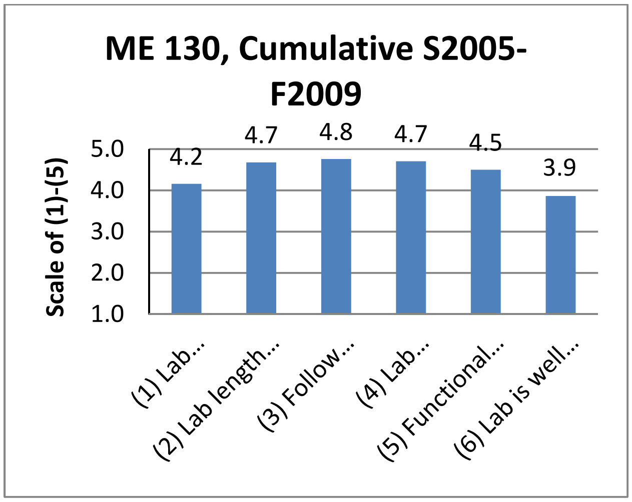


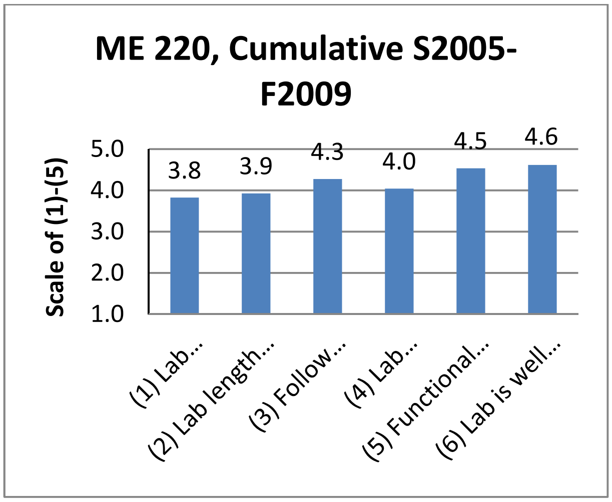


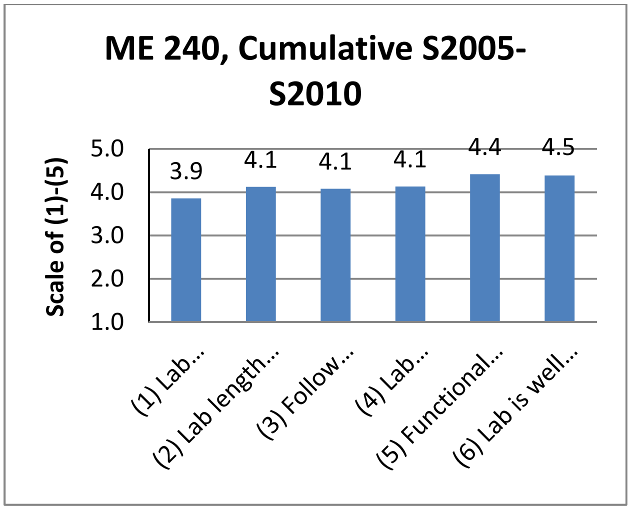
Cumulative Results for ME Laboratories from Spring 2005 to Fall 2009

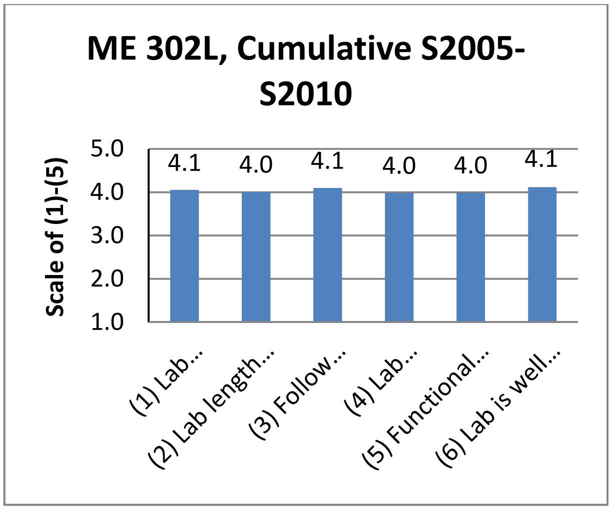


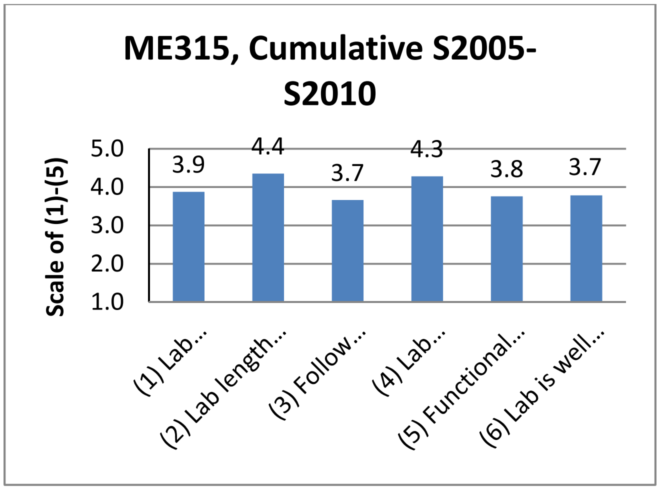











ME315, Cumulative S2005-S2010
Scale of (1)-(5)
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2.0
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4.4
3.7
4.3
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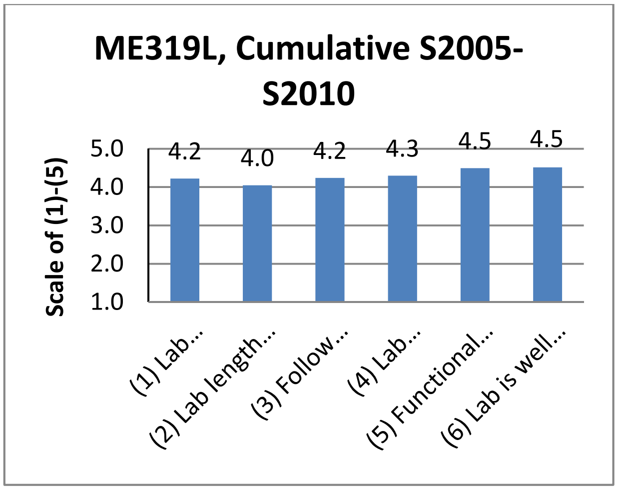
3.7
(1) Lab...
(2) Lab length...
(3) Follow...
(4) Lab...
(5) Functional...
(6) Lab is well...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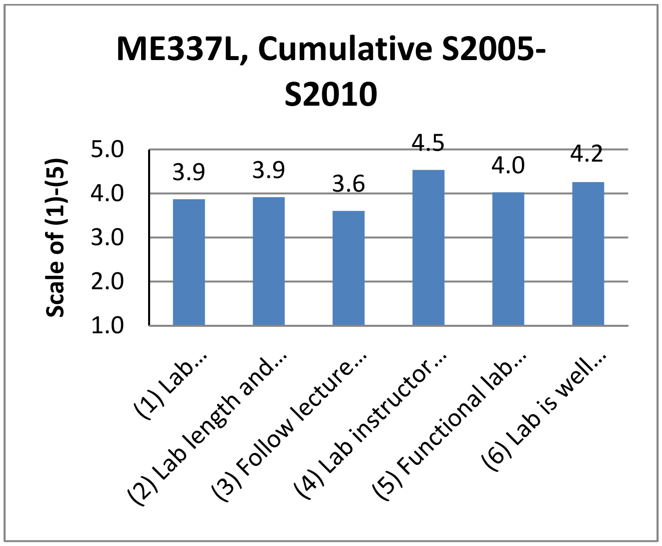
4.5
4.5
(1) Lab...
(2) Lab length...
(3) Follow...
(4) Lab...
(5) Functional...
(6) Lab is well...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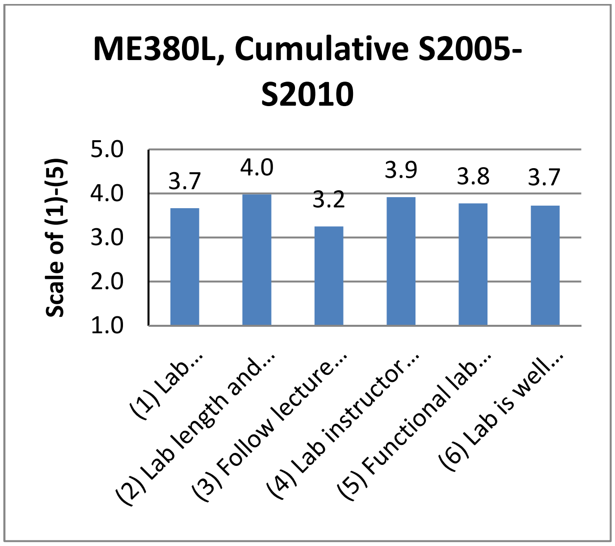
3.9
3.6
4.5
4.0
4.2
(1) Lab...
(2) Lab length and...
(3) Follow lecture...
(4) Lab instructor...
(5) Functional lab...
(6) Lab is well...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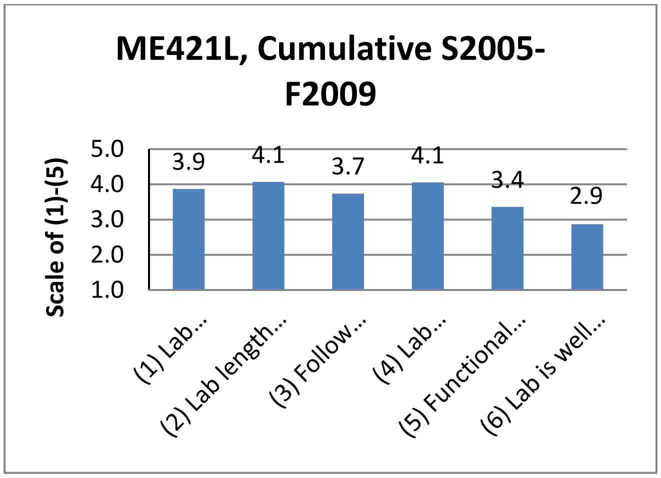
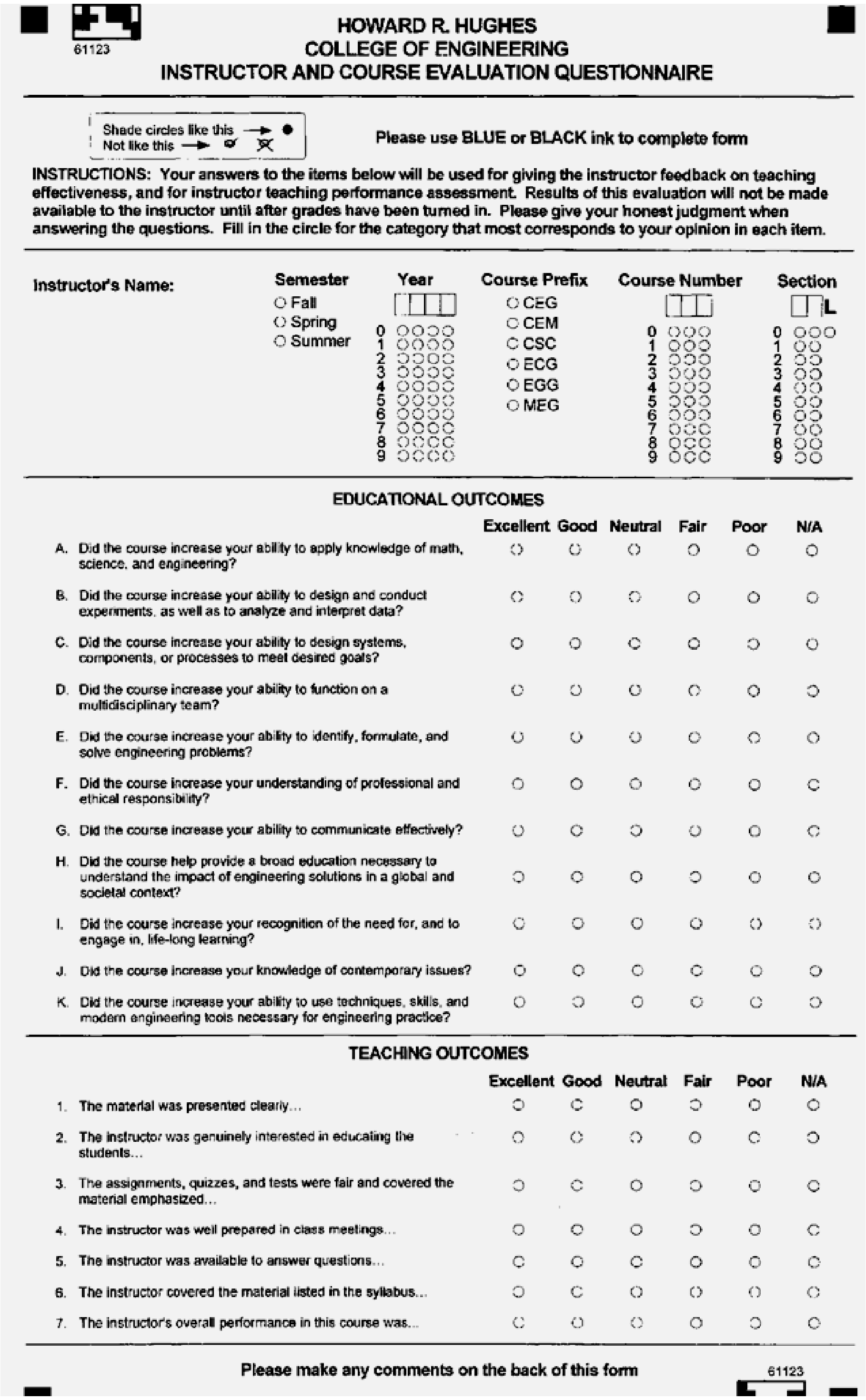
4.0
3.2
3.9
3.8
3.7
(1) Lab...
(2) Lab length and...
(3) Follow lecture...
(4) Lab instructor...
(5) Functional lab...
(6) Lab is well...


ME421L, Cumulative S2005-F2009
Scale of (1)-(5)
5.0
4.0
3.0
2.0
1.0
3.9
4.1
3.7
4.1
3.4
2.9
(1) Lab...
(2) Lab length...
(3) Follow...
(4) Lab...
(5) Functional...
(6) Lab is well...

E.5 Instructor Evaluation

The following is the form used by the College of Engineering to assess both teaching and (a)-(k) educational outcomes: **(Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)**

APPENDIX E.5 INSTRUCTOR EVALUATION



61123

HOWARD R. HUGHES
COLLEGE OF ENGINEERING
INSTRUCTOR AND COURSE EVALUATION QUESTIONNAIRE

Shade circles like this → ●
Not like this → ✓ ✗

Please use BLUE or BLACK ink to complete form

INSTRUCTIONS: Your answers to the items below will be used for giving the instructor feedback on teaching effectiveness, and for instructor teaching performance assessment. Results of this evaluation will not be made available to the instructor until after grades have been turned in. Please give your honest judgment when answering the questions. Fill in the circle for the category that most corresponds to your opinion in each item.

Instructor's Name:

Semester
○ Fall
○ Spring
○ Summer

Course Prefix
○ CEG
○ CEM
○ CSC
○ ECG
○ EGG
○ MEG

	Year	Course Number	Section
	☐☐☐☐	☐☐☐	☐☐ L
0	○○○○	○○○	○○○
1	○○○○	○○○	○○
2	○○○○	○○○	○○
3	○○○○	○○○	○○
4	○○○○	○○○	○○
5	○○○○	○○○	○○
6	○○○○	○○○	○○
7	○○○○	○○○	○○
8	○○○○	○○○	○○
9	○○○○	○○○	○○

EDUCATIONAL OUTCOMES

	Excellent	Good	Neutral	Fair	Poor	N/A
A. Did the course increase your ability to apply knowledge of math, science, and engineering?	○	○	○	○	○	○
B. Did the course increase your ability to design and conduct experiments, as well as to analyze and interpret data?	○	○	○	○	○	○
C. Did the course increase your ability to design systems, components, or processes to meet desired goals?	○	○	○	○	○	○
D. Did the course increase your ability to function on a multidisciplinary team?	○	○	○	○	○	○
E. Did the course increase your ability to identify, formulate, and solve engineering problems?	○	○	○	○	○	○
F. Did the course increase your understanding of professional and ethical responsibility?	○	○	○	○	○	○
G. Did the course increase your ability to communicate effectively?	○	○	○	○	○	○
H. Did the course help provide a broad education necessary to understand the impact of engineering solutions in a global and societal context?	○	○	○	○	○	○
I. Did the course increase your recognition of the need for, and to engage in, life-long learning?	○	○	○	○	○	○
J. Did the course increase your knowledge of contemporary issues?	○	○	○	○	○	○
K. Did the course increase your ability to use techniques, skills, and modern engineering tools necessary for engineering practice?	○	○	○	○	○	○

TEACHING OUTCOMES

	Excellent	Good	Neutral	Fair	Poor	N/A
1. The material was presented clearly...	○	○	○	○	○	○
2. The instructor was genuinely interested in educating the students...	○	○	○	○	○	○
3. The assignments, quizzes, and tests were fair and covered the material emphasized...	○	○	○	○	○	○
4. The instructor was well prepared in class meetings...	○	○	○	○	○	○
5. The instructor was available to answer questions...	○	○	○	○	○	○
6. The instructor covered the material listed in the syllabus...	○	○	○	○	○	○
7. The instructor's overall performance in this course was...	○	○	○	○	○	○

