Computational Methods in EE

University of Texas at El Paso
College of Engineering
Department of Electrical and Computer Engineering

Course Syllabus for

EE-4386/5301
Computational Methods in EE

Fall 2020   CRN 19311/19306

COURSE INFORMATION

Course Prefix and Number: EE-4386/5301
Course Title: Computational Methods in Electrical Engineering
Course Website: http://emlab.utep.edu/ee4386_5301_CompMethEE.htm
Meeting day and time: T/R, 12:00pm – 1:20pm
Meeting Venue: Blackboard Collaborate
CRN: 19311 (EE-4386), 19306 (EE-5301)
Credit hours: 3
Lecture hours: 3

Catalog Description – A presentation of the fundamental numerical techniques used in engineering, including solution of systems of linear and nonlinear equations, interpolation and curve-fitting, solution of ordinary and partial differential equations.

Course Rationale – This course is intended to teach how to do basic numerical computations on a computer and how to visualize the results. In addition to the methods, the course teaches best practices and the philosophy of computation and visualization. With this course, the student will be able to do root-finding, curve fitting, optimization, solve differential equations, and visualize the results.

INSTRUCTOR INFORMATION

Dr. Raymond C. Rumpf
Office: ENGR A-337
Office Hours: Virtual twice per week via Blackboard, Hours to be announced
Telephone: (915) 747-6958
E-Mail: rcrumpf@utep.edu

COURSE MATERIALS

The following items are required for this course:

- Access to the internet
- Access to computer with MATLAB 2018 or later installed. A manual for this software is available at: http://www.mathworks.com/help/techdoc/
- You will need to download or update the following software: MATLAB, Microsoft Office, Flashplayer, Windows Media Player, QuickTime and Java.
- Engineering graph paper
- TI85 scientific calculator, or equivalent
- Textbook:
  Numerical Methods for Engineers, 7th Edition
  Steven C. Chapra
  McGraw Hill
  ISBN-13: 978-0073397924
  ISBN-10: 007339792X
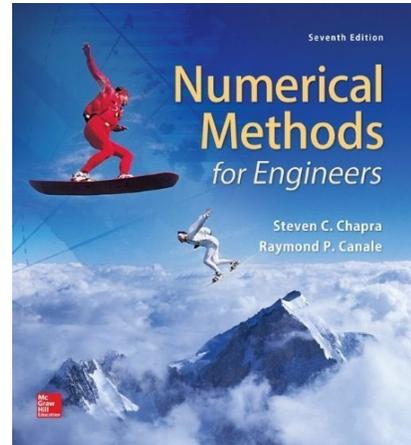
Students are required to archive their syllabus, lecture notes, homework solutions, and quizzes in a well-organized notebook.

TECHNOLOGY REQUIREMENTS

This course is delivered through the internet. Lecture notes, lecture videos, supplemental information, homework and projects will be provided on the course website. Discussion boards, demonstrations, and Q&A sessions will be provided through the Blackboard Learning Management System (LMS). Ensure your UTEP e-mail account is working and that you have access to the internet. You may use any of the primary web browsers including Explorer, Chrome, Firefox and Safari. If you have problems, try using another browser.

You will need to have access to a computer/laptop, a webcam and a microphone. Check that your computer hardware and software are up-to-date and able to access and perform all parts of the course. If you encounter technical difficulties of any kind, contact the UTEP Help Desk.

UTEP Technology Support
Web: https://www.utep.edu/technologysupport/
Phone: 915-747-4357 (HELP)
Chat: Chat With Us
Library: Room 300
Online: Submit a Service Request

PREREQUISITES

By Course (with grade of "C" or better):
- MATH 2326 – Differential equations
- EE 2353 – Continuous Time Signals and Systems

By Topic:
- Linear Algebra
- Differential equations
- MATLAB
- Basic programming skills

COREQUISITES

None.

