20-ENED-1090   Engineering Models I   2 Credit Hours

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Resources: MATLAB: A Practical Introduction to Programming and Problem Solving, 3rd edition, Stormy
Attaway, Elsevier, 2013.   Available free on-line through U.C. libraries at:
http://proxy.libraries.uc.edu/login?url=http://www.sciencedirect.com/science/book/9780124058767

Cody: A program developed by MathWorks that allows students to progressively
develop MATLAB® programming skills and earn badges in the process:
https://www.mathworks.com/matlabcentral/cody

MATLAB Marina: An interactive learning environment created by Armstrong Atlantic
State University that includes tutorial videos and practice exercises for MATLAB®.
http://engineering.armstrong.edu/matlabmarina/index.html

Software: Students are required to purchase the Student Version of MATLAB® & Simulink available at
the U.C. Bookstore behind the computer counter and also at DuBois. Students should install the
software on their laptops prior to the first recitation section.

Grading:

Homework Assignments	20 %	
Lab Assignments	20 %	
Project	**10%**	
Attendance/Quizzes	10%	
Midterm	20 %	
Final	20 %	

Description: This is the first in a unique sequence of interdisciplinary courses designed to develop good
problem solving techniques and to illustrate how engineers use mathematics to solve a variety of practical and
often complex problems. The course will closely track and directly apply fundamental theory from algebra,
trigonometry, and calculus to relevant engineering applications chosen from a variety of disciplines.
MATLAB® will be introduced and progressively developed as a programming tool to enable students to explore
engineering concepts, to investigate solutions to problems too complex for hand solutions, and to develop an
appreciation of the power and limitations of computer tools. Special attention will be given to graphical
visualization of concepts and to numerical approximation techniques and the errors associated with
approximations. The course includes a two-week team project.

Pre-Reqs: Algebra and trigonometry.

Objectives:

1. To explore the application of algebra, trigonometry, and calculus to various engineering
    disciplines.
2. To learn the fundamentals of programming and good programming practices and utilize
    these skills to solve numerical problems and create numerical algorithms with MATLAB®.
3. To develop good problem solving skills by applying problem solving strategies to a variety
    of engineering problems.
4. To cultivate effective team-work and communication skills through lab work and a
    team project.

Revised by Joni Torsella 1-1-2014

Schedule: Lecture meets once a week for 55 minutes. Recitation sections meet once per week for two hours. Students are expected to bring their laptops to all lecture and recitation sections. Exception: students that meet for lecture in 805 OldChem may use classroom computers during lecture instead of their laptops.

Policies:
- Make-up Tests are only given under extreme and verifiable circumstances.
- Students are expected to attend all lecture and recitation sessions.
- Lab constitutes a major portion of the course grade and participation is essential. Any student missing a recitation session must arrange a meeting with his/her instructor to go over the work for that week. **Failure to do so will result in a zero for the lab assignment even if the student submits** the work via Blackboard.
- Lab work will be accepted late only in extreme circumstances and by permission of your instructor.
- Homework will not be accepted late under any circumstances; however, the lowest homework score will be dropped.
- There is NO EXTRA CREDIT for this course.
- Cell phones must be turned off during lecture and recitation.
- The Student Code of Conduct is in effect for this course and every course that is offered at CEAS. Website: http://www.uc.edu/conduct/Code_of_Conduct.html

Course Information:
- All lecture material, lab assignments, and homework assignments will be posted on Blackboard. Student assignments must be submitted to Blackboard.
- Homework (when assigned) and lab work (for the previous week's recitation section) will be due at the start of each recitation session.
- In recitation, students will be broken up into groups of 10 and each group of ten students will have a **teaching assistant (peer level tutor). Students will remain in the same group with the same teaching** assistant throughout the semester.
- Each section will have two graders to grade all homework assignments and lab work.
- There is a tutoring center in the Learning Center (Rhodes 801M) open Mon-Thurs 2-6 p.m. for any students that need extra help with homework or lab work for this course.

Topics:
1. Course Introduction
2. MATLAB® Basic Features
3. Bits, Bytes, and Data Types
4. Introduction to 1-d arrays (vectors)
5. Graphing Functions (Line graphs)
6. Solving Equations Graphically
7. Curve Fitting and Interpolation
8. Using MATLAB® Programming to Solve Problems
    - Input/Output Statements
    - **Conditional statements**
    - Loops
9. Vectors: Operations and Engineering Applications
10. Matrices: Operations and Engineering Applications