Please make any comments on the back of this form

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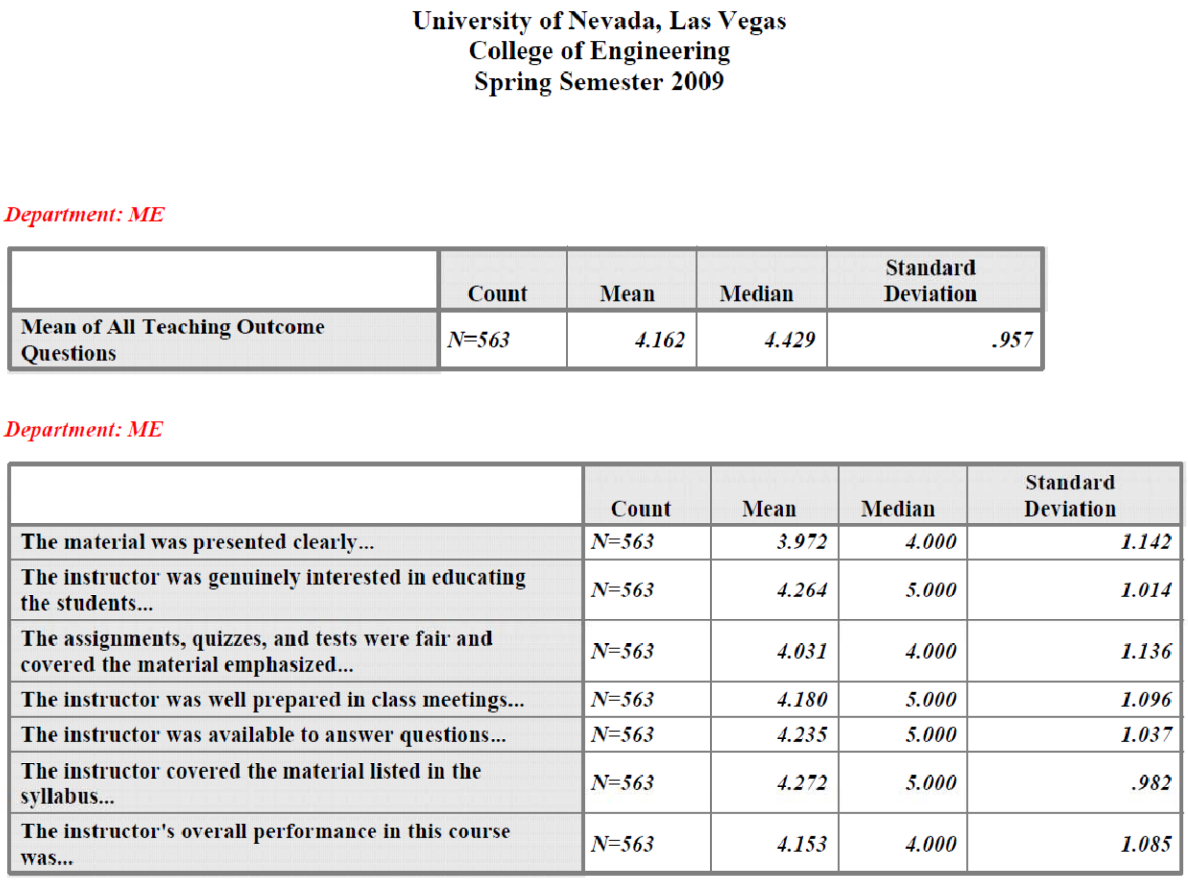
The following shows the mean of all teaching outcomes for the end-of-semester evaluation in Spring 2009. Data for other semesters is available in the department website.



University of Nevada, Las Vegas
College of Engineering
Spring Semester 2009

Department: ME

	Count	Mean	Median	Standard Deviation
Mean of All Teaching Outcome Questions	*N=563*	*4.162*	*4.429*	*.957*

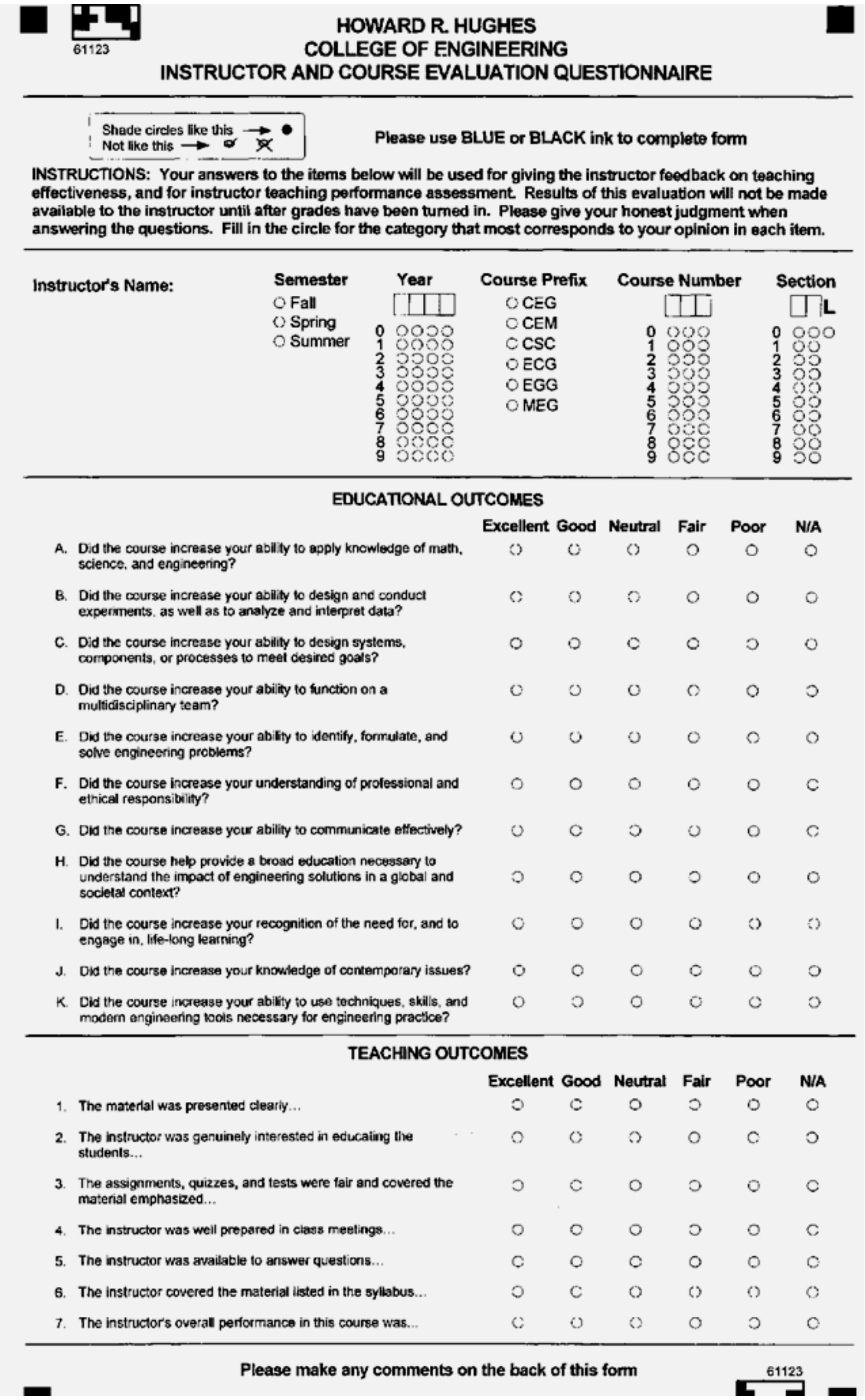
Department: ME

	Count	Mean	Median	Standard Deviation
The material was presented clearly...	*N=563*	*3.972*	*4.000*	*1.142*
The instructor was genuinely interested in educating the students...	*N=563*	*4.264*	*5.000*	*1.014*
The assignments, quizzes, and tests were fair and covered the material emphasized...	*N=563*	*4.031*	*4.000*	*1.136*
The instructor was well prepared in class meetings...	*N=563*	*4.180*	*5.000*	*1.096*
The instructor was available to answer questions...	*N=563*	*4.235*	*5.000*	*1.037*
The instructor covered the material listed in the syllabus...	*N=563*	*4.272*	*5.000*	*.982*
The instructor's overall performance in this course was...	*N=563*	*4.153*	*4.000*	*1.085*

Summary statistics are based on a five-point Likert scale, from Excellent (5) to Poor (1).

E.6 Evaluation of (a)-(k) ABET Educational Outcomes by Students

The following is the form used by the College of Engineering to assess both teaching and (a)-(k) educational outcomes: **(Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)**



61123

HOWARD R. HUGHES
COLLEGE OF ENGINEERING
INSTRUCTOR AND COURSE EVALUATION QUESTIONNAIRE

Shade circles like this → ●
Not like this → ✓ ☒

Please use BLUE or BLACK ink to complete form

INSTRUCTIONS: Your answers to the items below will be used for giving the instructor feedback on teaching effectiveness, and for instructor teaching performance assessment. Results of this evaluation will not be made available to the instructor until after grades have been turned in. Please give your honest judgment when answering the questions. Fill in the circle for the category that most corresponds to your opinion in each item.

Instructor's Name:

Semester
○ Fall
○ Spring
○ Summer

Year
0 ○○○○
1 ○○○○
2 ○○○○
3 ○○○○
4 ○○○○
5 ○○○○
6 ○○○○
7 ○○○○
8 ○○○○
9 ○○○○

Course Prefix
○ CEG
○ CEM
○ CSC
○ ECG
○ EGG
○ MEG

Course Number
0 ○○○
1 ○○○
2 ○○○
3 ○○○
4 ○○○
5 ○○○
6 ○○○
7 ○○○
8 ○○○
9 ○○○

Section
L
0 ○○○
1 ○○
2 ○○
3 ○○
4 ○○
5 ○○
6 ○○
7 ○○
8 ○○
9 ○○

EDUCATIONAL OUTCOMES

	Excellent	Good	Neutral	Fair	Poor	N/A
A. Did the course increase your ability to apply knowledge of math, science, and engineering?	○	○	○	○	○	○
B. Did the course increase your ability to design and conduct experiments, as well as to analyze and interpret data?	○	○	○	○	○	○
C. Did the course increase your ability to design systems, components, or processes to meet desired goals?	○	○	○	○	○	○
D. Did the course increase your ability to function on a multidisciplinary team?	○	○	○	○	○	○
E. Did the course increase your ability to identify, formulate, and solve engineering problems?	○	○	○	○	○	○
F. Did the course increase your understanding of professional and ethical responsibility?	○	○	○	○	○	○
G. Did the course increase your ability to communicate effectively?	○	○	○	○	○	○
H. Did the course help provide a broad education necessary to understand the impact of engineering solutions in a global and societal context?	○	○	○	○	○	○
I. Did the course increase your recognition of the need for, and to engage in, life-long learning?	○	○	○	○	○	○
J. Did the course increase your knowledge of contemporary issues?	○	○	○	○	○	○
K. Did the course increase your ability to use techniques, skills, and modern engineering tools necessary for engineering practice?	○	○	○	○	○	○

TEACHING OUTCOMES

	Excellent	Good	Neutral	Fair	Poor	N/A
1. The material was presented clearly...	○	○	○	○	○	○
2. The instructor was genuinely interested in educating the students...	○	○	○	○	○	○
3. The assignments, quizzes, and tests were fair and covered the material emphasized...	○	○	○	○	○	○
4. The instructor was well prepared in class meetings...	○	○	○	○	○	○
5. The instructor was available to answer questions...	○	○	○	○	○	○
6. The instructor covered the material listed in the syllabus...	○	○	○	○	○	○
7. The instructor's overall performance in this course was...	○	○	○	○	○	○

Please make any comments on the back of this form

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APPENDIX E.6 EVALUATION OF (a)-(k) ABET EDUCATIONAL OUTCOMES BY STUDENTS

The following is a sample student assessment of (a)-(k) ABET Educational Outcomes conducted in Spring 2009. Data for other semesters is available in the department web site.

University of Nevada, Las Vegas
College of Engineering
Spring Semester 2009

Department: ME

	Count	Mean	Median	Standard Deviation
Mean of All Educational Outcome Questions	*N=563*	*3.838*	*4.000*	*.845*

Department: ME

	Count	Mean	Median	Standard Deviation
Did the course increase your ability to apply knowledge of math, science, and engineering?	*N=563*	*4.041*	*4.000*	*.979*
Did the course increase your ability to design and conduct experiments, as well as to analyze and interpret data?	*N=563*	*3.885*	*4.000*	*.976*
Did the course increase your ability to design systems, components, or processes to meet desired goals?	*N=563*	*3.885*	*4.000*	*1.028*
Did the course increase your ability to function on a multidisciplinary team?	*N=563*	*3.724*	*4.000*	*1.124*
Did the course increase your ability to identify, formulate, and solve engineering problems?	*N=563*	*3.996*	*4.000*	*1.033*
Did the course increase your understanding of professional and ethical responsibility?	*N=563*	*3.565*	*4.000*	*1.076*
Did the course increase your ability to communicate effectively?	*N=563*	*3.677*	*4.000*	*1.040*
Did the course help provide a broad education necessary to understand the impact of engineering solutions in a global and societal context?	*N=563*	*3.715*	*4.000*	*1.042*
Did the course increase your recognition of the need for, and to engage in, life-long learning?	*N=563*	*3.885*	*4.000*	*1.027*
Did the course increase your knowledge of contemporary issues?	*N=563*	*3.613*	*4.000*	*1.117*
Did the course increase your ability to use techniques, skills, and modern engineering tools necessary for engineering practice?	*N=563*	*4.038*	*4.000*	*.997*

Summary statistics are based on a five-point Likert scale, from Excellent (5) to Poor (1).

E.7 Evaluation of Course Objective (COA) Assessment by Students

The following table shows the total averages COA for all courses offered from Fall 2005 to Fall 2009. This total average values are obtained by using 1(Strongly disagree)-5(strongly agree) scale by counting the number of responses in each course objective, and each average obtained for each objective is averaged again for all objectives. The COA data with the number of responses in each course objective for all courses in each year can be viewed from our department web site. **(Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)**

Cumulative Results for Course Objective Assessment by Students (F05-F09)
5 (Strongly Agree)-1 (Strongly Disagree)

	Fall 05	Spring 06	Fall 06	Spring 07	Fall 07	Spring 08	Fall 08	Spring 09	Fall 09	5 Yr Avg.
ME 100*	3.9	3.7	4.0		4.1	4.0		3.8	2.5	**3.7**
ME 100L*	4.3	3.9	3.8	4.5	4.3	4.4	4.0	4.3	4.1	**4.2**
ME 120*	4.3	4.2	4.3	4.3	3.8	4.4		4.3	4.7	**4.3**
ME 130	4.8	5.0	3.8	4.7	5.0	4.3	5.0	4.9	5.0	**4.7**
ME 220*	4.5		4.3		4.3		4.4		4.7	**4.4**
ME 230								5.0		**5.0**
ME 240*				4.7		4.1		4.4		**4.4**
ME 242*			3.9	3.8	4.1	3.9	4.6		4.4	**4.1**
ME 301*	4.4		4.3		4.4		4.2	4.7		**4.4**
ME 302*	4.6	4.2	4.5		4.5	4.7	4.4	4.4	3.6	**4.4**
ME 302L*	4.5	4.7	4.5	4.6	4.5	4.6	4.2	4.7	4.4	**4.5**
ME 311*	4.2		4.0	4.2	3.9		4.0	3.8	4.2	**4.0**
ME 314*		4.3		4.4	4.5	4.2		4.5	4.5	**4.4**
ME 315*		4.0		4.1	4.3	4.4	4.6	4.5	4.5	**4.3**
ME 319*								4.5	4.5	**4.5**
ME 319L*								4.5	4.5	**4.5**
ME 320*		4.4		4.4		4.4		3.4		**4.2**
ME 330*		3.9		4.3		4.0		4.4		**4.2**
ME 337*	4.0		3.4		3.9		4.0	4.1		**3.9**
ME 337L*	4.5		3.7		3.8		4.0	4.2		**4.0**
ME 345						4.2				**4.2**
ME 380*	4.3	3.8	3.9	4.5	4.0	4.0	4.6	4.0	4.2	**4.1**

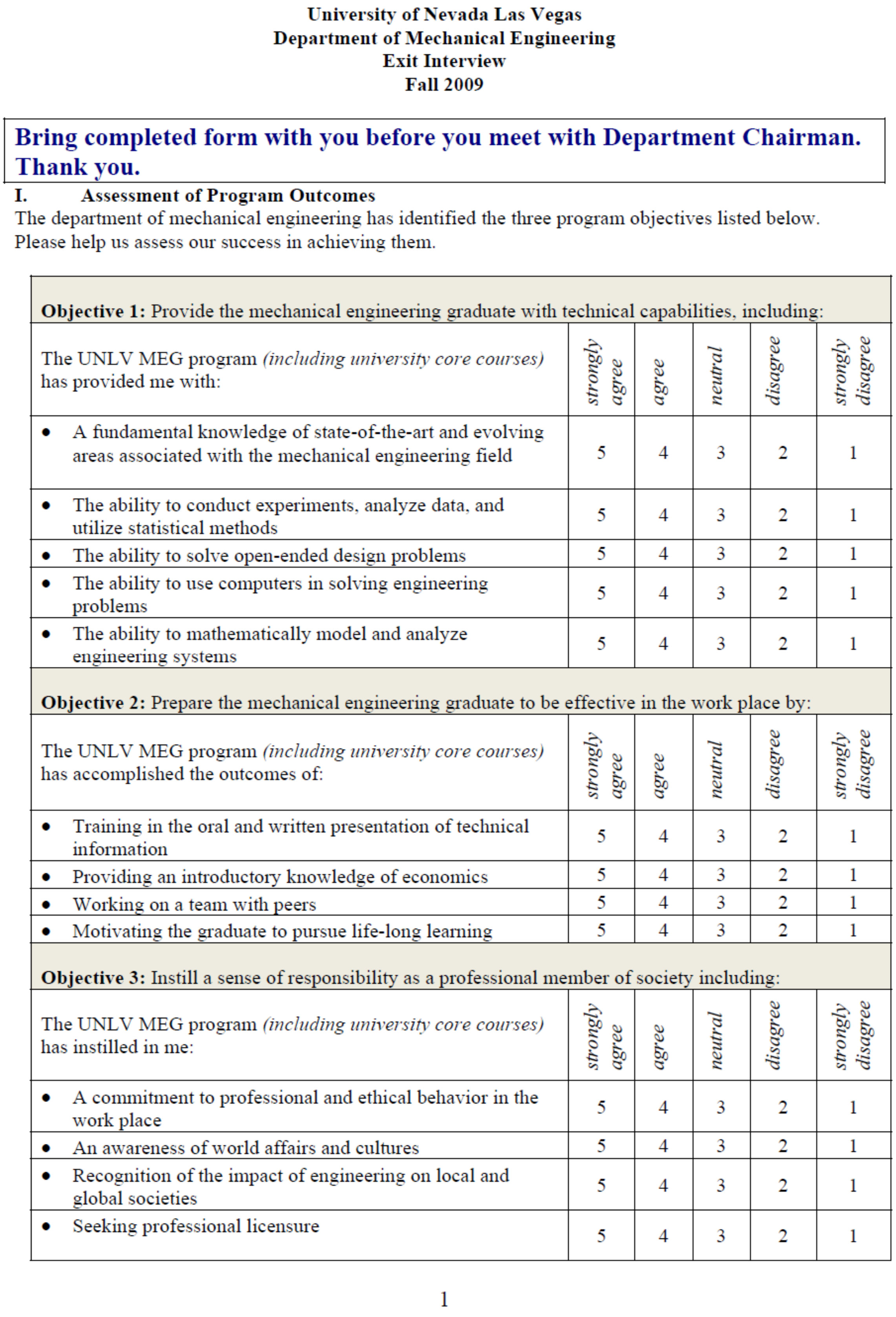
ME 380L*	3.9	3.9	3.7	4.2	3.9	4.5	3.7	3.5	3.6	**3.9**
ME 400					3.5					**3.5**
ME 402*			3.8		3.8		3.7		3.7	**3.8**
ME 415				4.4				4.4		**4.4**
ME 416						4.0		3.0		**3.5**
ME 418			3.9		3.4			4.3		**3.9**
ME 421*	3.7		4.0		3.5		3.8		4.3	**3.9**
ME 421L*	3.3		4.0		2.6		4.0		4.3	**3.6**
ME 425	3.9				4.0				4.0	**4.0**
ME 426				4.3				4.8		**4.6**
ME 427							4.0			**4.0**
ME 434	3.8					4.3		4.6		**4.2**
ME 440*	4.6		4.6		4.6		3.2		4.1	**4.2**
ME 446								4.0		**4.0**
ME 453*			4.6		4.3		4.7		4.3	**4.5**
ME 455	4.4				4.1		2.8		4.0	**3.8**
ME 456		4.0								**4.0**
ME 470						4.6				**4.6**
ME 480				4.3				4.3		**4.3**
ME 482							4.6			**4.6**
ME 497*	4.7	4.7	4.6	4.5	4.5		3.5	4.3		**4.4**
ME 498*	4.7	4.7	4.7	4.5	3.7		4.5	3.9		**4.4**

*Required courses

E.8 Graduate Exit Interview

Mechanical Engineering Graduate Exit Interview Form **(Complete data is available in http://me.unlv.edu/GeneralInfo/ABETData.html)**

APPENDIX E.8 GRADUATE EXIT INTERVIEW RESULT



University of Nevada Las Vegas
Department of Mechanical Engineering
Exit Interview
Fall 2009

Bring completed form with you before you meet with Department Chairman. Thank you.