COURSE OUTLINE

Topics covered in this course include:

1. Introduction to MATLAB
2. Review of linear algebra
3. Roots of equations
4. Curve fitting
5. Numerical differentiation and integration
6. Finite-difference method
7. Optimization

LEARNING OUTCOMES

After this course, students will demonstrate a rich and deep understanding of computational methods, including the ability to produce high-quality graphics and visualizations. The following items are the specific *student learning outcomes* for this course:

By the end of the semester, the student will demonstrate the ability to:

- Use MATLAB proficiently.
- Have a basic understanding of linear algebra and basic matrix operations.
- Find roots of equations.
- Fit curves to data.
- Perform numerical differentiation and integration.
- Solve differential equations using the finite-difference method
- Perform basic optimizations

Contribution to Professional Component

EE-4386 is a senior level core course that will give the student the ability to use a computer to solve engineering problems and analyze data.

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Relationship to (ABET) Program Outcomes

- Ability to apply knowledge of mathematics, science, and engineering:
Students use concepts from physics and calculus in the analysis of engineering problems.
- Ability to identify, formulate, and solve engineering problems:
Students solve problems numerically and observe simulations of transmission line problems.
- Ability to communicate effectively:
Students solve problems and give oral individual presentations summarizing their work.
- Ability to use computers to enhance problem solving:
Students will use MATLAB to solve problems and visualize solutions.

TEACHING METHODOLOGIES

This is an asynchronous online class, meaning lectures and demonstrations are prerecorded and made available to you 24/7 at any time during the semester. You do not have to be on campus to complete any portion of this class. Some information will be supplemented with excerpts from other sources and made available on the course website or via e-mail. The course is intended to have a close relationship between the student and professor, especially when getting computer codes to work in MATLAB. The notes are highly visual to better understand the underlying mathematics.

RULES AND POLICIES

Netiquette

Act professionally during all aspects of the course and always treat others with kindness and respect.

- Always consider audience. Remember that the instructor and all members of the class will be reading any postings.
- Respect and courtesy must be given to classmates and to the instructor at all times. No harassment, inappropriate postings, or bullying will be tolerated.
- When reacting to someone else's message, address the ideas, not the person. Post only what anyone would comfortably state in a face-to-face situation.
- Blackboard is not a public internet venue. All postings to it should be considered private and confidential. Whatever is posted in these online spaces is intended for classmates and the professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students which to do so, then they have the legal and ethical obligation to first request the permission of the author(s).

Homework Policy

Homework will be assigned on a weekly basis and graded on a 100-point scale. Show all work! Homework is due no later than 11:59pm on the assigned due date and submission must be through Blackboard. In order to provide solutions in a timely manner, no late homework assignments will be accepted. The due date/time is enforced by Blackboard. Homework must be completed with a high level of professionalism and

be formatted properly. Points will be deducted for sloppy work, incorrect formatting, or if not all of the work is shown. Students must do their own work on assignments. Disciplinary action will be pursued for all incidents of academic dishonesty. See section on Academic Dishonesty.

Format – Unless otherwise indicated, all homework assignments will be submitted as a single PDF document. The first page must be a cover sheet with the student's name, date of the assignment, course information, and assignment number. No problems or work should appear on the cover sheet. Homework must be professional and of high quality. Your work must be provided in the same order that the problems/questions/tasks of the assignment were asked. Information must be well organized and the writing must be clear and succinct. Problem number being solved should be clearly identified and final answers to questions should be clearly marked or boxed. Finish all calculations before providing the final answer. That is, do not answer with something like $\sqrt{\pi}$. Instead the answer is 1.7725. All computer codes shall be provided in an Appendix located at the end of the homework document, not intermixed with the answers. Failure to comply with formatting will result in points deducted from the score.

