

**UTSA**  
**Electrical Engineering Department**  
**EE 3413 – Analysis and Design of Control Systems**  
**Syllabus**  
**Fall 2008**  
**Part A – Course Outline**

**Required course in Electrical Engineering**

**Catalog description:**

(3-1) 3 hours credit. Modeling, analysis, and design of linear automatic control systems; time and frequency domain techniques; stability analysis, state variable techniques, and other topics. Control systems analysis and design software will be used. One hour of problem recitation per week.

**Prerequisites:**

- EGR 2323 or MAT 3253; EE 3423

**Textbook(s) and other required material:**

- Richard C. Dorf, and Robert H. Bishop, *Modern Control Systems*, 11th Edition, Addison-Wesley 2008 (Required);
- Rudrapratap, Getting started with MATLAB for Engineers and Scientists, Harcourt Brace & Company, 1996 (Recommended)

**References:**

- Katsuhiko Ogata, Modern Control Engineering, Prentice Hall

**Major prerequisites by topic:**

1. Application of mathematical principals to the analysis of engineering problems.
2. Linear algebra and ordinary differential equations.
3. Frequency response and complex variables.
4. Mathematical modeling of systems.

**Course objectives\*:**

1. Introduce to students some real systems, which use automatic control. [k]
2. Introduce to students mathematical modeling of physical systems. [a, b, e]
3. Introduce students to analysis of automatic control systems. [a, c, e]
4. Introduce students to design of linear automatic control systems. [a, c, k]
5. Learning to apply course material to improve thinking, problem solving, and making. [b, e]

**Topics covered:**

1. Mathematical modeling of mechanical, electrical and Electro-mechanical systems.
2. Block diagrams.
3. Closed-loop system characteristics, time and frequency domain responses, Routh-Hurwitz criterion.
4. Root-locus construction and design.
5. Frequency response plots, Nyquist stability.
6. Gain margins and phase margins.
7. Compensator design (lead, lag, lead-lag, PID).
8. State variable models and time domain analysis.

**Class/laboratory schedule:**

Two 75-minute lectures per week (16 weeks)

**Contribution of course to meet the professional component:**

This course prepares students to work professionally in the area of control systems.

**Relationship to EE program objectives and outcomes:**

This course primarily contributes to Electrical program outcomes that develop student abilities to:

- (a) an ability to apply knowledge of mathematics, science, and engineering.
- (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.

The course secondarily contributes to Electrical program outcomes that develop student abilities to:

- (b) an ability to design and conduct experiments, as well as to analyze and interpret data.
- (e) an ability to identify, formulate, and solve engineering problems.
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Course content:**

65% Engineering Science; 35% Engineering Design

**Coordinator:**

Chunjiang Qian, Associate Professor of Electrical Engineering

**Persons who prepared this description:**

Philip Chen, Mo Jamshidi, Yufang Jin, Chunjiang Qian, September 29, 2008.

---

## Part B General Course Information and Policies

### Fall 2008

Instructor: Dr. Yufang Jin Office: BSE 1.534  
Office Hour: MW 3:30 – 5:30PM or by appointment Phone: 458-5588  
Email: [yufang.jin@utsa.edu](mailto:yufang.jin@utsa.edu)

**Time/Venue:** MW 5:30 – 6:45pm, EB2.04.04;

### Assessment:

Final assessment will be determined on the basis of:

Homework	10 %	In – class Quizzes	10%	Matlab Project	10%
Mid-term	20%	Mid – term II	25%	Final Exam (Comprehensive)	25%

### Grading Distribution:

Percentage grade = (grade/the highest grade in class) X 100%

Percentage Grade	Final Grade				
100 - 90	A	89 - 80	B		
79 - 70	C	69 - 60	D	below 59	F

### Comment:

The objectives of the lectures are to explain and to supplement the text material. Students are responsible for the assigned material whether or not it is covered in the lecture. Students who wish to succeed in this course should read the assignments prior to the lecture and should work all homework and lab assignments. You are encouraged to look at other sources (other texts, etc.) to complement the lectures and text.

### Homework Policy:

The completion and correction of homework is a powerful learning experience; therefore:

- There will be approximately 7 homework assignments.
- Homework is due one week after assignment unless otherwise noted, no late homework is accepted.
- Possible revision of homework grades may be discussed with the grader within one week from the return of the marked homework
- The course grade will be based on the average of the HW grades.

### Quizzes

Two mid-term exams will be held during the semester. There will be a 15-minute in class exam every Week.

### Note

- Recitation session is important part of this course and attendance is strongly recommended.
- Check WebCT ([webct.utsa.edu](http://webct.utsa.edu)) for announcement, homework and lectures. Report any mistake on your grades within one week after posting.
- No make-up exam is given except for CLEAR medical proof.
- No exam is given if you are 15 minutes late in the midterm exams and 30 minutes late in the final exam. Even if you are late in the exam, you must turn in at the due time.
- Cheating is absolutely prohibited by the university.