I. Assessment of Program Outcomes

The department of mechanical engineering has identified the three program objectives listed below. Please help us assess our success in achieving them.

Objective 1: Provide the mechanical engineering graduate with technical capabilities, including:

The UNLV MEG program *(including university core courses)* has provided me with:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*
• A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field	5	4	3	2	1
• The ability to conduct experiments, analyze data, and utilize statistical methods	5	4	3	2	1
• The ability to solve open-ended design problems	5	4	3	2	1
• The ability to use computers in solving engineering problems	5	4	3	2	1
• The ability to mathematically model and analyze engineering systems	5	4	3	2	1

Objective 2: Prepare the mechanical engineering graduate to be effective in the work place by:

The UNLV MEG program *(including university core courses)* has accomplished the outcomes of:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*
• Training in the oral and written presentation of technical information	5	4	3	2	1
• Providing an introductory knowledge of economics	5	4	3	2	1
• Working on a team with peers	5	4	3	2	1
• Motivating the graduate to pursue life-long learning	5	4	3	2	1

Objective 3: Instill a sense of responsibility as a professional member of society including:

The UNLV MEG program *(including university core courses)* has instilled in me:	*strongly agree*	*agree*	*neutral*	*disagree*	*strongly disagree*
• A commitment to professional and ethical behavior in the work place	5	4	3	2	1
• An awareness of world affairs and cultures	5	4	3	2	1
• Recognition of the impact of engineering on local and global societies	5	4	3	2	1
• Seeking professional licensure	5	4	3	2	1

APPENDIX E.8 GRADUATE EXIT INTERVIEW RESULT

II. **Faculty Evaluation:** Please fill out the following information for faculty (listed alphabetical you have had. We appreciate comments on both positive and negative characteristics.

Name	# of classes taken from:	Average grade you received:	Overall Rating				
			Outst-anding	Good	Ave-rage	Poor	Unsat-isfact-ory
Boehm			5	4	3	2	1

Comments:

Chen			5	4	3	2	1

Comments:

Cook			5	4	3	2	1

Comments:

Culbreth			5	4	3	2	1

Comments:

Mauer			5	4	3	2	1

Comments:

Moujaes			5	4	3	2	1

Comments:

O'Toole			5	4	3	2	1

Comments:

APPENDIX E.8 GRADUATE EXIT INTERVIEW RESULT

Name	# of classes taken from:	Average grade you received:	Overall Rating				
			Outstanding	Good	Average	Poor	Unsatisfactory
Pepper			5	4	3	2	1

Comments:

Reynolds			5	4	3	2	1

Comments:

Trabia			5	4	3	2	1

Comments:

Wang			5	4	3	2	1

Comments:

Yim			5	4	3	2	1

Comments:

Zhao			5	4	3	2	1

Comments:

III. **Shop:** Evaluate your experiences in the shop. How can the shop be enhanced?

	Overall Rating				
Jeff Markle	Outstanding	Good	Average	Poor	Unsatisfactory

Comments:

Kevin Nelson	Outstanding	Good	Average	Poor	Unsatisfactory

Comments:

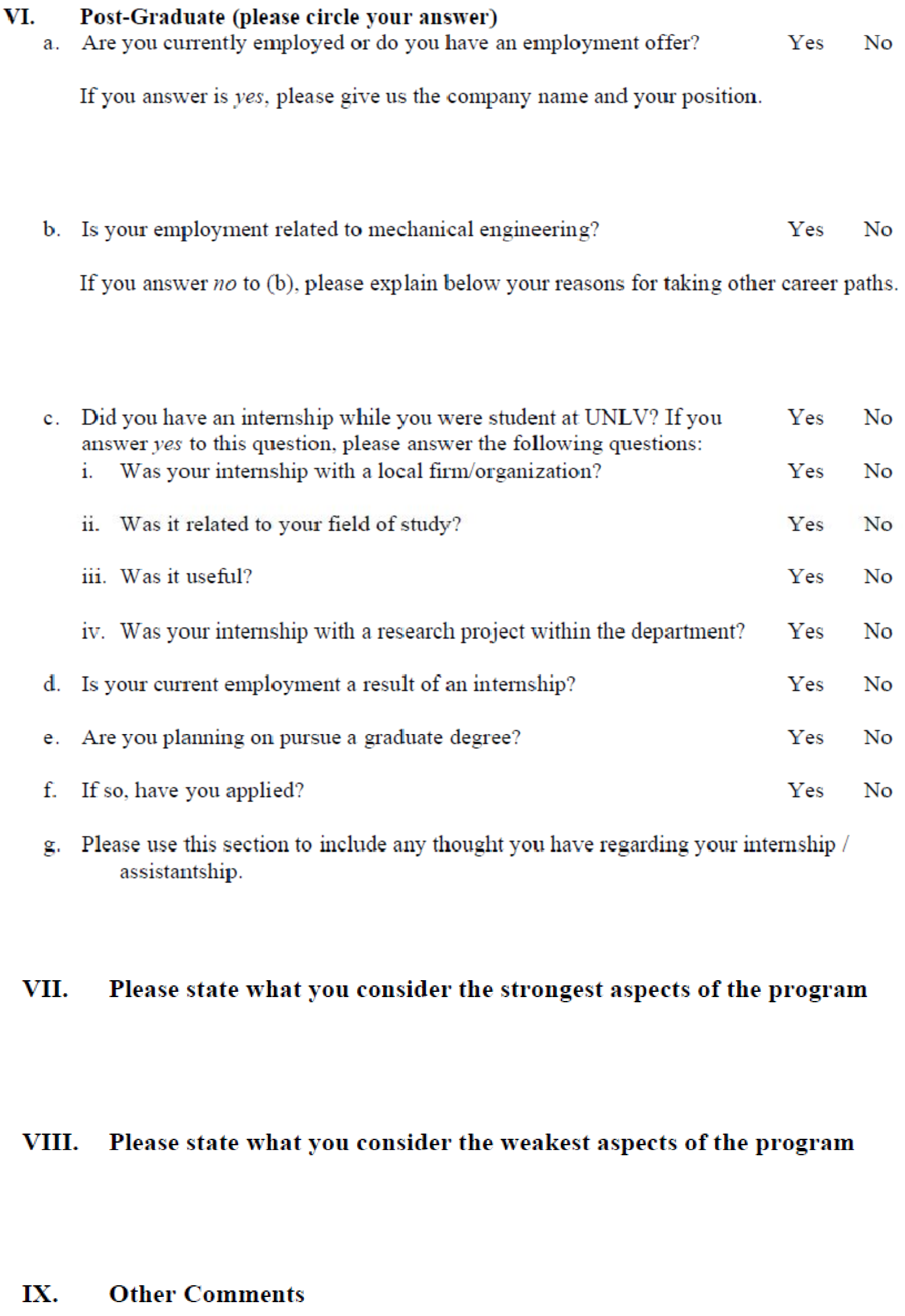
IV. **Office Staff:** Evaluate your experiences in the office. How can the office service be enhanced?

	Overall Rating				
Joan Conway	Outstanding	Good	Average	Poor	Unsatisfactory

Comments:

V. **Lab Evaluation.** Please indicate your overall experience with the labs that you took.

	strongly agree	*agree*	*neutral*	*disagree*	*strongly disagree*
1. The lab manual/notes adequately describe equipment and experiments. If not, please help us identify problems.	5	4	3	2	1
2. The lab experiments are reasonable in length and content. If not, how can we change it?	5	4	3	2	1
3. The lab experiments follow the lecture material. If not, please explain.	5	4	3	2	1
4. The performance of the lab instructors is satisfactory. If not, how can they improve it?	5	4	3	2	1
5. The lab equipment is functional. If not, please explain.	5	4	3	2	1
6. The lab is well equipped. If not, what do you think is missing?	5	4	3	2	1



VI. Post-Graduate (please circle your answer)

a. Are you currently employed or do you have an employment offer? Yes No

If you answer is *yes*, please give us the company name and your position.

b. Is your employment related to mechanical engineering? Yes No

If you answer *no* to (b), please explain below your reasons for taking other career paths.

c. Did you have an internship while you were student at UNLV? If you answer *yes* to this question, please answer the following questions: Yes No

- i. Was your internship with a local firm/organization? Yes No
- ii. Was it related to your field of study? Yes No
- iii. Was it useful? Yes No
- iv. Was your internship with a research project within the department? Yes No

d. Is your current employment a result of an internship? Yes No

e. Are you planning on pursue a graduate degree? Yes No

f. If so, have you applied? Yes No

g. Please use this section to include any thought you have regarding your internship / assistantship.

VII. Please state what you consider the strongest aspects of the program

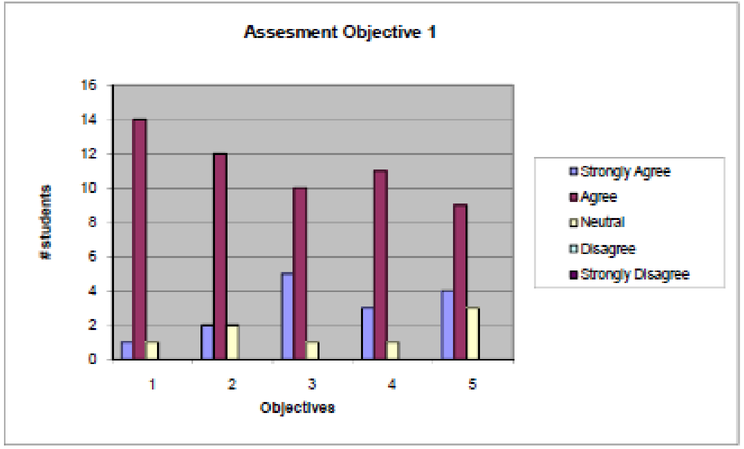
VIII. Please state what you consider the weakest aspects of the program

IX. Other Comments

Fall 2009 Graduate Exit Interview Results (Complete data for other semesters is available in http://me.unlv.edu/GeneralInfo/ABETData.html)

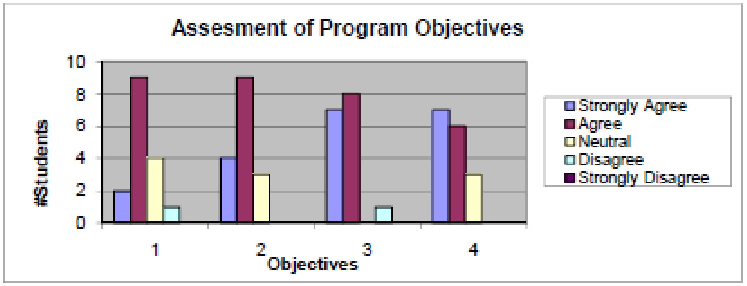
Objective 1: Provide the Mechanical Engineering graduate with technical capabilities including:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. A fundamental knowledge of state-of-the-art and evolving areas associated with the mechanical engineering field.	1	14	1	0	0
2. The ability to conduct experiments, analyze data, and utilize statistical methods.	2	12	2	0	0
3. The ability to solve open-ended design problems.	5	10	1	0	0
4. The ability to use computers in solving engineering problems.	3	11	1	0	0
5. The ability to mathematically model and analyze engineering systems.	4	9	3	0	0



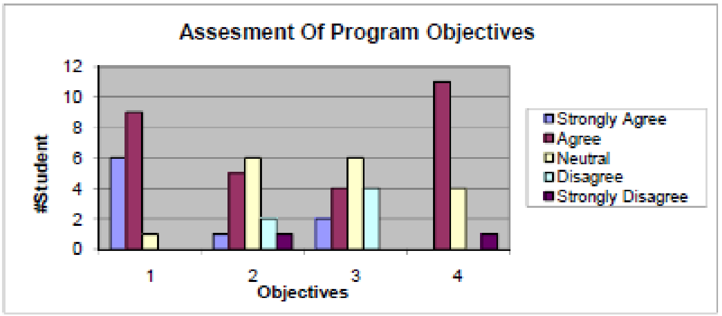
Objective 2: Prepare the mechanical engineering graduate to be effective in the work place by:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. Training in the oral and written presentation of technical information.	2	9	4	1	0
2. Providing an introductory knowledge of economics.	4	9	3	0	0
3. Working on a team with peers.	7	8	0	1	0
4. Motivating the graduate to pursue life-long learning.	7	6	3	0	0



Objective 3: Instill a sense of responsibility as a professional member of society including:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. A commitment to professional and ethical behavior in the work place.	6	9	1	0	0
2. An awareness of world affairs and cultures.	1	5	6	2	1
3. Recognition of the impact of engineering on local and global societies.	2	4	6	4	0
4. Seeking professional licensure.	0	11	4	0	1



MEG UG EXIT INTERVIEWS - FALL 2009						
Lab Evaluations						
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	**Student Comments**
1. The lab manual/notes adequately describe equipment and experiments. If not, please help us identify problems.	3	11	2	0	0	I had many problem with the lab I felt the notes and lab manuals had many errors. Fluids and controls lab manuals did not always describe lab procedures well. Needs some correction, especially fluids lab. Lab instructions does not help. Sometimes too much information is given. Simplify the handouts. Most labs were ok. However some of the experiments in ME 421L are simply too long and need to be revised.
2. The lab experiments are reasonable in length and content. If notl, how can we change it?	2	10	3	1	0	Some were overly easy and some were far more difficult. Sometimes the labs were short and others very long. I think the experiments are reasonable but would suggest the lab be more structured. For example, each student perform the experiment and describe why the lab is being used. Difficult to evaluate all labs here. Some labs extremely long and arduous. Needs good explaining the theory, beside Ahmad good, explains everything in detail. Cut out wordy explanations; number steps and bullet points. Overall the labs were ok. The write ups take the most amount of time for only the one credit.
3. The lab experiments follow the lecture material. If not please explain.	2	8	3	2	1	Many times the lab would be ahead of the class in controls and measurements. Labs were usually not conducted in time with the lecture. I stated previously when I took the lab classes the manuals were not very good, generally speaking. I didn’t feel Fluids followed the lecture material. The labs are always too far ahead of the lecture.

4. The performance of the lab instructors is satisfactory. If not, how can they improve it.	1	11	3	1	0	I think that if you improved the lab manuals the instructors performance would improve. Ahmad Fayed is an awesome TA. Many of the labs could have been explained in greater detail. Overall my lab TA's were awesome! Some were great others were poor almost 50/50. However the fluids lab was the worse lab I've taken. It had dysfunctional equipment, poor instructors and it did not follow the course material. Perhaps the ME department should open up a section of the lab. Explain more. Try and help out those that's not sure what to do. Explain material clearer. The problems lie with the organization.
5. The lab equipment is functional. If not, please explain.	1	9	4	1	0	Not everything in Fluids lab worked. Generally speaking, most of the time the equipment functioned properly. Mostly functional, if outdated. In heat transfer lab s machine didn't work. In fluids the wind tunnel didn't work. I remember a lot of material and fluid labs not working. Could use some better technical help.
6. The lab is well equipped. If not, what do you think is missing.	1	9	5	1	0	Sometimes there was not enough equip. Students had to share measurements. Not enough equipement. Generally, I thought the lab equipment was satisfactory. Students had to share some stations. Some labs are not fully equiped; not enough space. We need functioning equipement and well defined objectives. With an understanding of how to evaluate our results.

