EF 105 COMPUTER METHODS IN ENGINEERING PROBLEM SOLVING
(1 HOUR CREDIT)

CATALOG DESCRIPTION
EF 105 computer Methods in Engineering Problem Solving; 1 cr. Introduction to computer applications used in engineering problem solving and communications. Introduction to programming concepts including conditional statements and looping, the development and implementation of logic flow diagrams. Coreq: 151 or 157.

INSTRUCTOR
Professor: Denise Jackson (Dr. J)
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Office: 312 East Stadium Hall, Phone: (865) 974-5578
Hours: TBA

Graduate Teaching Assistants:
Ortal Arazi, Paul Karakashian, and Sirisha Saripalli
(See web site for contact information and hours)

TEXTBOOK(S) AND/OR OTHER REQUIRED MATERIAL
• Notes, laboratory exercises, and other course materials prepared by instructor

COURSE OBJECTIVES
This course is intended for engineering freshmen and is not meant to be an introduction to computers, nor a "how to" course on application software. The emphasis will be on concepts, not on keystrokes. The course includes concepts, theory, and contemporary issues underlying the use of computers as a tool in engineering. Specific objectives include the following:
• Fundamental concepts, issues (including ethics), and trends in computing.
• Using the Internet and the Web to effectively gather and communicate information.
• Engineering- related applications (including spreadsheets), and their relationship to computing in general.
• An introduction to programming with MATLAB.

TOPICS COVERED
• Elements of problem solving, including strategies and heuristics, attitude, creativity, teamwork.
• Introduction to computer coding of logic to solve problems
• Basic and selected advanced features of productivity and equation solving computer tools: Word, Excel, Access, PowerPoint.
• Internet basics: Web, ftp, email, searching, HTML.
• Introduction to the design and construction of websites.

Course Structure:
• One 2-hour computer class/laboratory per week
• First 30 – 45 minutes, introduction of new material.
• The remaining time is devoted to in-class work and the completion of the current assignment.
• No homework will be assigned. Students may need to review material. There will be assistance provided in the labs each week.

Relationship of course to undergraduate degree program objectives
• Ability to apply knowledge of mathematics and physics to the solving basic materials science and engineering [ABET:3a]
• An ability to analyze and interpret experimental data [ABET:3b]
• An ability to design a system to meet desired needs (team project involving the design and construction of website) [ABET:3c]
• An ability to function on teams [ABET:3d]
• An ability to identify, formulate, and solve engineering problems [ABET:3e]
• An ability to communicate effectively orally and in writing [ABET:3g]
• An ability to use the techniques, skills and modern engineering and computing tools necessary for engineering practice [ABET:3k]

Assessment of student progress toward course objectives
• Two exams to assess students’ ability to use the various computer tools to solve elementary engineering problems, analyze data, and process information. (70%)
  • >90 = A  87-89 = B+  80-86 = B  77-79 = C+
  • 70-76 = C  60-70 = D  <60 = F
• Participation in individual and team-based demonstration of concepts (15%)
  • Positive contribution, with work completed = 10
  • Positive contribution, with work incomplete = 8
  • Minimal contribution = 4
  • No contribution = 0
• Attendance and attention (15%)
  • On time, attentive = 10
  • Late, attentive = 8
  • On time, inattentive = 7
  • Late, inattentive = 5
  • Absent = 0

ACADEMIC INTEGRITY
You are required to adhere to all University policies related to academic integrity. Please see http://web.utk.edu/~homepage/hilltopics/HILLTOPICS2006-07.pdf

Honor Statement: The University of Tennessee, Knoxville, is proud of its students' commitment to academic integrity and their pledge to abide by the Honor Statement found in Hilltopics. This tradition of intellectual honesty is maintained by the cooperation of students and faculty members. "Each faculty member," according to Hilltopics, "is responsible for defining, in specific terms, guidelines for preserving
academic integrity in a course." We shall discuss the important Honor Statement, as it relates to both individuals and groups in this particular course, at either the first or second class meeting.

PROCEDURES
All weekly lectures and in-class assignments will be posted to the on-line class site at the beginning of each week of each class. They will remain available for review as needed. It is your responsibility to check for assignment postings.

E-MAIL GUIDELINES
You are responsible for protecting your password. Do not share your password with friends or classmates. All class e-mails must contain a relevant subject line that begins with EF105 (to identify the class).

STUDENTS WITH DISABILITIES
If you need course adaptations or accommodations because of the impact of a disability or you have emergency information to share, please contact the Office of Disability Services at 191 Hoskins Library at (865) 974-6087. For more information, see http://ods.utk.edu/.

ON-LINE CLASS SITE
This course will include the integration of a password-protected on-line site for disseminating information and for communication. You will be expected to visit this source two times each week. Many resources and study guides will be posted within this site.

To access the entire on-line course listing, use the URL: http://ef.engr.utk.edu/ef105-2006-08/

Please note, any message you post on the Discussion Board is available for anyone in class to read. It is not private mail. It is, however, a useful tool for posting announcements or for seeking information from classmates in an open forum.

CLASS/LABORATORY SCHEDULE

Week 1 – Introduction to UT/EF Computer Resources. Overview of available computer resources, UT’s email system and web resources, UT’s computer use policy and proper netiquette, navigating the EF105 and 151 (157) websites, updating current student information on the EF website.

Week 2 – Basic Web Pages How to create a basic web page, use of available software, importing graphics and data including Excel data and graphs, guidelines for good web pages, how to create a web-based engineering report. In EF152 (158), at least one design report will be web based.

Week 3 – Report Writing Word processing including formatting, adding footnotes/endnotes, importing graphics and data, how to construct a good engineering report.
**Week 4 – Presentation Skills** Introduction to Power Point, how to create presentations, importing graphics and data, how to construct and deliver a good engineering presentation.

**Week 5 - Excel.** Introduction to working with data stored in spreadsheets. Including cell addressing, entering / importing data, simple operations, graphing data including how to make a good graph.

**Week 6 - Excel - Functions and Data Analysis** Built-in functions such as average, standard deviation, min, max, sine (needs to be in radians), exp, ln, absolute value, etc. Actually take data and do an analysis in class.

**Week 7 – MidTerm Exam**

**Week 8 – Excel - Curve Fitting** Linear and polynomial regression using Excel, brief background material (concentrate more on why and when to use curve fitting rather then the mathematical background of the how). Briefly mention other fits, such as exponential.

**Week 9 - Excel – Other Advanced Features** Goal seek, conditional statements, macros. Solving single and simultaneous equations. Look at potential pitfalls (multiple solutions, no solution, etc).

**Week 10– Intro to Programming Logic** Basic concepts of programming and logic. The emphasis will be on the development of the logic flow and not the writing of actual programs. Examples of how a particular logic flow diagram gets “translated” into a program in a particular program/application (Visual Basic, Matlab, etc.) will be presented.

**Week 11 – Intro to Programming** Overview of available software (Matlab, Octave, MathCAD, Visual Basic, etc.), basic concepts that are common such as storing numbers and text in variables, basic algebraic operations, I/O, etc.

**Week 12 – Conditional Statements** Intro to basic conditional statements, development of logic flow diagrams.

**Week 13 – Intro to Looping** Introduction to the basic for loop, how it works, applications. Integration of conditional statements, further development of logic flow diagrams.

**Week 14 – Looping Continued** Introduction of the while loop, how it works, applications. Integration of conditional statements, further development of logic flow diagrams.

**Week 15: Wrap up.**

Final Exam during exam period.
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