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:

1. Electric Circuits
2. Mathematics for Engineers.
3. 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

Class/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