MEG UG EXIT INTERVIEWS - FALL 2009

Post-Graduate

	YES	NO	Comments
a. Are you currently employed or do you have an employment offer?If you answer no to, please go to 3.	9	7	USAF, Developemental Engineer / Hydro & Mechatronics Research App. Asst. / I work for Dr. Boehm / MSA Engineering Consultants 5.5 yrs, Electrical Designer / UNLV Center for Energy Research / I am working on a police office for 24 yr position of sergeant and working on an adjust professor at CSN / GA / Bechtel Marine Propulsion Co.; Associate Engineer / Sierra Metals, Inc.; Asst. Project Manager
b. Is your employment related to Mechanical Engineering? If no, please explain below your reasons for taking other career paths?	7	3	N/A / We do ME at the firm but they moved ME to the Elec. Dept. 1 yr after starting and want me to stay there. We do a lot of coordination with the ME Dept. / Wanting to start a business in accident reconstruction.
c. Did you have an internship while your were student at UNLV? If you answer *yes,* please answer the following questions?	10	5	
1. Was your internship with a local firm/organization?	8	2	City of Henderson / Hoover Dam
2. Was it related to your field of study?	8	2	Civil EGG, Traffic
3.Was it useful?	10	0	I enjoyed it
4. Was your internship within a research project within the department?	4	6	No / Dr. Boehm and Dr. Yim
d. Is your current employment a result of an internship?	1	8	NA
e. Are you planning to pursue a graduate degree?	7	1	Not at the moment, eventually. / Later / Undecided / Maybe
f. If so, have you applied?	1	9	No

g. Please use this section to include any thought you have regarding your internship/assistantship

It was good to view an engineering environment.

Opportunities for internships were very good and the experience gained was invaluable.

An internship was very useful. Needed for real real life experience.

I was there first one. They didn't know what they were doing.

I did not have an actual internship, but I worked in the construction management field under an engineer at Hansen Mechanical Contractors (HVAC and plumbling) for 3 years during my schooling.

Strongest and Weakest Attributes of ME Program, FALL 2009	
Strongest	1. Teaching the theoretical aspect of ME.
	2. Thermodynamics/ Heat transfer.
	3. Instructors always had office hours and encouraged scheduling meetings if extra help was needed.
	4. Good instructors.
	5. One good thing is that we are able to interact directly with instructors for help. We are able to get very hands n with plenty of opportunity.
	6. Anything Dr. Chen or Dr. Boehm is involved in.
	7. Overall the program is excellent at delivering the material. I think the success depends a lot on the motivation f the students to learn.
	8. Group projects and class presentations.
	9. The theory is presented and taught well I believe
	10. Good projects, homework
	11. Staff, most professors, machine shop, lab TA's, Joan, resources, elective offers.
	12. A lot of items/theories used in the real world are also provided for us here.
	13. Undergraduate research.
	14. Competent and helpful staff.
	15. The ME program really sets an excellent base and covers many aspects of engineering. There is a very broad verview of everything in just a few years.
	16. The lab equipment seemed to be working most of the time. I tend to learn better with hands on experience, o a well working lab was important to me. The professors that are there to teach, and put the students before heir own research agenda are also a good addition to the program.
Weakest	1. Showing students the career aspect of ME.
	2. Vibrations, programming/numerical methods, chemistry, dynamics in general
	3. Classes were not always available when they were scheduled to be. Obtaining the emphasis requirement was ery difficult especially since so many elective classes would get cancelled because of under-enrollment.
	4. Not enough resources for students to practice fundamental principles of ME.
	5. The lack of permanent instructors in the department. I have had a lot of first time instructors, and the course vas poorly run.
	6. Missing professors in their teaching cycle. i.e. Dr. Trabia left and Venkatesh taught 440, and Dr. Yim on abbatical so Dr. Landsberger taught 330. Allowing online/multiple choice exams for 400-level classes is a travesty.
	7. Some of the instructors' teaching styles make it hard to learn; specifically Dr. Pepper and Dr. Venkatesh.
	8. Homework is more difficult to solve than what was discussed in class.
	9. Computer applications
	10. Some of the lectures in class; needs more hands on experiences; oral project needed to help out with resentation
	11. Number of students, classes offered once a year, advisors.
	12. Computer lab is outdated and limited number computers hurts when lab is full. Getting into classes without neeting prereqs are hassle.
	13. Bringing engineering firms from the area (aka NV test site) to campus for collaboration. Specializing in areas f interest to Nevada.
	14. Progression guidance.
	15. Some of the electives need to be offered more often. Also HVAC is a part of the FE and I feel we learned ttle about HVAC.

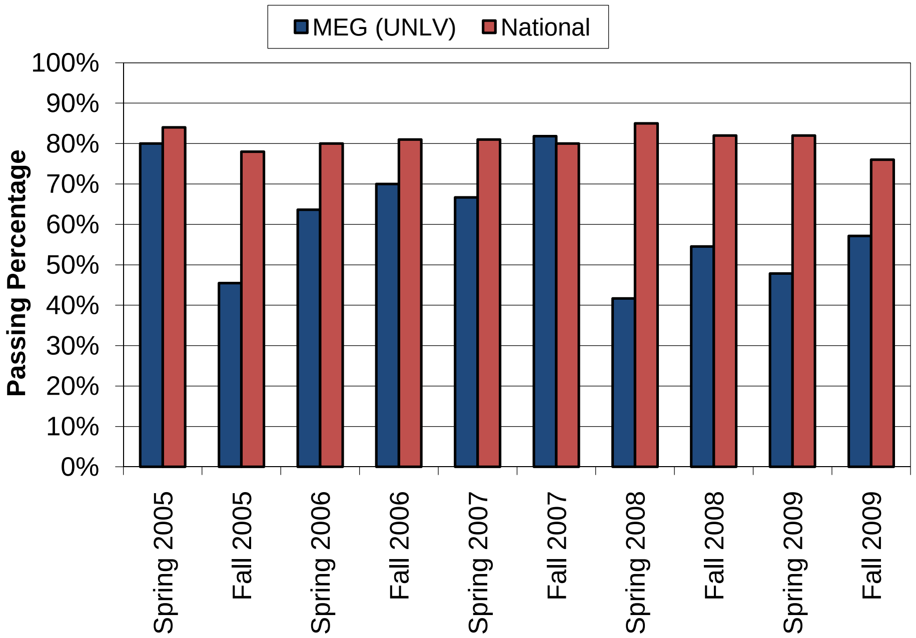
	16. The bad professors and the horrible advising staff. Most of the advising staff did not even the knew call umbers for classes when they changed. They also did not know what the differences were from one course atalog to the next.
Other Comments	1. Considering the resources available and the current situation with faculty, I would say the department is doing a fair job. There is definitely room for improvement.
	2. Have additional study sections for required classes that follow the fundamental principles of a specific class.
	3. The computer lab should be strictly for engineers and not others. It is a big inconvenience when half the lab is filled with Bio students. There are no other places on campus that has the engineering softwares.
	4. The engineering lab is over run with Liberal Arts majors (Bio/Chemistry/Nursing). This makes it difficult to get assignments done during peak hours. We don’t have access to MatLab, MathCad, SolidWorks, VisSim, etc. at any other lab on campus. During busy times, non-engineering students should not be allowed on the campus.
	5. Our engineering programs are only available in one lab, and more than just engineering students can use that lab.
	6. Specific electives not always offered.
	7. ASME needs departmental backing. The students need to be competing and attending conferences if UNLV is to be thought of as an engineering university.

E.9 FE Exam Results

In this section, the results of FE exams from Fall 20903 to Spring 2009 are summarized.

Passing percentage

	ME (UNLV)	**National**	# Pass	# of UNLV
Spring 2005	80%	84%	4	5
Fall 2005	45%	78%	5	11
Spring 2006	64%	80%	7	11
Fall 2006	70%	81%	7	10
Spring 2007	67%	81%	6	9
Fall 2007	82%	80%	9	11
Spring 2008	42%	85%	5	12
Fall 2008	55%	82%	12	22
Spring 2009	48%	82%	11	23
Fall 2009	57%	76%	8	14



AM Subject Score for Currently Enrolled Students

	Fall 2006			Spring 2007			Fall 2007			Spring 2008			Fall 2008			Spring 2009			Fall 2009		
	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)
Mathematics	75	76	-1.0	73	75	-2.0	65	65	0.0	59	68	-9.0	69	72	-3.0	70	75	-5.0	66	67	-1.0
Engineering Probability and Statistics	65	59	6.0	65	68	-3.0	44	50	-6.0	47	60	-13.0	60	65	-5.0	41	55	-14.0	55	54	1.0
Chemistry	58	64	-6.0	73	71	2.0	59	63	-4.0	55	72	-17.0	58	64	-6.0	59	66	-7.0	57	58	-1.0
Computers	75	71	4.0	88	85	3.0	68	72	-4.0	60	80	-20.0	70	72	-2.0	62	72	-10.0	79	75	4.0
Ethics and Business Practices	82	79	3.0	81	77	4.0	69	77	-8.0	73	77	-4.0	85	83	2.0	74	81	-7.0	69	75	-6.0
Engineering Economics	59	58	1.0	72	54	18.0	80	68	12.0	56	59	-3.0	55	55	0.0	79	74	5.0	69	63	6.0
Engineering Mechanics (Statics and Dynamics)	54	66	-12.0	73	73	0.0	76	73	3.0	65	75	-10.0	62	70	-8.0	60	65	-5.0	58.5	59	-0.5
Strength of Materials	84	75	9.0	62	65	-3.0	63	60	3.0	56	69	-13.0	46	55	-9.0	67	74	-7.0	59	53	6.0
Material Properties	60	67	-7.0	69	77	-8.0	52	64	-12.0	31	59	-28.0	43	51	-8.0	61	72	-11.0	54	50	4.0
Fluid Mechanics	69	67	2.0	62	73	-11.0	67	70	-3.0	65	76	-11.0	51	61	-10.0	65	72	-7.0	55	58	-3.0
Electricity and Magnetism	49	53	-4.0	63	69	-6.0	58	61	-3.0	30	53	-23.0	37	50	-13.0	43	59	-16.0	45	58	-13.0
Thermodynamics	52	53	-1.0	64	63	1.0	54	55	-1.0	53	61	-8.0	51	60	-9.0	45	71	-26.0	53	57	-4.0

PM Subject Score for Currently Enrolled Students

	Fall 2006			Spring 2007			Fall 2007			Spring 2008			Fall 2008			Spring 2009			Fall 2009		
	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)	UNLV(%)	National(%)	UNLV-National(%)
Mechanical Design and Analysis	41	45	-4.0	32	35	-3.0	52	60	-8.0	43	59	-16.0	44	53	-9.0	50	57	-7.0	48	50	-2.0
Kinematics,Dynamics, and Vibration	46	51	-5.0	63	68	-5.0	41	46	-5.0	52	62	-10.0	48	49	-1.0	66	63	3.0	48	46	2.0
Materials & Processing	57	63	-6.0	37	46	-9.0	50	56	-6.0	57	56	1.0	40	62	-22.0	58	71	-13.0	51	53	-2.0
Measurement, Instrumentation, and Controls	58	66	-8.0	52	46	6.0	61	51	10.0	40	55	-15.0	54	56	-2.0	59	54	5.0	64	53	11.0
Thermodynamics and Energy Conversion Processes	56	62	-6.0	52	44	8.0	54	52	2.0	50	58	-8.0	51	58	-7.0	48	52	-4.0	55	50	5.0
Fluid Mechanics and Fluid Machinery	59	58	1.0	63	58	5.0	64	57	7.0	49	67	-18.0	51	60	-9.0	47	48	-1.0	52	53	-1.0
Heat Transfer	40	39	1.0	39	47	-8.0	49	51	-2.0	54	68	-14.0	42	49	-7.0	53	65	-12.0	61	59	2.0
Refrigeration & HVAC	43	53	-10.0	39	48	-9.0	45	49	-4.0	38	42	-4.0	40	42	-2.0	35	41	-6.0	45	50	-5.0

Cumulative Average for AM and PM Subjects from Fall 2006 to Spring 2009

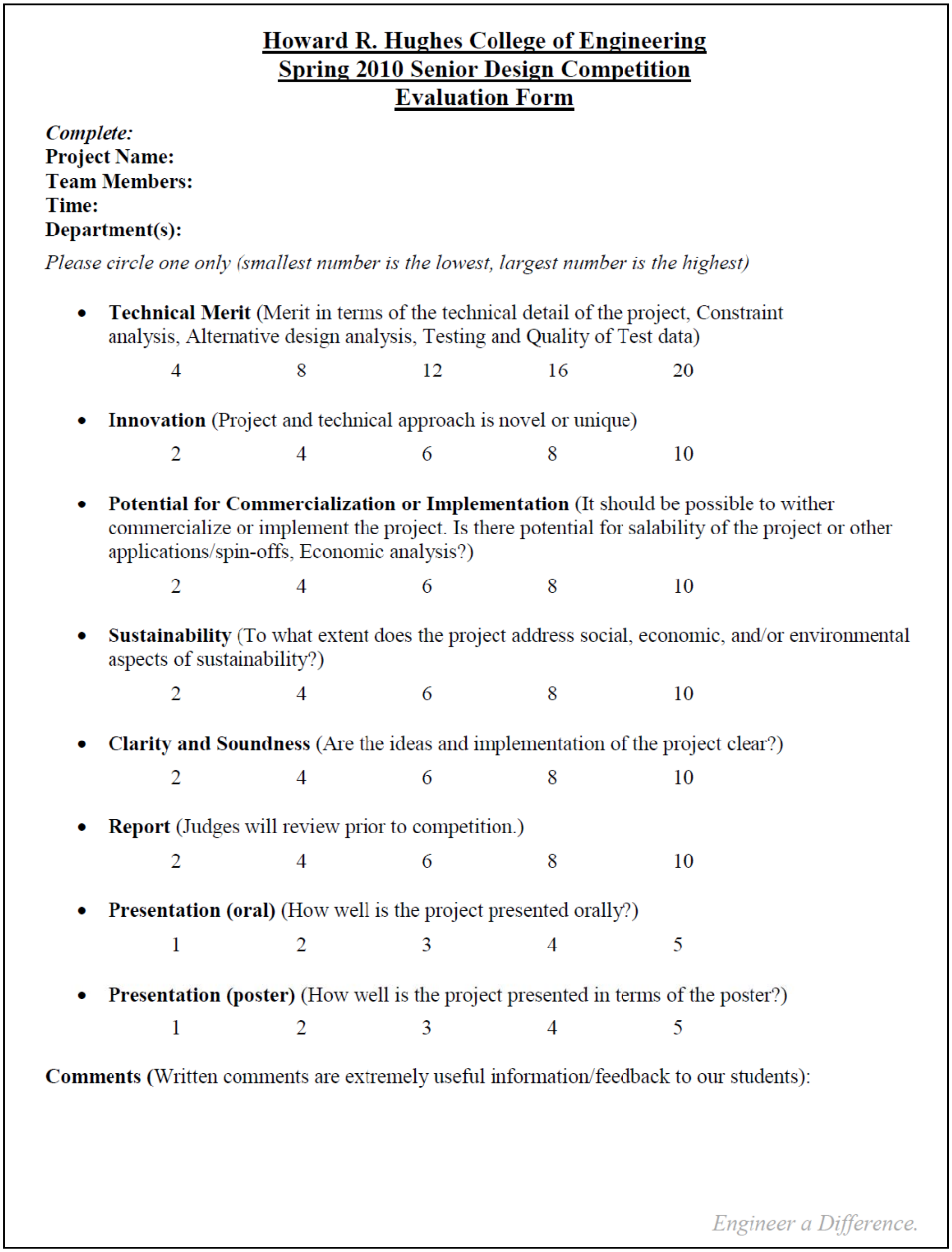
Average F06-S09

	UNLV	National	(UNLV-National)/National (%)	
AM Subjects				
Mathematics	68.1	71.1	-3%	
Engineering Probability and Statistics	53.9	58.7	-5%	
Chemistry	59.9	65.4	-6%	
Computers	71.7	75.3	-4%	
Ethics and Business Practices	76.1	78.4	-2%	
Engineering Economics	67.1	61.6	6%	
Engineering Mechanics (Statics and Dynamics)	64.1	68.7	-5%	
Strength of Materials	62.4	64.4	-2%	
Material Properties	52.9	62.9	-10%	
Fluid Mechanics	62.0	68.1	-6%	
Electricity and Magnetism	46.4	57.6	-11%	
Thermodynamics	53.1	60.0	-7%	
			-4.5%	Total deviation

PM Subject				
Mechanical Design and Analysis	44.3	51.3	-7%	
Kinematics ,Dynamics, and Vibration	52.0	55.0	-3%	
Materials & Processing	50.0	58.1	-8%	
Measurement, Instrumentation, and Controls	55.4	54.4	1%	
Thermodynamics and Energy Conversion Processes	52.3	53.7	-1%	
Fluid Mechanics and Fluid Machinery	55.0	57.3	-2%	
Heat Transfer	48.3	54.0	-6%	
Refrigeration & HVAC	40.7	46.4	-6%	
			-4.0%	Total deviation

E.10 Senior Design Competition

The following is a sample evaluation form used in the Spring 2010 Senior Design Competition[8] for evaluating student's project by external judges:



Howard R. Hughes College of Engineering
Spring 2010 Senior Design Competition
Evaluation Form

Complete:
Project Name:
Team Members:
Time:
Department(s):

Please circle one only (smallest number is the lowest, largest number is the highest)

- **Technical Merit** (Merit in terms of the technical detail of the project, Constraint analysis, Alternative design analysis, Testing and Quality of Test data)

  4 8 12 16 20

- **Innovation** (Project and technical approach is novel or unique)

  2 4 6 8 10

- **Potential for Commercialization or Implementation** (It should be possible to wither commercialize or implement the project. Is there potential for salability of the project or other applications/spin-offs, Economic analysis?)

  2 4 6 8 10

- **Sustainability** (To what extent does the project address social, economic, and/or environmental aspects of sustainability?)

  2 4 6 8 10

- **Clarity and Soundness** (Are the ideas and implementation of the project clear?)

  2 4 6 8 10

- **Report** (Judges will review prior to competition.)

  2 4 6 8 10

- **Presentation (oral)** (How well is the project presented orally?)

  1 2 3 4 5

- **Presentation (poster)** (How well is the project presented in terms of the poster?)

  1 2 3 4 5

Comments (Written comments are extremely useful information/feedback to our students):

Engineer a Difference.

