

CENG 5131 Engineering Applications

- COURSE: CENG 5131
Monday Wednesday 4-5:20 PM
- INSTRUCTOR: Dr. Thomas L. Harman, harman@uhcl.edu
<http://sceweb.sce.uhcl.edu/harman/>
- OFFICE: D104 Phone: (281) 283-3774
OFFICE HOURS: M 1-4, M-Wed After 7PM; Tuesdays By Appointment
- PREREQUISITES: Graduate standing and Linear Systems Analysis or Equivalent
- DESCRIPTION: The course presents a thorough study of modern engineering techniques emphasizing mathematical methods. As is common in industry today, the problems will be solved using a mathematical package designed for such problems. Students will be able not only to solve various problems but also plot the results with the MATLAB software. The applications relate to Signal Processing and Control Theory among other topics.
- COURSE FORMAT: The course presentations will be mainly lectures. In addition to regular homework and examinations, problem solutions and plots using the MATLAB software are required.
- TEXT REQUIRED: *Advanced Engineering Mathematics Using MATLAB*, Second Edition, T.L. Harman, Dabney, and Richert, Brooks Cole. Available in Bookstore, online, and used versions.
- RECOMMENDED: *The Student Edition of MATLAB*; the version from the Mathworks. Note: MATLAB will be used in other courses such as DSP, Digital Control, etc.
- GRADING: The grade will be divided as follows:
- | | |
|--|-----|
| Exams (Quiz, Midterm in class and Final) | 70% |
| Homework (Hand work and MATLAB) | 25% |
| In class work and participation | 5% |

See Homework Rules for Homework Requirements

The homework will consist of problems of an analytical nature. The programs and plots are to be done using MATLAB. **Dates for examinations, etc. will be discussed in class.**

CENG 5131 Course Outline F2014

Course Outline: Note that since I am the Chairperson of the Engineering Division, there may be times that my administrative duties require me to change the schedule somewhat. You will be informed in plenty of time for most changes.

Engineering Applications Dr. T. L. Harman Chapter References refer to Required Textbook.

Introduction MATLAB and Course contents Chapter 1 **HW 1**

**Complex Variables,
Linear Equations.** Chapter 2.1, 2.3, 14.1, 3.2, 3.7, 6.2, 6.3 **HW2**

Exam 1 –September 15

**Differential and
Difference Equations** Parts of Chapter 5 and 6.4, 6.5, 10.2 **HW3**

Fourier Analysis and Signal Processing

Orthogonal Functions. 2.10, 7.4
Fourier Analysis Parts of Chapter 7, 8 **HW4**
DFT/FFT Chapter 11 **HW5**

Laplace Transforms, Z-transforms and Control Theory

Laplace Transforms Chapter 9
z transforms and Digital Control **HW 6**

EXAM 2 ?? Late October or Toward Middle of November

Signal Processing and Sampling

Digital Signal Processing Chapter 10 and 11 **HW 7**
Digital Filters

Various Techniques Applied to Signals and Systems

- Homework due dates to be given on Homework sheets
- **FINAL EXAM DECEMBER**

Learning Outcomes

The purpose of the course is to study the mathematics necessary to solve problems in Engineering and Computer Science.

Program and Document Problems using MATLAB software.

Apply complex variables to differential equations and Fourier Analysis

Use Fourier techniques to characterize linear systems

Solve differential equations with Laplace Transforms and apply transforms to Control Theory

Solve discrete equations using classical and z-transform techniques

Program Fast Fourier Transforms and solve frequency analysis problems as are presented in Digital Signal Processing courses.

**Apply various advanced mathematical techniques to engineering problems
(See Course Outline for possible topics)**

ATTENDANCE POLICY: Attendance in class is expected and you should understand that classroom participation is an important element in the learning process. Students are encouraged to ask questions and make comments. An absence from class does not excuse students from tests and assignment deadlines. **The instructor would appreciate a phone mail or email message from students who are not going to attend class for whatever reason. If informed, the instructor will keep any handouts for the next class.**

Honesty Policy: Every student is expected to follow the honesty policy as described in the catalog. The first honesty violation will result in a grade of 0 on the assignment or test. The second honesty violation will result in a grade of F for the course. Students must remember the honesty pledge on all exams, as a reminder of the honesty code.

**Academic Honesty Code: see the handbook for the UHCL Academic Honesty Code.
DO NOT COPY OTHERS WORK!!**

GRADING POLICY: The grading policy of this course will follow the grading system as outlined in the current Catalog of the University of Houston-Clear Lake. In an effort to fairly assign letter grades according to the student's final average, usually there will not be a curve. Instead the following grading policy will hold:

A : 93-100%	C : 73-76 %
A-: 90-92 %	C-: 70-72 %
B+: 87-89 %	D+: 67-69 %
B : 83-86 %	D : 63-66 %
B-: 80-82 %	D-: 60-62 %
C+: 77-79 %	F : 0-59 %

American Disabilities Act (ADA)

If you are certified as disabled and entitled to accommodations under the ADA, section 503, please notify the instructor as soon as possible. If you are not currently certified and believe you may qualify, please contact the UHCL Health and Disability Services office.

Accommodations (as specified by the Americans with Disabilities Act) -
Suggested statement: If you will require special academic accommodations, please contact the [Disability Services Office](#) at 281-283-2627.

The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504 and ADA guidelines, each University within the System strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact your University's student disability services center.

6 Drop Rule Limitation

Students who entered college for the first time in Fall 2007 or later should be aware of the course drop limitation imposed by the Texas Legislature. Dropping this or any other course between the first day of class and the census date for the semester/session does not affect your 6 drop rule count. Dropping a course between the census date and the last day to drop a class for the semester/session will count as one of your 6 permitted drops. You should take this into consideration before dropping this or any other course. Visit www.uhcl.edu/records for more information on the 6 drop rule and the census date information for the semester/session.

HOMEWORK RULES

A. -10 POINTS FOR EACH DAY LATE

B. For all Problems: (-10 points if violated)

1. Briefly describe the problem to be solved before attempting the solution.
2. Show all work.
3. Turn in problems in order
4. Make the results clear (Circle answers, explain results, etc.)
5. When an explanation of the results is requested, the numerical solution will not be sufficient.

MATLAB Problems (-10 or more if violated)

1. Write the equations to be solved
2. Describe the solution method (flowchart, description, etc)
3. Comment the MATLAB code
4. Turn in the code and the results (Plots, etc.)

Be Neat - if I cannot read the solution - no credit!!