

**ECE 488 – MODELING AND SIMULATION IN ENGINEERING PROBLEM SOLVING
(Special Topics ECE 480-489)**

Type (check one): Required: _____ Elective: X

2005-2006 Catalog Data: ECE 480-489. Special Topics. (Formerly EE 480-489) Elective courses of special or current interest. Usually taught by visiting faculty with special or unique qualifications. Normally taken by seniors. Prerequisites are announced with course offerings. *One semester; three credits.*

ECE 488. Modeling and Simulation in Engineering Problem Solving. Describing systems, dynamical systems, initial value problems solution of equations by digital computer, random processes, generation of non-uniform random variables, application of probability density functions, distribution functions, and power spectral density functions in both linear and nonlinear systems. Computer solutions throughout. Matlab software is emphasized. *One semester; 3 credits.*

Prerequisites: Math 131, Math 132

Co-Requisites: None

Textbook: *System Modeling and Simulation*, Frank L. Severance, John Wiley and Sons, 2001.

Other Required Materials: None

Other References: As assigned

Instructor: Robert L. Drake, Ph.D., P.E.

Course Objectives: This course is intended to give both engineering and non-engineering students the opportunity to apply digital computer simulation in modeling both physical (engineering) and non-physical (social-political-economic, SPE) systems.

Prerequisites by Topics: Differentiation, Integration

- Topics:**
1. Describing systems
 2. Dynamical systems
 3. Preparation of ordinary differential equations for computer solution
 4. Computer solution of initial value problems
 5. Random process. Probability density and distribution functions. Power spectral density.
 6. Application in linear and nonlinear systems with computer solutions
 7. Application to social-political-economic systems
 8. System optimization
 9. Two projects

Class Schedule: Two 75-minute sessions per week

Prepared by: Robert L. Drake, Ph.D., P.E. **Date:** October 2005

PROFESSIONAL COMPONENT:

ECE 488 – MODELING AND SIMULATION IN ENGINEERING PROBLEM SOLVING (Special Topics)

Category (check one)	<input type="checkbox"/> Math/Basic Science <input checked="" type="checkbox"/> Engineering <input type="checkbox"/> General Education <input type="checkbox"/> Other
Design (check one)	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Some <input type="checkbox"/> None
Realistic Constraints (check all that apply)	<input checked="" type="checkbox"/> Economic <input type="checkbox"/> Environmental <input type="checkbox"/> Sustainability <input type="checkbox"/> Manufacturability <input type="checkbox"/> Ethical <input type="checkbox"/> Health & Safety <input checked="" type="checkbox"/> Social <input checked="" type="checkbox"/> Political

Relationship to Program Outcomes:

Check all that apply:

- (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
- (d) an ability to function on multi-disciplinary 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 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