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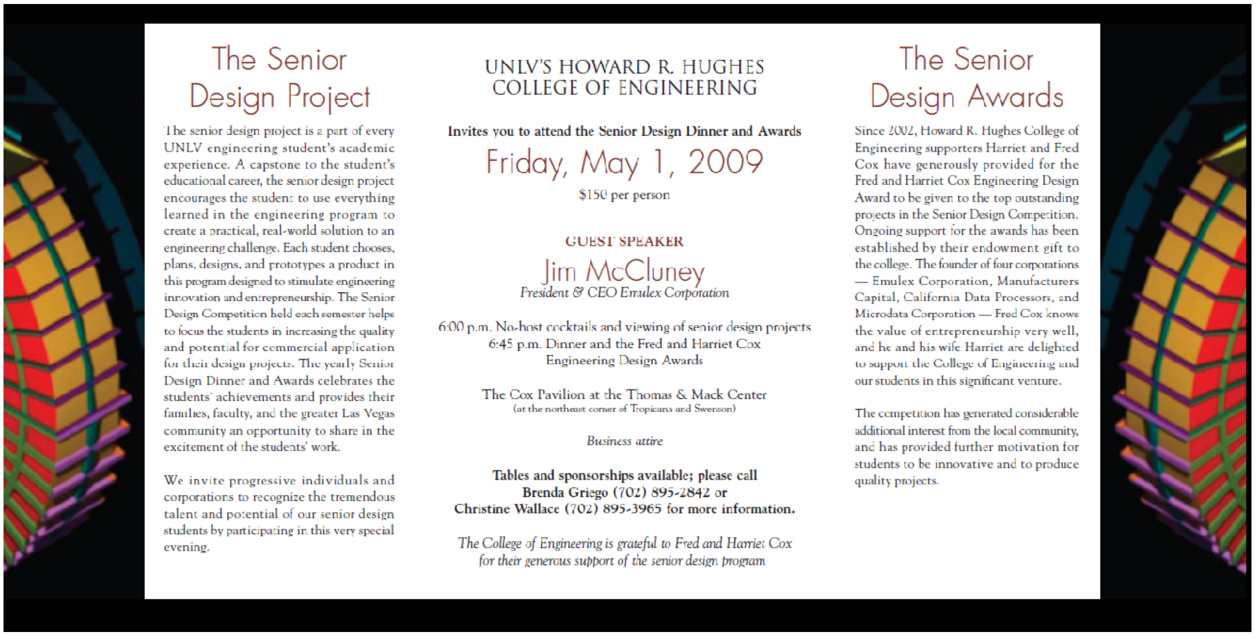
[8] There has been a minor change in the form from Spring 2010

The following shows sample pages from the Spring 2009 Senor Design Competition Booklet distributed to local industry and alumni.



The Senior Design Project

The senior design project is a part of every UNLV engineering student's academic experience. A capstone to the student's educational career, the senior design project encourages the student to use everything learned in the engineering program to create a practical, real-world solution to an engineering challenge. Each student chooses, plans, designs, and prototypes a product in this program designed to stimulate engineering innovation and entrepreneurship. The Senior Design Competition held each semester helps to focus the students in increasing the quality and potential for commercial application for their design projects. The yearly Senior Design Dinner and Awards celebrates the students' achievements and provides their families, faculty, and the greater Las Vegas community an opportunity to share in the excitement of the students' work.

We invite progressive individuals and corporations to recognize the tremendous talent and potential of our senior design students by participating in this very special evening.

UNLV'S HOWARD R. HUGHES
COLLEGE OF ENGINEERING

Invites you to attend the Senior Design Dinner and Awards

Friday, May 1, 2009

$150 per person

GUEST SPEAKER

Jim McCluney

President & CEO Emulex Corporation

6:00 p.m. No-host cocktails and viewing of senior design projects
6:45 p.m. Dinner and the Fred and Harriet Cox Engineering Design Awards

The Cox Pavilion at the Thomas & Mack Center
(at the northeast corner of Tropicana and Swenson)

Business attire

Tables and sponsorships available; please call
Brenda Griego (702) 895-2842 or
Christine Wallace (702) 895-3965 for more information.

The College of Engineering is grateful to Fred and Harriet Cox for their generous support of the senior design program

The Senior Design Awards

Since 2002, Howard R. Hughes College of Engineering supporters Harriet and Fred Cox have generously provided for the Fred and Harriet Cox Engineering Design Award to be given to the top outstanding projects in the Senior Design Competition. Ongoing support for the awards has been established by their endowment gift to the college. The founder of four corporations — Emulex Corporation, Manufacturers Capital, California Data Processors, and Microdata Corporation — Fred Cox knows the value of entrepreneurship very well, and he and his wife Harriet are delighted to support the College of Engineering and our students in this significant venture.

The competition has generated considerable additional interest from the local community, and has provided further motivation for students to be innovative and to produce quality projects.

Senior Design Project Abstracts
Cox Pavilion, Thomas & Mack Center
May 1, 2009

Time: 9:30 – 10:00 a.m.
Handicap Freedom Project
Department of: Mechanical Engineering
Project Participants: Ronn Fojas, James Spotts, Paul Texeira, and Victor Perez-Rubio
Instruction: Dr. BJ Landsberger
Faculty Adviser: Dr. YT Chen
Abstract

For millions of Americans manual wheelchairs are a necessity for freedom of movement and access to necessities inside and outside the home. Even with motorized chairs and scooters available, the manual wheelchair continues to perform an essential function due to its cost, weight, size, transportability and reliability. Unfortunately, these wheelchairs have benefited only from small incremental improvement over the decades. By comparison, bicycles, while retaining the advantages of a manual vehicle, have benefited from multiple innovations. Wheelchair users were canvassed to determine the most needed improvements. As a result, this project has applied drive-train technology designed for bicycles to improve the mobility of a wheelchair bound person.

Our product is a variable speed wheelchair. The variable-speed wheelchair design utilizes a planetary gear transmission internal to the wheel hub that the rider uses to selectively lower the force required to move the chair. The standard metal handgrip ring on the outside of the wheelchair wheels is no longer directly connected to the wheel but to the input of the transmission while the wheel is connected to the output. Gear shifting is accomplished with conveniently located click shifters. Wheelchair users can now adapt their drive to the varying conditions they face.

Figures opposing page: (upper) Standard wheelchair, (lower) Wheel hub with internal gearing.

Notes:

Spring 2010 ME Student Senior Design Evaluation

	Student Group 1 "Dual Axis Solar Tracker"			Student Group 2 "Autonomous Material Sorter"			Student Group 3 "H2O No Flow"			Student Group 4 "Composite Airfoil Turbine"			Student Group 5 "The Scubba Caddy"			Student Group 6 "Autonomous Refuse Transporter (A.R.T.)"*			Student Group 7 "AquaProdigio Shower System"*				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Technical Merit (20 points)	12	16	12	16	16	12	12	16	12	16	12	16	12	12	12	12	16	12	8	16	16	**13.5**	**67%**
Innovation (10 points)	6	10	8	8	8	8	8	10	8	6	10	6	6	8	8	8	10	4	4	8	8	**7.6**	**76%**
Potential for Commercialization/Implementation (10 points)	10	10	8	8	4	6	8	8	6	8	4	8	8	10	8	6	6	2	6	4	8	**6.9**	**70%**
Sustainability (10 points)	8	8	8	10	10	8	10	8	6	10	10	10	4	4	2	6	4	2	6	6	2	**6.8**	**67%**
Clarity and soundness of the project (10 points)	10	8	8	8	8	8	10	10	8	8	8	6	8	8	6	8	8	4	8	8	6	**7.8**	**78%**
Report (10 points)																							
Presentation (oral) (5 points)	4	4	4	4	3	4	3	3	3	4	4	3	4	3	3	4	4	3	4	4	3	**3.6**	**71%**
Presentation (Poster) (5 points)	4	4	4	4	4	3	4	4	3	4	4	3	4	4	4	4	4	3	4	4	3	**3.8**	**75%**
Total in Percentile per Each Student Group	**69.2%**			**66.7%**			**66.7%**			**66.7%**			**57.5%**			**54.2%**			**56.7%**				

Fall 2009 ME Student Senior Design Evaluation

	Student Group 1 "Locking Bicycle Pedal"			Student Group 2*"R.E.V. Recumbent Electric Vehicle"			Student Group 3 "Curf Board"			Student Group 4 "Car Chassis"				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Innovation (10 points)	8	8	8	6	7	8	8	8	8	6	8	8	**7.6**	**76%**
Potential for Commercialization/Implementation (10 points)	8	8	9	9	8	8	9	9	9	6	6	8	**8.1**	**81%**
Technical Merit (10 points)	7	6	8	8	7	7	7	6	6	7	7	9	**7**	**71%**
Clarity and soundness of the project (10 points)	6	8	8	7	8	8	6	7	8	7	6	9	**7**	**73%**
Presentation (oral) (5 points)	5	5	4	4	4	4	4	4	4	4	3	5	**4**	**83%**
Presentation (Poster) (5 points)	4	4	5	4	4	5	4	3	4	4	4	5	**4**	**83%**
Total in Percentile per Each Student Group	**79.3%**			**77.3%**			**76%**			**74.7%**				

* Interdisciplinary Group with Electrical Engineering

Spring 2009 ME Student Senior Design Evaluation

	Student Group 1 "Best Baja Buggie"			Student Group 2 "Elegant Bath Plumbing"			Student Group 3 "Handicap Freedom Project"			Student Group 4 "Hear My Volt"			Student Group 5 "Lots of Pepper Now"			Student Group 6 "Optimum Ceiling Fan"			Student Group 7 "Supersonic Water Table"			Student Group 8 "What is in Refrigerator"			Student Group 9* "Electric Car Conversion"			Student Group 10* "Home Power Meter"				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Innovation (10 points)	8	7	6	6	4	5	10	8	9	N/A	7	8	10	6	7	8	8	8	8	8	9	10	10	8	6	8	8	10	8	9	**7.8**	**78%**
Potential for Commercialization/Implementation (10 points)	8	8	6	8	8	6	10	8	9	N/A	10	8	10	8	9	8	10	8	8	9	9	10	8	9	8	8	8	10	10	10	**8.6**	**86%**
Technical Merit (10 points)	10	8	8	8	8	6	6	6	7	N/A	7	7	10	8	9	8	8	8	10	9	10	10	6	6	10	8	10	10	8	9	**8.2**	**82%**
Clarity and soundness of the project (10 points)	10	7	7	8	6	7	8	6	5	N/A	8	7	10	10	8	10	6	7	10	8	8	10	8	7	8	10	10	10	10	8	**8.2**	**82%**
Presentation (oral) (5 points)	5	4	4	5	4	4	5	4	3	N/A	4	4	5	4	5	5	4	3	5	5	5	5	4	5	5	4	5	5	5	5	**4.5**	**90%**
Presentation (Poster) (5 points)	5	4	3	5	4	3	5	4	4	N/A	4	4	5	4	5	5	4	3	5	4	4	5	4	4	4	4	3	5	5	4	**4.2**	**84%**
Total in Percentile per Each Student Group	**79%**			**70%**			**78%**			**52%**			**89%**			**81%**			**89%**			**86%**			**85%**			**94%**				

* Interdisciplinary Group with Electrical Engineering

Fall 2008 ME Student Senior Design Evaluation

	Student Group 1 "Shhhop Vac"			Student Group 2 "Lug Nut Remover"			Student Group 3 "Ergonomic Laptop"			Student Group 4 "Easy Branch Pruner"			Student Group 5 "Auto Cork Remover"			Student Group 6* "Headlight Aiming Improvement"				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Innovation (10 points)	8	9	9	6	5	6	6	6	7	7	7	8	6	7	7	9	10	10	**7.4**	**74%**
Potential for Commercialization/Implementation (10 points)	10	9	10	8	6	6	7	5	6	8	5	7	7	7	7	9	8	10	**7.5**	**75%**
Technical Merit (10 points)	9	10	10	7	7	6	8	7	7	7	8	7	8	9	7	9	9	9	**8.0**	**80%**
Clarity and soundness of the project (10 points)	9	9	9	7	8	6	7	7	7	7	8	6	8	9	6	10	9	9	**7.8**	**78%**
Presentation (oral) (5 points)	5	5	5	4	4	3	5	3	4	5	4	4	5	5	4	5	5	4	**4.4**	**88%**
Presentation (Poster) (5 points)	5	4	4	4	2	3	4	4	4	4	4	4	5	4	4	3	4	4	**3.9**	**78%**
Total in Percentile per Each Student Group	**93%**			**65%**			**69%**			**73%**			**77%**			**91%**				

* Interdisciplinary Group with Electrical Engineering

Spring 2008 ME Student Senior Design Evaluation

	Student Group 1* "Gas Heat Pump Water Heater"			Student Group 2 "Dragonfly Aircraft"			Student Group 3 "UAV Variable Wing"			Student Group 4 "Motorized Palm Tree Trimmer"			Student Group 5 "Mechanical Torque Limiter"			Student Group 6 "High Perform Brake"				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Innovation (10 points)	8	8	9	6	4	8	7	6	6	7	6	8	8	8	8	7	4	8	**7.0**	**70%**
Potential for Commercialization/Implementation (10 points)	8	10	9	5	6	9	7	8	8	7	10	10	9	10	10	7	10	5	**8.2**	**82%**
Technical Merit (10 points)	9	8	10	4	4	10	6	8	8	8	6	9	9	8	10	7	8	6	**7.7**	**77%**
Clarity and soundness of the project (10 points)	8	8	8	6	6	10	8	8	6	8	8	8	10	8	9	7	8	7	**7.8**	**78%**
Presentation (oral) (5 points)	3	3	4	4	4	5	4	4	3	4	4	4	5	4	5	3	3	4	**3.9**	**78%**
Presentation (Poster) (5 points)	4	4	5	3	4	4	4	3	3	5	4	4	5	4	5	4	4	5	**4.1**	**82%**
Total in Percentile per Each Student Group	**84%**			**68%**			**71%**			**80%**			**90%**			**71%**				

* Interdisciplinary Group with Electrical Engineering

Fall 2007 ME Student Senior Design Evaluation

	Student Group 1 "Robotic Pellet Mover"			Student Group 2 "Miniature Air Vehicle"			Student Group 3 "Liquid Cooled Computer"			Student Group 4 "Insulated Cook Pot.."			Student Group 5 "Cool Alternatives"			Student Group 6 "Auto Solar Sunshade"				
	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Judge 1	Judge 2	Judge 3	Average Points per Area	Percentile per Area
Innovation (10 points)	6	8	5	7	9	8	6	9	6	7	7	6	9	10	8	9	9	8	**7.6**	**76%**
Potential for Commercialization/ Implementation (10 points)	7	8	4	7	7	6	8	9	8	6	6	8	10	10	10	8	9	8	**7.7**	**77%**
Technical Merit (10 points)	8	9	6	7	8	10	6	7	6	8	7	10	8	10	8	7	7	6	**7.7**	**77%**
Clarity and soundness of the project (10 points)	8	8	6	8	8	8	8	8	8	7	9	8	8	9	8	6	8	8	**7.8**	**78%**
Presentation (oral) (5 points)	4	5	3	3.5	5	4	4	5	4	4	5	4	4	5	5	4.5	5	5	**4.4**	**88%**
Presentation (Poster) (5 points)	2.5	4	3	3.5	4	3	2	3	4	2.5	5	3	3	5	5	2.5	4	4	**3.5**	**70%**
Total in Percentile per Each Student Group	**70%**			**77%**			**74%**			**75%**			**90%**			**79%**				

E.11 End-of-Semester Faculty Reports on Courses

a. Average grades for ME course in last two years

UNDERGRADUATE COURSE GRADES FALL 2007 - FALL 2009						
	FALL 2007	**SPRING 2008**	**FALL 2008**	**SPRING 2009**	**FALL 2009**	**AVERAGE GRADE**
ME 100	3.10	2.68	3.20	2.86		2.96
ME 100L	3.65	3.56	3.95	3.45		3.65
ME 120	3.23	3.12	3.41	3.52		3.32
ME 130	4.00	4.00	3.91	3.71		3.91
ME 220	3.85		3.48			3.67
ME 230		3.33		3.23		3.28
ME 240		3.76		3.67		3.72
ME 242	1.67	1.15	2.66	2.76	2.71	2.39
ME 301	3.46		2.62	3.32		3.13
ME 302	3.31	3.30	2.93	3.30	2.90	3.01
ME 302L	3.89	3.18	3.53	3.82	3.56	3.59
ME 311	2.64		2.80	1.89	2.70	2.57
ME 314	4.00	3.11		3.19	2.77	3.10
ME 315	3.78	3.59	3.77	3.76	3.45	3.59
ME 319/L				2.86	2.57	2.72
ME 320		3.00		3.41		3.21
ME 330		2.98		2.73		2.86
ME 337	2.70		2.50	3.16		2.79
ME 337L	3.64		3.22	3.56		3.47
ME 380	3.36	3.25	2.70	3.28	2.17	2.66
ME 380L	3.68	3.84	3.62	3.94	3.73	3.75
ME 400	2.53		3.10			2.81
ME 402	3.18		3.19		3.30	3.24
ME 415				3.67		3.67
ME 416		3.70		3.20		3.45
ME 418	3.10			3.17		3.13
ME 419			2.15	3.79	3.50	3.24
ME 421	3.38		3.05		2.80	3.01
ME 421L	3.78		3.60		3.56	3.63
ME 425	3.00				3.03	3.02
ME 426				3.35		3.35
ME 427			3.45			3.45
ME 434		4.00		3.33		3.66
ME 440	3.08		3.55		3.20	3.26

ME 446				3.68		3.68
ME 453	3.34		2.97		3.07	3.12
ME 455	4.00		3.00		3.59	3.54
ME 460		4.00		4.00		4.00
ME 462		4.00				4.00
ME 470		4.00				4.00
ME 480				3.89		3.89
ME 482			3.58			3.58
ME 491	3.14	3.94			4.00	3.77
ME 492	3.02	3.11	2.93	3.85		3.23
ME 497	3.79	4.00	3.74	3.58		3.78
ME 498	3.83	3.70	3.61	3.62		3.69

b. Faculty Responses

The following is sample faculty responses for the lab evaluation done for Fall 2009. It should be noted that faculty only give the responses to the class whose evaluation results are below average.