Graphics – All graphics produced during this course must be of professional quality and suitable for publication. Diagrams should be made as small as possible while still being understandable and easily viewed. Ensure linewidths are sufficient to be easily visible, but not overpowering. Fonts should be of a professional type and of sufficient size to be easily readable without being overpowering. Axes must be labeled and legends provided for plots conveying multiple pieces of information. Graphics must be of sufficient resolution that they are not pixelated. If submitting your assignments in black and white, be sure the graphics are suitable to be accurately read and interpreted in black and white. To ensure professional graphics, complete and sign the Checklist for Graphics and Diagrams and attach it to the end of your assignment. The checklist may be revised during the semester so always download the latest version at the following link:

http://emlab.utep.edu/pdfs/Checklist%20for%20Graphics%20and%20Diagrams.pdf

Exam Policy

Exams during the semester will be given in the same format as the homework so they will have the same formatting and professionalism requirements as the homework. Information tested on the midterm exams will be mostly focused on the material covered since the last exam. The final exam will be a project presented to the class.

A missed exam can be made-up ONLY IF: (1) the reason for missing the exam is beyond the student's control, e.g. such as a medical excuse, jury duty, death in the family or automobile accident, or (2) prior consent must be obtained from the instructor for missing the exam based on a non-frivolous excuse, e.g. such as a job interview or out-of-town job related travel. In either case, the student must submit a written and signed statement describing the reasons for missing the exam, with appropriate documentation, and petition for a makeup exam. **A missed exam will carry zero grade if these conditions are not met**.

Project Policy

The purpose of the project is to learn something outside of what is taught in the class or apply what is taught in class to something not discussed in class, and to share this with the class so that all students can benefit from the experience. Project topics and the submission materials must be approved by the instructor by the middle of the semester (see schedule of topics for specific date). It is highly recommended to begin working on your project early. All materials (codes, PowerPoint slides, multimedia files, etc.) for the project must be submitted to the course instructor 24 hours before the final exam session or a score of zero will be given. Videos of your project will be posted to Blackboard prior to the final exam sessions for the other students to view and comment on. 20% of your project grade will come from your comments on the other students projects.

Participation Policy

The following items are expected from students as part of their participation grade:

- Ask questions! Despite how "silly" or "dumb" you may think your question is, it is very likely that other students have the same question. Confusion on even small details in course material can cause bigger problems and hold you back. If you are truly embarrassed by your question, send an anonymous e-mail to the course instructor. I promise I will respond!
- Respond honestly to poles and provide timely feedback to instructor about the course. This will contribute greatly to the quality of the course and your success in it.
- Treat e-mail correspondence as a professional exchange of information.
- Show proper netiquette during the semester.

Grading Policy

Student achievement in the course objectives will be assessed using a combination of homework, exams, class attendance and participation. Student grades are protected by the Privacy Act of 1974. The final course grade will be determined by the weighted performance in the following categories:

Homework	40%	90% – 100% → **A**
Participation	20%	80% – 89% → **B**
Midterm Exams	20%	70% – 79% → **C**
Final Exam	20%	60% – 69% → **D**
		0% – 59% → **F**

Please note the 40% weight assigned to homework! The homework is critical for this class!!!

Homework/Projects – Each assignment/project will be graded out of 100 points.

Final Project – The final projects will be posted to Blackboard for the entire class to view and discuss. A grade of zero will be given if all of the electronic files associated with the project are not submitted, even if the student presented to the class. Discussion on student projects is mandatory.

Participation – The participation grade includes participation in the discussion boards, responsiveness to class polls, and contributions the students makes to the class. You are required to make at least two posts to the discussion boards per week. You can ask questions, respond to others' questions, or post other interested and related information. You may also provide feedback or make suggestions about how to improve the course. You will be expected to be professional and polite on the discussion boards and only post topics that are related to the course.

EXPECTATIONS

What should you expect from the course instructor?

- Instructor will do all that they can to ensure your learning and success in this class.
- Instructor will provide students with clear instructions and expectations.
- Homework will be graded and feedback on your performance will be provided within seven days after the due date.
- Solutions to the homework will be provided within one week of the due date.
- Instructor will respond to student e-mails within 24 hours.
- The course calendar is a living document and may be adjusted due to events occurring curing the semester. Instructor shall notify students of any such changes or deviations.