FALL 2009 Lab Survey

Answer Key: 5=*strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree*

MEG 380L 02 udayvadlamani@hotmail.com TA: Uday Vadlamani

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Student Comments	Faculty Responses
1) The lab manual/notes adequately Describe equipment and experiments. If not, please help us identify problems.	3	6	1	1	0	Pull money from the other colleges to fund some more engineering! The description in lab 1 should be revised. There were issues with the equipment and calculations.	I will revisit the lab 1 despcrition.
2) The lab experiments are reasonable in length and content. If not, how can we change it?	3	7	0	0	0	More equipment to help it go faster.	
3) Do the lab experiments follow the lecture material. If not, please explain.	3	4	2	1	0		It seems that most students feel that the lab follows the lecture.
4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	3	8	0	0	0		
5) The lab equipments are functional. If not, please explain.	1	6	4	0	0	Hydrometer's are almost all broken.	
6) The lab is well equipped. If not, what do you think is missing?	1	6	2	2	0	Better layout, desk setup. More hydrometers, thermometers, scales, etc. Some of the lab equipment has structural problems causing more calculated errors during the experiment process.	Since Jon becker from civil engineering is in charge of lab equipments, we might need to work with him to improve the lab deficency.

Lab Survey (Fall 2009)

ME 302L 03	syful_islam@yahoo.com	Muhammed Syful Islam
	Student Comments	**Faculty Responses**
1) The lab manual/notes adequately Describe equipment and experiments.	~Sometimes the lab manual doesn't give the student enough info. ~Lab #1 totally confusing. Lab is not in organized fashion for this section. ~Lab #1 was so confusing. Didn't understand any of it. ~It doesn't have equations we need, it is vague. The timeline is from last semester. ~Lab manual; some labs didn't have procedure or set up and/or charts. ~Some of the labs are described perfectly. ~Others like the Torsion one need to be updated.	We have been using the same lab manual for a while. I am not sure why there was so much confusion this semester with it. We have not received many comments like this before. We will review and make some modifications to the manual for next semester.
2) The lab experiments are reasonable in length and content. If not, how can we change it?	~80% is him talking, 20% experiment. ~Lab experiment taking so long with professor ever if lab supposed to be short. ~Some topics are repeated an unnecessary amount of times dragging the lab out longer than it needs to be. ~The TA makes it last soooo much longer. If he would stop repeating things and wasting time it would be smoother. ~The professor constantly repeats simple facts and takes 3 times longer than needed. ~The length greatly depends on the TA. ~Better TA's are drastically needed! That is the problem with UNLV engineering now.	We will try to work on presentation style with the TA's. This TA has been doing the lab for several semesters so we should not be having this problem.
3) Do the lab experiments follow the lecture material. If not, please explain.	~The course itself didn't follow the material of the lab. ~After the 3rd week, the material covered in lecture was behind that in the lab. ~Sometimes they do but sometimes they don't. ~Lab is ahead of lecture. ~Our lecture is behind schedule than lab. ~Material, yes, schedule, no. ~Lab gets ahead of the class for awhile and it becomes challenging until the class catches up. ~Poorly correlated. Both 302 and 302L teachers do not teach material adequatly.	There is no way that this course will ever match the lecture class exactly; where lab experiments are ocurring at the same time as the lecture material. The lab is set up to be a separate 1-credit stand alone class that complements the lecture material.

4) The performance of the lab instructor is satisfactory. If not, how can he/she improve it?	~He can make sure we are out in a timely manner. The experiment usually only take 15 mins. But we are here for 3 hours. ~Expedite labs. ~Goes on and on, confusing me, his lecture and lab do not go together, hard to understand him. ~He talks too much what makes lab long. ~He is a good instructor but repeats topics too long. ~Speak louder, clearer. ~Don't repeat stupid things so many times. ~Too repeatitive and confuses students. ~Better organization and preparation! Needs to relate to the students better.	We will work with this TA to improve his lecture style or use a different TA for this lab.
5) The lab equipments are functional. If not, please explain.	~Torque, TQ machine, broke in middle of class and began working later. ~There was an issue with the machine used for the Torsion Test. It took about 2 hours to get it to work properly and there was still error in the results. ~Some lab experiments are not. ~In the torsion lab the force sensor was not working correctly. ~In lab we encountered malfunction with equipment. ~Sometimes we have trouble to get a data from lab equipment. ~The reading not onsistant. ~Torque machine broke, we waited one hour trying to fix it. ~The Torque one broke and the gauges are off on the strain box. One machine didn't work until the last 30 minutes of class and he made us sit here while he played with it and rushed the lab. For the most part. Some strain gauges are misaligned. Torsion machine broke for 2 hours. Outdated.	The torque machine did break during this section of the lab class causing considerable delays. This has not happened before and is an isolated incedent. It was repaired but it took some time to do this.
6) The lab is well equipped. If not, what do you think is missing?	~Lab equipment should be tested if it works. ~There is all the equipment necessary but it is not always very reliable ie. Some equipment didn't work holding up the actual experimentation. ~Only one lab experiment per class? ~Fair equipment.	We only have one experimental apparatus for each experiment. The TA's do trial runs of the experiments the week before the lab.

E.12 Department Meeting Agenda and Minutes (2008-2009)

Agenda for 2/7/2008 (2:30) Department Meeting (Department Conference Room)

1. Approval of minutes of last meeting.
2. Results and Request forms (due 2/15/2008)
3. Department Budget update (please see attached)
4. Enrollment Update (please see attached)
5. Senior Design Update (Wang)
6. ABET update: We need to discuss evaluations for Fall 06 semester. Please review results of:
   - 7TU7TUCourse Objectives Evaluation ResultsUU7T7T

   The results are on the web in the department web site at: 7TU7TUhttp://me.unlv.edu/Undergraduate/Assessment/Course%20and%20Instructor%20Evaluations.htmUU7T7T
   - Exit Interviews:

   7TU7TUhttp://me.unlv.edu/Undergraduate/Assessment/Exit%20Interviews/Exit%20Interviews.htm
7. Integrated BS-MS Program:

   The Integrated BS-MS degree program is designed to provide high-achieving ME undergraduate students with the opportunity to be exposed to graduate courses and to encourage them to continue with graduate degree by reducing the time needed for degree completion. Up to nine credit hours of approved graduate-level course work can be taken as technical electives during the senior year may apply to both undergraduate and graduate degrees. The following conditions are needed to enroll in the Integrated BS-MS program:

   [1] *A minimum of two semesters of full-time enrollment in B.S. of Mechanical Engineering program is required.*

   [2] *Applications are normally submitted with two semesters remaining in the senior year.*

   [3] *A minimum of 90 credit hours of course work applicable to the B.S. of Mechanical Engineering degree with a cumulative GPA of 3.50 to 4.00 or higher must be completed before beginning the joint degree program.*
8. Nomination for Graduate Faculty Status: Dr. V.C. Venkatesh (please review attached CV)
9. Selection of next department chairman. It is suggested to convene a meeting to vote on this issue before the end of February.
10. New business

Minutes of 2/7/2008 (2:30) Department Meeting (Department Conference Room)

Present: Cantrell, Cook, Roy, Trabia, Mauer, Boehm, Reynolds, Moujaes, O’Toole, Landsberger, Markle, Pepper, Lee

Excused: Wells, Wang

1. Approval of minutes of last meeting (Cook / O’Toole)
2. Results and Request forms (due 2/15/2008)
3. Department Budget Update
4. Enrollment Update
5. Senior Design Update: Dr. Landsberger mentioned that he is moving the deadline for finishing prototypes to March. He wants student groups to maintain focus of objectives of the projects.
6. ABET update: Tabled

7. Integrated BS-MS Program:

    The Integrated BS-MS degree program is designed to provide high-achieving ME undergraduate students with the opportunity to be exposed to graduate courses and to encourage them to continue with graduate degree by reducing the time needed for degree completion. Up to nine credit hours of approved graduate-level course work can be taken as technical electives during the senior year may apply to both undergraduate and graduate degrees. The following conditions are needed to enroll in the Integrated BS-MS program:

    [1] *A minimum of two semesters of full-time enrollment in B.S. of Mechanical Engineering program is required.*

    [2] *Applications are normally submitted with two semesters remaining in the senior year.*

    [3] *A minimum of 90 credit hours of course work applicable to the B.S. of Mechanical Engineering degree with a cumulative GPA of 3.50 to 4.00 or higher must be completed before beginning the joint degree program.*

    The proposal is amended by Pepper to include:

    [4] *Student has to choose the thesis option.*

    Motion to approve (Mauer / Cook). Motion is carried with two abstaining.

8. Nomination for Graduate Faculty Status: Dr. V.C. Venkatesh.
   Motion to approve (Mauer / Cook). Motion is carried with two abstaining.

9. Selection of next department chairman. It is suggested to convene a meeting to vote on this issue before the end of February.

Agenda for 8/28/2008 Department Meeting (Department Conference Room)

1. Student advising (Diona Williams)
    - New director of advising center
    - Use of Advising Data System for student advising
    - Some issues in a prereq. waiver for future ABET visit
2. Prof. W. Wells retired under university's VSIP Program. It is an early retirement program. College is planning to have an event on Aug. 29 to celebrate his retirement.
    - Emeritus Professorship
3. Prof. Ajit Roy resigned. He will work as a science adviser for DOE's Savanna River National Lab. Prof. Roy will maintain a graduate faculty status for advising his students in UNLV for next 5 years.
4. Prof. Shizhi Qian resigned last month due to family reason, and the Provost office approved a replacement position.
    - Advertisement will be out in September for a target hiring date of Jan 2009.
    - Need to form a search committee including an external member.
    - Area?
5. College's recent restructuring in AA positions:

    First restructuring: Betty moved to MEP office and we only have 1.5 position of AA. Joan's position is not changed and Livia of CEE will work for our department a half time.

    Second and final restructuring: Each dept will have one AA support and all travel and Edoc will be done in college level.

6. Prof. O'Toole will be a new graduate coordinator for our department effective from July 1, 2008. He will be in charge of graduate application, and other issues in the program including PhD qualifying exam.

7. Prof. Mauer will be a new undergraduate coordinator effective from July 1, 2008. He will be in charge of undergraduate curriculum and other issues we are facing for upcoming ABET visit in 2010.
8. Dr. VC Venkatesh joined a department as a visiting professor for one year. Prof. Venkatesh has an extensive background in manufacturing and precision engineering.
9. Numbers from the new student orientation we have on Aug. 21
    *Civil Engineering * 23
    Electrical & Computer Engineering Computer-20 and Electrical-19
    Computer Science 38
    Construction Management 10
    Mechanical/EED 42
    Undeclared 19
10. Long term schedule F08-S13
    - ME 301 will be offered every spring semester from S09
    - ME 337 will be offered every spring semester from S09
        - Combining resources for ME 337L and ME 421L to TBE B121.
11. Laboratory upgrade status (Jeff Markel)
12. Department website update
    - Need new pictures for each faculty
13. Mendenhall Innovation Program (MIP) update (BJ Lansberger)
    - New design center update
    - To advise students about the "Technology Commercialization Minor" and encourage them to register for it (ME 460)
14. New building update
    - First move is expected in October and fully occupied in Jan 09
    - M/C shop is available with one machinist position
    - Space committee will meet at the end of fall semester for back-fill space
15. Nuclear Program (A. Hechanova, D. Beller)
    - Dr. Charlotta Sanders will be a research assistant professor in ME department.
    - Future PhD program in nuclear engineering
16. New travel policy of college
    - No $1K travel money for 08-09
17. Need a department vote for the College Faculty Affair Committee member.
18. Need a department representative for the College Bylaw Committee.

MINUTES
DEPARTMENT MEETING
CONFERENCE ROOM TBE-A 220
AUGUST 28, 2008

ATTENDEES:

Dr. W. Yim, Chairman	Dr. B. Landsberger
Dr. M. Trabia	Kevin Nelson
Dr. D. Pepper	Dr. A. Hechenova
Dr. D. Reynolds	Dr. D. Beller
Dr. B. O'Toole	Dr. A. Roy

Meeting called to order.

IN ORDER OF AGENDA (attached):

ITEM 1: Introduction of Diona Williams, Interim Director for COE Advising Center.
a. Advising center working with curriculum changes.
b. Sending mass e-mail to student advising of curriculum changes.

c. Advising center shared database is up and running.
d. Database to be used by Faculty Mentors.
e. Assignment of Faculty Mentors and conveying to students.

ITEM 2: Announced Dr. William Wells' retirement effective immediately. Unanimously voted the designation of Emeritus Professor.

ITEM 3: Resignation of Dr. Ajit Roy. Dr. Roy accepted position at the DOE's Savanna River National Lab as a science advisor. Dr. Roy approved by the Graduate College 5 year term status of Associate Graduate Faculty in order to continue advising and monitoring 3 Ph.D. students and 1 MS student. Dr. Roy presented with gift from department.

Words from Dr. Roy: will be working closely with University of South Carolina's nuclear program.

ITEM 4: Resignation of Dr. Shizhi Qian.

a. Provost office approved replacement position.
b. Prepare advertisement for replacement position.
c. Provost's office does not want the Bio-Medical program dissolved. Position description should be in accordance with hiring a person qualified to continue Bio-Medical program.
d. Target hire date is prior to beginning of spring 2009 semester. Beginning teaching spring 2009 semester.
e. Search committee must be formed, which must include 1 external member. Dr. Pepper and Dr. Reynolds volunteered.
f. Dr. Yim announced that there's a candidate waiting in the wings. Candidate is from Penn State and credentials are identical to Dr. S. Qian's.
g. Dr. Pepper voiced reservations about the continuation of the Bio-Medical program and predicts the program being dissolved in the near future. Suggested candidate should be able to slide in to the area of Materials i.e. Bio-Engineering vs. Bio-Medical. Suggestion well received by other faculty members.
h. Brief discussion regarding start-up funds for successful candidate. Re-use of equipment purchased under the direction of Dr. Qian – lab TBE-B 164 is in place and set-up.
i. Average start-up funds according ASME is $175,000. Not a realistic figure for the COE.
j. Comment from Dr. Trabia: grave reality that further academic budget cuts will be instituted after 12/31/2008.

ITEM 5: COE restructuring of AA positions.

a. Bettie re-assigned to Multi-Cultural Engineering
b. Majority of information conveyed to faculty is not accurate.
c. Dr. Yim conveyed information to faculty as it has been presented to him by the Dean's office

CORRECTIONS TO RESTRUCTING – by Joan:

d. Levia from CEE will not be working with ME
e. All departments have 1 AA.
f. Travel has not been taken over by the Dean's office. Only some travel will be taken – new policy unclear.
g. E-Docs will be taken over by the Dean's office. Student workers and summer salary stay in department – policy unclear.

NEITHER f. nor g. has taken place.

ITEM 6: Dr. O'Toole appointed Graduate Coordinator, effective 07/01/08.

ITEM 7: Dr. Mauer appointed Undergraduate Coordinator, effective 07/01/08.

ITEM 8: Announce the one year appointment of Dr. Vellore Venkatesh, Visiting Professor. Fall 2008 semester is teaching 3 ME courses.

ITEM 9: Census information taken from new undergraduate student orientation, took place on August 21, 2008. ME department has the highest enrollment figure.

ITEM 10: In order to realign undergraduate program:

a. Effective Spring 2009: ME 301 and ME 337 offered every spring semester.
b. Effective Spring 2009: TBE-B 121 will be strictly a teaching

lab only. ME 337L and ME 421L will be taught in B 121.
  c. Updated long-term scheduled attached.

ITEM 11: Laboratory status – update carried over to next meeting.

ITEM 12: ME website: update faculty pictures. Response from faculty was less than overwhelming.

ITEM 13: Mendenhall Innovation Program – Dr. Landsberger working closely with program. Comments from Dr. Landsberger:
  a. ME shop is undergoing upgrades and expansion to create a new design center.
  b. ME requested to relocate labs in TBE-B 175 and 164. Department's position, at this time, is to not relinquish need space prior to alternative space being identified.
  c. Clear communication with students informing them of the Technology Commercialization Minor. Encourage students to enroll in EGG 460 – Technology Commercialization (flyer attached) as a tool to expose student to this minor.

ITEM 14: SEB building:
  a. Anticipated stage 1 moves to begin October 2008.
  b. Full occupancy January 2009.
  c. Machine Shop in SEB for research only. One machinist position open.

ITEM 15: Nuclear Program:
Comments from Dr. Beller and Dr. Hechanova:
  a. Tremendous growth potential.
  b. Funding limited – HRC will fund instructor @ 50% and instructor will need to bring in 50% in external funding, i.e. grants, personal consulting, etc.
  c. Expansion of courses offered. Proposed nuclear course offerings attached.
  d. Dr. Charlotte Sanders accepted Research Assistant Professor position in ME department.

ITEM 16: COE suspended $1,000 faculty travel funding. Department will fund 1 registration fee and $500 of other travel expenses.

ITEM 17: College Faculty Affairs Committee – vote required.

ITEM 18: College Bylaw Committee – vote required.

Announced: Next faculty meeting will be held at the end of September 2008.

MEETING ADJURNED.

Agenda for 1/15/2009 ME Department Meeting (Department Conference Room)

1. Approval of minutes for 10-30-2008 department meeting.
2. New faculty introduction: Dr. Hui Zhao (Biomedical Position)
   a. Office TBE B-113; Laboratory: B 164
3. F08 Undergraduate Exit Interview results (Please see the attached summary)
   a. Need to discuss our plan to accommodate their feedbacks.
4. F08 COA (Course Objective Assessment) was sent to each faculty. We need the following two items from faculty: (Due: mid Feb)
   a. Faculty response for COA (So far I received two) together with average grade for each courses taught in F08.
   b. Updating course objectives if needed for 2010 ABET visit.
5. All lab syllabus needs to be revisited to check whether (1) the syllabus reflect all lab objectives specified in the course objectives and(2) lab equipment needs any improvement. The following is the list of faculty mentors for each lab. (Due: Mid Feb)

Mauer:	ME 421L
Cook, Mauer:	ME 100L
Chen, Boehm, Moujaes:	ME 315(Thermal Lab)
Yim:	319L (Matlab), 337L
Wang:	120 (AutoCAD), 220 (Pro Eng), 240 (Solid Works)
O'Toole:	302L
Pepper, Zhao:	ME 380L
Nelson:	130 (M/C shop), 230 (CNC)

6. ABET class note collection:
   a. F08: ME 400 (Chen), ME 427 (Wang), ME 482 (Culbreth)

  - b. S09: ME 230 (Nelson), ME 240 (Wang), ME 345 (Lybarer), ME 301 (Cook), ME 320 (Wang)ME 415(Boehm), ME 416 (Zhao), ME 418(Mousajes), ME 426(Wang), ME 434 (Reynolds), ME 441 (Venkatesh), ME 480 (Culbreth), ME 495 (Cheng), ME 495 (002)(Chen), ME 319 (YIM), ME 330 (YIM)

7. College advisory board meeting on Feb 6. All department board members will be invited too.
8. Need to form dept committee (3) for
   - a. Tenure review (every year)
   - b. Full promotion review (3 years)

9. Undergraduate Program (G. Mauer)
   - a. Currently only two elective courses are required for graduation (2008-2010 Catalog). This means that there are difficulties in enforcing students to choose the area of emphasis for their BSE degree.
   - b. How to enforce the FE exam requirement for 2008-2010 Catalog?
     - S09 ME 492 schedule is available (see attachment)
     - Sept 1 deadline for October Exam, March 1 deadline for April Exam
10. Graduate Program (B. O'Toole)
    - a. Update for S09 enrollment
11. Fall 09 schedule (See attachment)
12. Summer 09 schedule
    - a. Planning to offer ME 120 (TA), ME 242 (Need volunteer), ME 311 (Moujaes), ME 314 (Moujaes)
13. 2008 Alumni Survey Results (about 33 received) : will be posted in the web
14. One page ear mark proposal due Jan 16 to college.
15. 2008 Annual Report is due to chair by Jan. 26. Form is at 7TU7TUhttp://facultysenate.unlv.eduUU7T7T All academic faculty report form was email
16. Brendan O'Toole will be an acting chair from Jan 20-23.

ME Department Meeting Minutes

Date: 1/15/2009
Location: Department Conference Room
Attendees: Yim, O'Toole, Boehm, Reynolds, Pepper, Mauer, Zhao, Trabia, Cook, Markle, Chen, Landsberger, Nelson, Wang

Agenda Item: Approval of minutes for 10-30-2008 department meeting	Discussion: None
	Action Taken: • All members voted unanimously to approve the minutes of the 10-30-2008 department meeting
	Persons Responsible:
Agenda Item: F08 Undergraduate Exit Interview results	Discussion: • Need to reflect the results of exit interview to the program • Need to have better communications between TAs and lab supervisors • Need separate lab for ME 380L from CEE
	Action Taken: ME 421L • Inclusion of TecQuipment Process Trainer in lab curriculum • Additional computers and Quanser ELVIS stations for hands-on experience on control ME 380L • Discuss with Civil chair for possible split of ME 380L between ME and CEE

	Persons Responsible: Mauer, Markle, Yim
Agenda Item: F08 COA (Course Objective Assessment) was sent to each faculty. We need the following two items from faculty	Discussion: • COA was sent to each faculty and to be reviewed for possible update for 2010 ABET visit • Advised not making any catalog changes until after the upcoming ABET review.
	Action Taken: • Updating course objectives if needed for 2010 ABET visit.
	Persons Responsible: • All faculties
Agenda Item: Updating all laboratory syllabi	Discussion: • Need to review all lab syllabus for (1) the syllabus reflect all lab objectives specified in the course objectives and(2) lab equipment needs any improvement.
	Action Taken: • Need to revise all lab syllabi and handouts by the end of S09. • Updated syllabi need to be sent to Yim
	Persons Responsible: Mauer: ME 421L Cook, Mauer: ME 100L Chen: ME 315(Thermal Lab) Yim: 319L (Matlab), 337L Wang: 120 (AutoCAD), 220 (Pro Eng), 240 (Solid Works) O'Toole: 302L Pepper, Zhao: ME 380L Nelson: 130 (M/C shop), 230 (CNC)
Agenda Item: ABET Class note collection	Discussion: • Planning to collect class notes by F09 for ABET 2010 visit
	Action Taken: • F08: ME 400 (Chen), ME 427 (Wang), ME 482 (Culbreth) • S09: ME 230 (Nelson), ME 240 (Wang), ME 345 (Lybarer), ME 301 (Cook), ME 320 (Wang)ME 415(Boehm), ME 416 (Zhao), ME 418(Mousajes), ME 426(Wang), ME 434 (Reynolds), ME 441 (Venkatesh), ME 480 (Culbreth), ME 495 (Cheng), ME 495 (002)(Chen), ME 319 (YIM), ME 330 (YIM)
	Persons Responsible: • All faculties
Agenda Item: Department committees	Discussion: Need to form a department committee for tenure and promotion • Tenure review (every year) • Full promotion review (3 years)
	Action Taken: • Need volunteers from full professors
	Persons Responsible:
Agenda Item: Undergraduate program	Discussion: • Currently only two elective courses are required for graduation (2008-2010 Catalog). This means that there are difficulties in enforcing students to choose the area of emphasis for their BSE degree. • FE exam issues in 2008-2010 Catalog

	Action Taken: • Most of pre-req's waiver will be handled in the department for more strict enforcement • Must be advised to take FE Exam at least two semesters before intended graduation date to avoid delay in graduation in 2008-2010 catalog.. • Advisors need to improve strategic program planning to enhance the success of students.
	Persons Responsible: • All faculties
Agenda Item: Graduate Program	Discussion: • New admits: 4 MS – 2 PhD • Instructors of 400 level courses should actively recruit current students
	Action Taken:
	Persons Responsible:
Miscellaneous Items	• Fall 09 schedule is available now • Summer 09 schedule o Planning to offer ME 120 (TA), ME 242 (Need volunteer), ME 311 (Moujaes), ME 314 (Moujaes) • 2008 Alumni Survey Results (about 33 received) : will be posted in the web • One page ear mark proposal due Jan 16 to college. • 2008 Annual Report is due to chair by Jan. 26. Form is at 7TU7TUhttp://facultysenate.unlv.eduUU7T7T o All academic faculty report form was email • Brendan O'Toole will be an acting chair from Jan 20-23.

Agenda for 3/24/2009 ME Department Meeting (2:30PM Department Conference Room)

1. Approval of minutes for 1-15-2008 department meeting.
2. Follow-ups for F08 Undergraduate Exit Interview results
   a. Separation of ME 380L and ME 302L with Civil Engineering
   b. Each department (ME and CEE) will have 2 Sections each from F09
   c. Currently looking for a new site for ME 380L
3. Follow-ups for F08 COA Course Objective Assessment.
   a. Still need faculty responses for ME 100L (Cook), ME421L (Mauer), ME 402 (Pepper), ME497(Lansberger), ME380L(Chen)
4. ABET Materials
   a. Course Description: See attached template (2 pp limit)
      - Needs to be finished by the end of S09.
      - Be sure to review Curse Objective whether it is compatible with current syllabus
5. Mid-semester laboratory evaluation results
   a. See attached evaluation results
   b. Laboratory mentors need to review and update the following materials by the end of this semester. Make sure course syllabus reflects all lab objectives specified in the course objectives:
      ➢ **Syllabus** **Course Objectives** **Handouts** **Equipment upgrades**
   c. Spring semester labs:

ME 100L (Mauer, Cook), ME120 & 220 &240 (Wang), ME 130&230 (Nelson), ME 302 (O'Toole), ME 315 (Chen), ME 337L & 319L (Yim), ME 380L(Pepper)

6. Undergraduate Program Updates
   a. Advanced standing for ME students : See a modified flowchart
   b. FE Exam advising: At least two semesters before the targeted graduation for 2008-2010 Catalog.
7. Graduate Program (O'Toole)
   a. Update for F09 enrollment
   b. New web based application update
8. ABET class note collection reminder

F08: ME 400 (Chen), ME 427 (Wang), ME 482 (Culbreth)
S09: ME 230 (Nelson), ME 240 (Wang), ME 345 (Lybarer), ME 301 (Cook), ME 320 (Wang)ME 415(Boehm), ME 416 (Zhao), ME 418(Mousajes), ME 426(Wang), ME 434 (Reynolds), ME 441 (Venkatesh), ME 480 (Culbreth), ME 495 (Chen), ME 495 (002)(Chen), ME 319 (YIM), ME 330 (YIM)

ME Department Meeting Minutes

Date: 3/24/2009
Location: Department Conference Room
Attendees: Yim, Trabia, Boehm, Venkatesh, Reynolds, Mauer, Landsberger, Zhao, Chen, Wang Moujaes

Agenda Item: Approval of minutes for 1-15-2009 department meeting	Discussion: Introduction of Dr. Venkatesh – teaching Dr. Trabia's courses for academic year 2008-2009. Active submitting proposal for manufacturing grant
	Action Taken: • All members voted unanimously to approve the minutes of the 1-15-2009 department meeting
	Persons Responsible:
Agenda Item: Follow-up: F08 Undergraduate Exit Interview results	Discussion: Looking for new site for ME 302 and ME 380 labs. Discussed with Dean taking over B113 – no reply at this time. B150 priority is for teaching. Better appearance of lab areas. Possibility of moving to other buildings – not a good idea. Research should stop during teaching hours.
	Action Taken: Agreed to split ME 380L and ME 302L. Complaints that lab handouts need updating and noise in B150.
	Persons Responsible: Dean Sandgren and all faculties
Agenda Item: Follow-up: F08 COA (Course Objective Assessment	Discussion: Handed out to various faculties.
	Action Taken: Transmit 1-2 sentence comment
	Persons Responsible:
Agenda Item: ABET Materials	Discussion: What if more than I faculty teaching the same course. Dr. Yim will send table/spreadsheet for faculty to follow. Include design credit(s)
	Action Taken: Follow ABET course syllabus
	Persons Responsible: All teaching faculties
Agenda Item: Mid-semester laboratory evaluation results	Discussion: Construction comments – make a plan for improvements or clarification. All labs should have handouts. Plan – 1 faculty mentor per lab – permanent assignment - end rotation
	Action Taken: T/As will bring comments to Dr. Yim regarding their individual assignment
	Persons Responsible: SPRING 2009 SEMESTER LABS: ME 100L (Mauer, Cook), ME 120 & 220 & 240 (Wang), ME 130 & 230 (Nelson, ME 302 (O'Toole), ME 315 (Chen), Me 337L & 319L (Yim), ME 380L (Pepper, Zhao)
Agenda Item: Undergraduate Program Updates	Discussion: Students confused about advanced standing. Student can achieve advanced standing by end of sophomore year (ME 301, 302, 319 does not require advanced standing
	Action Taken: New flowchart and updated long term plan on website

	Persons Responsible:
Agenda Item: Graduate Program	Discussion:
	Action Taken:
	Persons Responsible: Dr. O'Toole
Agenda Item: ABET class note collection reminder	Discussion: Key information i.e. copies of graded work – tests, homework
	Action Taken:
	Persons Responsible: various faculties
Miscellaneous Items	None

Agenda for 8/27/2009 ME Department Meeting
(10:30 AM Department Conference Room)

1. Approval of minutes for 3-24-2009 department meeting.
2. Department Curriculum Committee (G. Mauer (Dept. Representative for college curriculum committee), S. Moujaes, D. Cook)
    a. All new course proposals and changes must go through this committee.
        i. ME program description will be rewritten (Please see the attachment).
    b. We had a meeting during summer, and the followings were discussed and suggested:
        - Introduction of programming in ME 100 in lecture, preferably Matlab. Students will continue programming skill development in ME 319/319L.
        - ABET related program and course assessment
3. Planned addition of special fees $50 per course ,

ME 453	Vibration
ME 414	Sizing Solar Energy System
ME 415	Design of Thermal System
ME 418	Air Conditioning
ME 419	HVAC
EGG 150/450	Intro Solar Energy
SS~~ME 230~~	~~CNC~~

4. Laboratory Update:
    a. ME 100L will remain in FDH one more semester. Future is uncertain (RAJ?)
    b. ME 337L will be integrated with ME 421L in TBE B121. Both labs will share the same resources and can hold more than 20 students in one section. B121 will be 100% teaching laboratory.
    c. B175 (old Measurement Lab) will be used by ASME Student Chapter activities and ME undergraduate laboratory preparation space by Jeff Markle.
5. Dr. VC Venkatesh's contract was extended one more year.
6. S09 Exit Interview Results (See attachment)
7. 2010 ABET Preparation
    a. Course Description (2pp limit, See the attached sample)
    b. Class note collection (Please see the attached schedule for note collection): Note that the most of class notes must be collected in F09.
8. Class evaluation
    a. TA evaluation: Will be done by our mid-semester lab evaluation and faculty mentor's input for the evaluation is important (See attached TA assignment and mentor list)
    b. Follow-up of the S09 COA
9. Mid-semester laboratory evaluation plan and mentor list:

ME 100L (Mauer), ME120 &220 (Wang), ME 302L (O'Toole), ME 380 (Zhao), ME 315 (Chen), 319L (Yim), ME 421L (Mauer)

After the evaluation laboratory mentors need to review and update the following materials by the end of this semester. Make sure course syllabus reflects all lab objectives specified in the Course Objectives:

10. FE Exam
    a. Prep course (ME 492):
        - Planning to change the format of instruction by solving more FE exam sample problem sets rather than general review of the subject. Department will provide the problems sets.
        - Dr. Wang will coordinate ME492 in F09.
    b. S09 FE Results for ME graduates (Please see the attachment)
    c. From the 2008-2010 Catalog, students need to pass the exam to graduate. We need to be careful when we mentor students.
    d. Shall we review AM common topics?
11. Graduate Program (O'Toole): Please see the attachment for enrollment data
    a. Update for F09 enrollment:
    b. New web based application update:
    c. Department GA list and assignment (Please see attached list)
12. Integrated BS-MS Program
    Lowering the required GPA.

Attachment:

- Minutes for 3-24-2008 department meeting
- Proposed ME Program Description Changes
- S09 Exit Interview Results
- ABET Course Description Template
- F09 class note collection schedule
- S09 FE Exam Results
- F09 TA Assignment

ME Department Meeting Minutes

- Date: 8/27/2009 10:30 AM
- Location: Department Conference Room
- Attendees: Dr. Yim, K.Nelson, Dr.Chen, Dr.Boehm, Dr.Mauer, Dr.Cook, Dr.Zhao, J.Markle, Dr.Reynolds, Dr.Wang, Dr.Trabia, Dr.Moujaes

Agenda Item: Approval of minutes for 3/24/2009 department meeting	Discussion: **Reminder to all faculties: course descriptions in ABET format need to be submitted as soon as possible.**
	Action Taken: Minutes 3/24/2009 approved.
	Persons Responsible: Attendees
Agenda Item: Department Curriculum Committee G.Mauer S.Moujaes D.Cook	Discussion: • All new course proposals and changes must go through department's curriculum committee. • ME program description will be rewritten (see attached) • Recap of Summer department meeting – RE: Introduction of programming in ME 100 lecture, preferably Matlab. Students will continue programming skill development in ME 319/319L • ABET related program and course assessment

	Action Taken: Change text book, next semester, for ME 319 because current MatLAB text is being used in ME 319 and ME 100. Degree requirements in catalog – UUclarification onlyUU to be published in next undergraduate catalog. No changes to overall program(s) to maintain continuity in preparation for upcoming ABET reaccreditation visit and analysis. Total credit hours in each category = 126, but catalog states “127-129” Identify number of credits discrepancy and adjust/clarify accordingly for next, future catalog. Updated flow-charts on ME website – PreME, Advanced Standing, clarify courses that students are eligible to take regardless of standing. ME degree program requires more credits vs. UNLV overall policy. Overall UNLV baccalaureate degree total credit requirement = 120 credits
	Persons Responsible: Dr. Yim and undergraduate curriculum committee
Agenda Item: Planned addition of $50 special fee per course	Discussion: ME 453 – Vibration, ME 414 Sizing Solar Energy System, ME 415 – Design of Thermal System, ME 418 – Air Conditioning, ME 419 HVAC, EGG 150/450 – Intro Solar Energy, ME 230 - CNC
	Action Taken: • UNR ME department applies special fees to majority of courses. Department will be submitting requests for the additional special fees to be effective Spring 2010. • Faculty will need to advise students of applicable course special fees during advising/mentoring sessions. Faculty must be able to justify the additional fees to students. • Consult with Dean’s office RE: special fees for thesis and dissertation credits. • Overall consensus was that the thesis and dissertation fees will be passed-on to PI’s and/or faculties funding graduate students.
	Persons Responsible: Dr. Yim and faculty mentors
Agenda Item: Laboratory Update	Discussion: • ME 100L will remain in FDH F09 semester, future location uncertain, possible location RAJ • ME 337L will be integrated with ME 421L in TBE B121. Both labs will share the same resources and can hold more than 20 students in each section. B121 will be 100% teaching laboratory. • TBE B175 (previously Measurement Lab) will be used by ASME and SAE Student Chapter activities and ME undergraduate laboratory preparation space by Jeff Markle
	Action Taken: • COE has not identified future space for ME 100L. Electrical Engineering is dominating the SEB building. Moving lab to SEB does not seem to be an option. • TBE-B113 is nearly cleared out of other engineering disciplines. • TBE-B113 the noise level remains high. Identify and explore solutions. • Dr. Zhao’s office and his lab (TBE-B164) are scheduled to move to SEB in appropriately 6-8 weeks
	sons Responsible: Dr. Yim, J.Markle, and faculties moving to SEB
Agenda Item:	Discussion:None

Dr. VC Venkatesh's contract was extended one more year	Action Taken: None
	Persons Responsible: N/A
Agenda Item: S09 Exit Interview Results (see attached)	Discussion: • Education objective includes core requirements
	Action Taken: • Undergraduate curriculum committee to review exit interview results in detail • ABET purposes – need to justify not diligently recruiting our student to purse post-graduate studies at UNLV, specifically in Mechanical Engineering. • Include graduate studies in mentoring sessions and possibly during 400 level classes.
	Persons Responsible: All faculties
Agenda Item: 2010 ABET Preparation	Discussion: • Course Description (2 paragraph limit – sample attached) • Class note collection (schedule for note collection attached) Most of the class notes must be collected in F09
	Action Taken: • Further clarification is need to complete ABET self-study report due July 2010 • Collection of class notes can be quizzes, tests, hand-written student notes. • Method used to grade students is a critical factor that will be assessed by the ABET team. • Class notes for Senior Design 497 & 498 will be the student's final report only. • Lab mentors are responsible for note collection from teaching assistants.
	Persons Responsible: Dr. Yim, teaching faculty, and staff
Agenda Item: Class evaluation	Discussion: • TA evaluation: will be done with mid-semester lab evaluation and faculty mentors's input for the evaluation is important (TA assignment and mentor list is attached) • Follow-up of the S09 COA (course objective assessment)
	Action Taken: None
	Persons Responsible: Staff – schedule and execute mid-semester lab evaluation.
Agenda Item: Mid-semester laboratory evaluation plan and mentor list	Discussion: • After the evaluation, laboratory mentors need to review and update the following materials by the end of this semester. Make sure course syllabus reflects all lab objectives specified in the Course Objectives. Action Taken: (a) Persons responsible (below) need to be available to TA's (b) Persons Responsible: ME 100L – Mauer, ME 120 and ME 220 – Wang, ME 302L – O'Toole, ME 380L – Zhao, ME 315 – Chen, ME 319L – Yim, ME 421L – Mauer
Agenda Item: FE Exam	Discussion: • Pre course – ME 492 – plans to change format of instruction by solving more FE exam sample problem sets rather than general review of the subject. Department will provide the problems sets • Dr. Wang will coordinate ME 492 for F09 semester. • S09 FE Results for ME graduates (see attached) • 2008-2010 Catalog, students need to pass the exam to graduate. Faculty needs to be careful when mentoring students.