What should the instructor expect from students?

- At the start of the course, students shall review the syllabus, calendar, and course material.
- Students should plan to study/work for a minimum of six hours per credit hour each week of the course. This includes reviewing the notes, reading supplemental material, completing the homework, and other assignments such as the final project.
- Students will be active participants in the class and provide the instructor feedback of their understanding of course material and progress on course assignments.
- Students shall follow proper netiquette rules.
- Students are expected to behave professionally at all times. Bullying, verbal abuse, insubordination, or personal attacks will not be tolerated in any form. Inappropriate behaviors may result in an administrative withdrawal from the course and/or dismissal from the course and from the program.

ACADEMIC DISHONESTY

Students are expected to be above reproach in all scholastic activities. As an entity of The University of Texas at El Paso, the Department of Electrical and Computer Engineering is committed to the development of its students and to the promotion of personal integrity and self-responsibility. The assumption that a student's work is a fair representation of the student's ability to perform forms the basis for departmental and institutional quality. All students within the Department are expected to observe

appropriate standards of conduct. Acts of scholastic dishonesty such as cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in the whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student, or the attempt to commit such acts will not be tolerated. Any case involving academic dishonesty will be referred to the Office of the Dean of Students. The Dean will assign a Student Judicial Affairs Coordinator who will investigate the charge and alert the student as to its disposition. Consequences of academic dishonesty may be as severe as dismissal from the University.

See the Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Student Conduct and Discipline for more information.
https://www.utsystem.edu/sites/default/files/offices/board-of-regents/files/historical-regents-rules-regulations/MasterRRR120904.PDF

See the Office of the Dean of Students' homepage (Office of Student Life) for more information:
http://studentaffairs.utep.edu/dos

You can also refer to the IEEE website for information on our code of ethics:
http://www.ieee.org/about/corporate/governance/p7-8.html

POLICY RELATING TO DISABILITY/PREGNANCY/CASS

It is the responsibility of the student to inform the Center for Accommodations and Support Services (CASS) so that written guidelines from CASS for accommodations are submitted to the course instructor PRIOR to the start of the course. CASS' staff are the only individuals who can validate and authorize accommodations for students.

All accommodations must be *specific* and *quantitative*. For example, "Extended time for course work" is not an acceptable accommodation because it does not specify how much time and does not specify what course work it applies to. Instead, one way this accommodation could be made acceptable is "Up to three homework assignments during the semester shall be accepted up to 24 hours past the regularly scheduled due date/time before penalties are applied." Other examples of accommodations that are not acceptable are "Absence consideration" and "Tardiness consideration" because they do not specify how many absences or tardiness events should be accepted. Instead, one way this accommodation could be made acceptable is "Student is permitted to be up to 10 minutes late to all classes and permitted to be absent up to three times during the semester before penalties are applied." Please work with CASS to determine reasonable accommodations, but be sure the accommodations are specific and quantitative.

The UTEP Disabled Student Services Office was established for the purpose of providing appropriate and reasonable accommodations as mandated in Section 504 of the Rehabilitation Act of 1973 (http://www.dol.gov/oasam/regs/statutes/sec504.htm) and the Americans with Disabilities Act (http://www.ada.gov/). For addition help, contact the Center for Accommodations and Support Services (CASS):

(915) 747-5148
cass@utep.edu
http://sa.utep.edu/cass/

DISCRIMINATION

I do not discriminate, nor will I allow discrimination, on the basis of age, gender, color, ethnicity, national origin, religion, disability, sexual orientation, or favorite sports team. Members of the UTEP community are protected from discrimination and harassment by the State and Federal Laws.

IMPORTANT DATES

Aug 24   Classes begin
Aug 25   First day of CMEE!!! ☺
Sep 7   Labor Day – University closed
Nov 1   Course drop deadline
Nov 26-27   Thanksgiving Holiday – University closed
Dec 4   Dead Day
Dec 8   Final Projects