	Action Taken: • SP08 - significate decrease in ME students that passed FE exam. • Day 1 of ME 492 ask students who is re-taking exam. • Solving more problems during review class is suggested to increase number or students passing actual FE exam • Need to teach the test. Teach using manual used for actual FE exam. • NCESS sells previous exams. • When advising students encourage them to register for ME 492 two (2) semesters prior to anticipated graduation semester. • Department will obtain copies of manual and practice test to be distributed to instructors assigned to ME 492.
	Persons Responsible: Dr. Yim and all ME faculty
Agenda Item: Graduate Program B.O'Toole	• Discussion: • Update for F09 enrollment • New web based application update • Department GA list and assignment (see attached)
	Action Taken: • Dr. O'Toole was not present – reviewed attached data provided by Dr. Toole pertaining to Fall 2009 graduate applications and enrollment.
	Persons Responsible: Dr. O'Toole, Dr. Yim, and assigned TA lab mentors

Agenda for 11/24/2009
ME Department Meeting
(11:00 AM Department Conference Room)

1. Approval of minutes for 8-24-2009 department meeting.
2. Undergraduate Program
    1. New 2010-2012 Catalog (Please see the attached updated program description)
        1. Any comments on the Program Description (see attached)
        2. College Curriculum Comm. (Nov. 25) (G. Mauer)
        3. Last chance to correct any errors in the current catalog (ex. ME 380 and ME380L descriptions are switched)
        4. ME electives (please note the updated list in the web site)
    2. ABET Status
        1. Lecture and Lab note collection (Please see the list of classes below)
        2. Self-study report will be available in January 2010
        3. Need faculty input for lab evaluation
        4. Course description status
    3. Integrated BS-MS Program
        1. Meeting with Graduate College
            1. Draft for the program information (O'Toole) (GPA requirement, Thesis-option, GRE requirement, etc)
            2. Thesis-option
            3. Need to spread out program information to students
3. Graduate Program
    1. Nuclear PhD Qualifying exam discussion
    2. Program update (B. O'Toole)
    3. Poor attendance of department seminar in this semester. Need to discuss how to manage graduate seminar in the future.
4. Student advisory Board Input
    1. Removal of ME 120
    2. Offering ME240 every semester

5. Other business
    1. Dr. Ajit Roy
    2. New position is data visualization (see attached position announcement)
    3. SolidWorks license

ME Department Meeting Minutes

Date: 11-24-009
Location: Department Conference Room
Attendees: Yim, Culbreth, Beller, Markle, Nelson, Hechanova, Boehm, Wang, Trabia, Mauer, O'Toole, Reynolds, Pepper, Chen

Agenda Item: Approval of minutes for 8-24-2009 department meeting	Discussion:
	Action Taken: • All members voted unanimously to approve the minutes of the 8-24-2009 department meeting
	Persons Responsible: All in attendance
Agenda Item: New 2010-2012 Catalog - undergraduate	Discussion: Changes submitted to Carmen (Dean's office). Several changes have already been approved. Integrated BS-MS program included in new catalog. Clarification of pre-major courses. Clarification of courses that can be taken as pre-major and major. Total credit hours changed to 127-129
	Action Taken: Changes to be submitted to Dr. Mauer, curriculum committee chair. No major changes until after ABET accreditation. After accreditation Dr. Yim will eliminate one required course. Increase tech. elective to 9 credits vs. existing 6 credits.
	Persons Responsible: All faculties -
Agenda Item: ABET Status - undergraduate	Discussion: Weak in faculty mentoring. Self-study report in progress – estimated completion for faculty review by end of winter break. Missing Dr. Reynolds course description – will be submitted soon.
	Action Taken: Stressed urgency to Dr. Reynolds. Dr. Culbreth will speak to the Advising Center to re-instate registration holds – holds lifted after student meets with ME faculty mentor.
	Persons Responsible: Dr. Reynolds and Dr. Culbreth
Agenda Item: Integrated BS-MS Program	Discussion: Dr. O'Toole recapped meeting with Graduate College. We need to be recruiting current students. Good recruitment tool to attract new student to UNLV and increase retention of current students – integrated BS-MS program – identify current students. Debate: 3.50 GPA – case by case with slightly lower GPA. Decided overall UNLV possible 3.3 with 3.5 in mechanical program.
	Action Taken: N/A
	Persons Responsible: all faculties
Agenda Item: Graduate Program	Discussion: Addition of nuclear based portion of Ph.D. qualifying exam – could be a major or minor declared for exam purposed. Qualifying exam is based on undergraduate courses. Exam will need to be customized for nuclear based student. Currently, not enough undergraduate nuclear courses offered. Change exam to include graduate course material. Admission applications are steadily increasing. Work-load for graduate students is under examination. 2 lab sections = 6 credits – 6 credits is the anticipated work-load for Fall 2010 TA's

	Action Taken: Vote on nuclear area being added to Ph.D. qualifying exam: 6 = **approved**
	Persons Responsible: All present
Agenda Item: Input from: Student Advisory Board	Discussion: Student Board suggested eliminating AutoCad ME 120. Possible offered every other semester
	Action Taken: Civil Engineering offers AutoCad course. Reiterate to Advising Center not to push AutoCad unless student is planning to go in to construction.
	Persons Responsible: Dr. Yim will speak to Advising Center
Miscellaneous Items not on Agenda: 1. Solidworks License 2. Dr. A. Roy	Discussion: Soildworks license can not be used for research. Dr. Roy wants to return to department. Dr. Roy is attempting to determine existing faculty support, if any.
	Action Taken: Overall majority: Dr. Roy does not have faculty support for returning. The position has been eliminated. Dr. Longzu Ma is able to fill the gap in the Metallurgy area.
	Persons Responsible: N/A

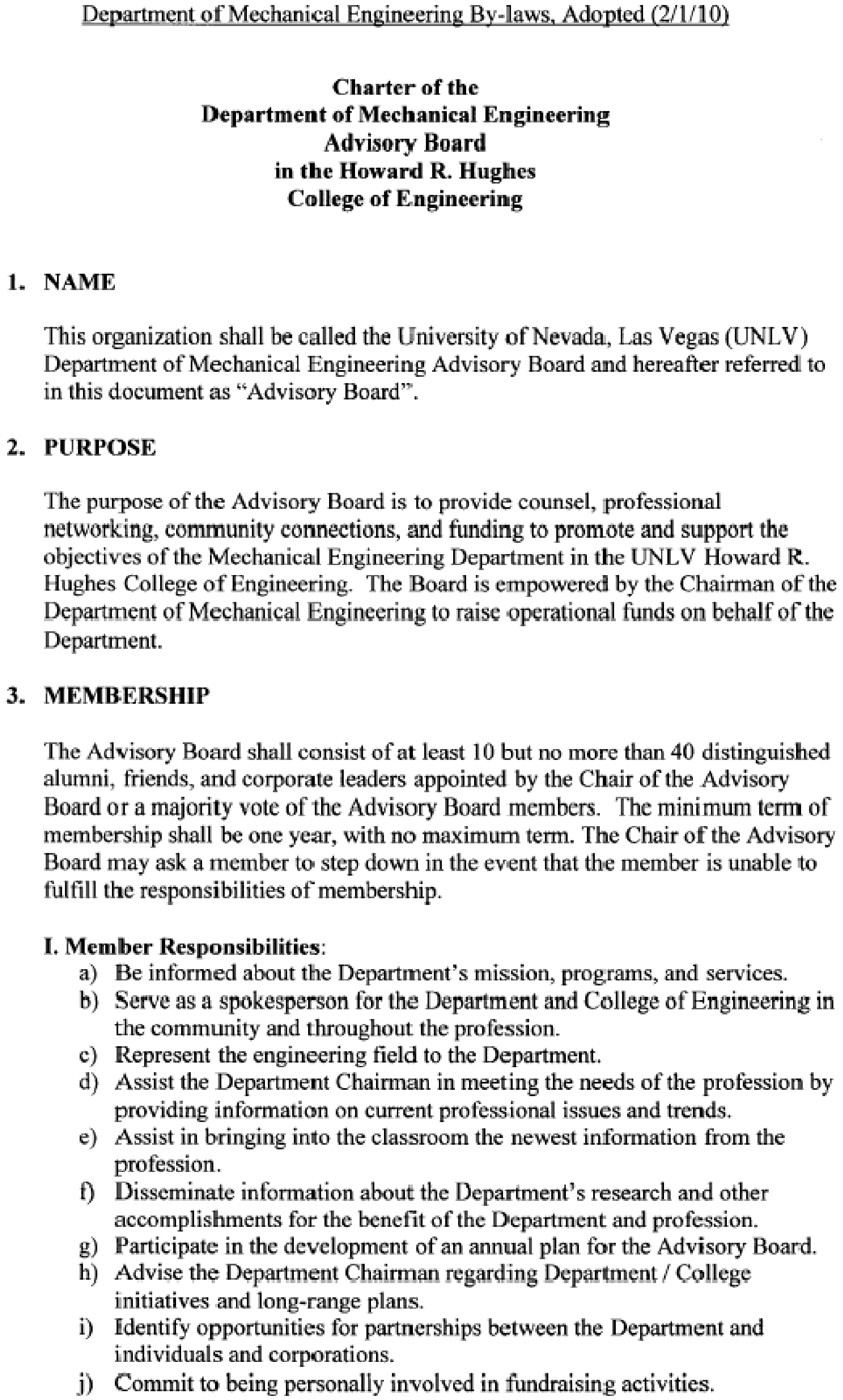
Agenda for 1/15/2010
ME Department Meeting
(11:00 AM Department Conference Room)

1. Approval of minutes for 11-24-2009 department meeting.
2. Review of assessment data collected for Fall 2009 (G. Mauer)
   Curriculum committee (Mauer, Mousajes, Cook) needs to review the following assessment data and make recommendations:
   - Lab survey results
   - Course objective assessment
   - Exit interview results
   - Student evaluation of (a)-(k): Not available yet
3. ABET Status (Yim)
   - We still need to collect the following Lecture and Lab notes including students homework, projects etc (please see the attached collection schedule)
   - Volunteers for reviewing ABET Self-Study report.
   - Review of Program Objective and Outcomes Achievement (will be distributed during the meeting)
4. Graduate Program update (O'Toole)
   - Integrated BS-MS Program. Review of the draft for the program information
   - New student enrollment
   - Graduate seminar will be coordinated by Prof. Mauer in S10, and will be held in TBE.
5. Machine shop policy (Yim, Nelson)
6. FE exam review class in Spring 2010 (ME 492) (Z. Wang)
   - Time and day change? (O'Toole)
   - F09 results (J. Wang)
7. ME Advisory Board general meeting on Jan 29. (9:00AM)
8. Department chair evaluation will be conducted by the college in Feb.
9. Any other issues
   - Department golf cart
   - Annual Work Report is due to department by Jan 25 (Note: From this year the tenured faculty overall evaluation will be two categories (Satisfactory/Non-satisfactory))

E.13 ME Advisory Board

Name	Primary Business Organization Name	Company Title
Bradford Colton	AMPAC Halotron	
Greg Maestas	Dunham Associates	
Clark G. McCarrell	NVEnergy	Senior Engineer/Project Manager
Michelle E. Miller (Board Chair)	National Security Technologies, LLC	Principal Program Manager
Frederick Peters	Retired	
Lancelot M. Robinson	Lawyer Train	Engineering Sales Manager
Michael A. Schwob	JBA Consulting Engineers	Director of Technology Services
Charles Scott	Las Vegas Valley Water District	Manager
Vic Sibilla	AE Associates	
Manuel Sifuentes	M&H Engineering Consultants LLC	Managing Partner
Ken Sohocki	GM (Retired)	
Kevin Spilsbury	Premier Mechanical	President
Von Sudderth	National Security Technologies, LLC	Senior Operations Specialist
Vasisht Venkatesh	TIMET	
Dayton Wittke	Retired	

APPENDIX E.13 ME ADVISORY BOARD



Department of Mechanical Engineering By-laws, Adopted (2/1/10)

Charter of the
Department of Mechanical Engineering
Advisory Board
in the Howard R. Hughes
College of Engineering

1. NAME

This organization shall be called the University of Nevada, Las Vegas (UNLV) Department of Mechanical Engineering Advisory Board and hereafter referred to in this document as "Advisory Board".

2. PURPOSE

The purpose of the Advisory Board is to provide counsel, professional networking, community connections, and funding to promote and support the objectives of the Mechanical Engineering Department in the UNLV Howard R. Hughes College of Engineering. The Board is empowered by the Chairman of the Department of Mechanical Engineering to raise operational funds on behalf of the Department.

3. MEMBERSHIP

The Advisory Board shall consist of at least 10 but no more than 40 distinguished alumni, friends, and corporate leaders appointed by the Chair of the Advisory Board or a majority vote of the Advisory Board members. The minimum term of membership shall be one year, with no maximum term. The Chair of the Advisory Board may ask a member to step down in the event that the member is unable to fulfill the responsibilities of membership.

I. Member Responsibilities:

a) Be informed about the Department's mission, programs, and services.
b) Serve as a spokesperson for the Department and College of Engineering in the community and throughout the profession.
c) Represent the engineering field to the Department.
d) Assist the Department Chairman in meeting the needs of the profession by providing information on current professional issues and trends.
e) Assist in bringing into the classroom the newest information from the profession.
f) Disseminate information about the Department's research and other accomplishments for the benefit of the Department and profession.
g) Participate in the development of an annual plan for the Advisory Board.
h) Advise the Department Chairman regarding Department / College initiatives and long-range plans.
i) Identify opportunities for partnerships between the Department and individuals and corporations.
j) Commit to being personally involved in fundraising activities.

k) Encouraged to make an annual personal gift of $100 or corporate gift of $1000 to the operational fund for the Department. Advisory Board member gifts should be received by June 30 of each year. Fundraising efforts resulting in contributions of the stated amounts may be counted as personal or corporate gifts.
l) Attend Board meetings, and review materials and agenda prior to meetings.
m) Suggest potential nominees to the Board.
n) Adhere to the university's policies on fundraising, confidentiality, and conflict of interest.

II. Member Qualifications:

a) Dedication to the goals and objectives of the Department and College, and willingness to promote them within the profession.
b) Superior knowledge, stature, leadership, and respect within the engineering profession.
c) Ability to represent the interests and needs of the engineering profession.
d) Willingness to make annual financial gifts to the department.
e) Ability to attend Advisory Board meetings or support the Department on a regular basis.

III. Membership Benefits:

Service on the Advisory Board will provide members the opportunity to:

a) Participate in developing the Department into an academically strong and financially well-supported program that meets the needs of UNLV, its students, the region, and the engineering profession;
b) Learn from the College of Engineering about new research and technology relevant to their industries; and
c) Learn from one another about important issues in their respective industries.

IV. Relationship to the College Advisory Board:

The Chair of the Advisory Board shall also be a member of the College of Engineering Advisory Board and shall serve on its Executive Committee.

V. Senior Advisor Status

Senior Advisors shall be comprised of founding members and/or major benefactors to the Department. This is an honorary position, appointed by the Chairman of the Department. The term of Senior Advisors lasts for perpetuity. Senior Advisors may or may not choose to participate in Advisory Board activities, but are strongly encouraged to remain in contact with the Advisory Board. Inactive Senior Advisors shall not be included in the membership count of the Advisory Board.

VI. Termination of Membership

Any board member may terminate membership by submitting a resignation letter to the Chair of the Advisory Board or Chairman of the Department. A member may also be forcibly removed by an affirmative vote of the majority of the Advisory Board for not fulfilling the responsibilities of membership.

4. MEETINGS

The Advisory Board's regular meetings will take place at least semi-annually on the campus of UNLV.

5. CHAIR

There shall be a Chair of the Advisory Board appointed by the Chairman of the Department of Mechanical Engineering from among the existing active members of the Advisory Board. Upon the resignation or removal of the Chair, the Chairman shall appoint another Chair. Among the duties of the Chair are:

a) Preside at the meetings of the Advisory Board
b) Act as a representative of the Advisory Board
c) Appoint task committees of the Advisory Board
d) Participate as a member of the College of Engineering Advisory Board and on its Executive Committee.

6. TEMPORARY TASK COMMITTEES

The ability of the membership to achieve various goals and objectives of the Advisory Board requires establishment of Temporary Task Committees hereafter referred to in this document as "Committees". Committees may be formed to address specific issues or tasks which may confront the Advisory Board. Committees may be appointed by a majority vote of the Advisory Board members as deemed appropriate for the most effective functioning of the Advisory Board in carrying out its purpose.

Committee members may include College faculty, students or other volunteers identified as having skills or expertise required to complete the committee's purpose. The Advisory Board Chair shall appoint a Committee Chair for each Committee. Committee Chairs shall represent their committee at each Advisory Board meeting.

Committee Chairs shall provide status reports and/or results of Committee activities to the Advisory Board at each of its meetings.

Committees shall be disbanded by a majority vote of the Advisory Board after completing their assigned purpose.

7. AMENDMENTS

This Charter can be amended with the approval of two-thirds of the membership of the Advisory Board and the endorsement of the Chairman of the Department.

8. ADOPTION

This Charter shall be adopted with the approval of two-thirds of the membership of the Advisory Board and the endorsement of the Chairman of the Department.

Adopted (*November 4, 2009*)

Michelle E. Miller

Michelle E. Miller
Chair of the Advisory Board

Woosoon Yim, PhD
Professor and Chairman