

MECH 3352: Engineering Analysis II (CRN: 12993)

<https://sites.google.com/view/utep-ea2/>

Prerequisites: Successful completion of Engineering Analysis I (Differential Equations) or equivalent.

Class time and location: TR 1200 - 1320, LART 319

Instructor: Dr. Piyush Kumar, pkumar2@utep.edu

Teaching Assistant:

Office hours: MTW 1330 - 1430AM or by appointment (MS Team)

Class delivery: The class will be delivered in-person mode or as informed by the instructor.

Minimum attendance requirements: You must attend at least 75% of all the classes.

I. Course Objectives

The primary goal is to provide engineering majors with a basic knowledge of numerical methods with a focus on *root-finding, elementary numerical linear algebra, solving systems of linear equations, curve fitting, numerical solution to ordinary differential equations, numerical integration, and Machine Learning/Artificial Intelligence*. An advanced programming tool (with Python) will be used for the implementation and application of these numerical methods. The numerical techniques learned in this course enable students to work with mathematical models used in various technology and systems including robotics and automation systems, fluid and thermal engineering, 3D additive manufacturing.

By the end of this course, the students should be able to do the following:

- Structured programming: Understand basic structured programming concepts involving decision making, loops, functions, and parameter passing implemented within the Python programming environment.
- Numerical methods: Understand the most common numerical methods used in engineering analysis, when to use each method, and how to implement basic methods in a structured manner using the programming language.
- Numerical accuracy: Estimate the amount of error inherent in different numerical methods.
- Numerical efficiency: Assess the efficiency of a selected numerical method when more than one option is available to solve a certain class of problem.

Detailed course contents are available at <https://sites.google.com/view/utep-ea2/contents>

II. Textbooks and Electronic media

Required: Applied Numerical Methods with Python for Engineers and Scientists, 1st Edition, By Steven Chapra and David Clough, ISBN10: 1266651497, ISBN13: 9781266651496

Required: Computer with an access to the UTEP network, Python softwares

References materials:

- SC Chapra, "Applied Numerical Methods with MATLAB for Engineers and Scientists", McGraw Hill.
- DV Griffiths and IM Smith. "Numerical Methods for Engineers", 2nd Edition, Chapman & Hall/CRC

- Online materials as provided by the instructor

III. ABET Program Outcomes Impacted

This class significantly addresses the following ABET Objectives (From [ABET](#) on page 3):

- (a) An ability to apply knowledge of mathematics, science, and engineering
- (e) An ability to identify, formulate, and solve engineering problems
- (i) Recognize the need for engaging in lifelong learning
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

IV. Class Materials

- Class Notes, Book chapters, suggested videos
- Presentations and Online Materials
- Exams, Quizzes and Homework

IV. Grading

There will be several assignments at regular intervals during the semester. You are required to submit the assigned work by the deadline. **Late submission of the assigned work will not be allowed.** The following percentages of the assessments will constitute the basis for the assigning of the final grade:

Grade distribution:

Assessment mode	Description	Overall weight
Out of class exercises (Homework)	Assessments assigned outside of the class-period will be considered as 'take home' exercises	15 %
In-class activities (Classwork)	Regular assessments and coding exercises will be conducted during the class period	15 %
Attendance	Minimum 75%	10%
Exam 1		20%
Exam 2		20%
Exam 3		20%
	Total	100%

Note: If you arrive more than 15 minutes late for an exam, you will not be allowed to enter the examination room. If conducting any of the exams gets badly affected due to unforeseen events (e.g., inclement weather, computing infrastructure failure, etc.), the instructor will use one of the officially assigned days (e.g., class period or final exam time) to re-conduct the affected exam(s), or prorate the score for the affected assessment.

Letter grade – percentage score conversion method:

Letter grade	Overall percentage score
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A	90% < Your score
B	80% < Your score < 90%
C	70% < Your score < 80%
D	60% < Your score < 70%
F	Your score < 60%

Note: Any outstanding issues related to grading arise, the issues must be resolved within **two weeks** from the day the graded work was returned/posted. In case of any disagreement about the grading policy or processes that may arise on an individual basis but falls beyond the scope of this syllabus, you should discuss with your department's undergraduate/graduate coordinator.

VI. Academic Misconduct

Students are encouraged to work together to discuss the subject, however, all graded materials must represent the student's individual work. Scholastic dishonesty is the attempt of any student to present as his or her own work of another, or any work which he/she has not honestly performed, or attempting to pass any examination by improper means. Scholastic dishonesty is a serious offense and will not be accepted. Academic misconduct will be handled according to the current university policy.

During exams and quizzes, you are not allowed to use any form of wifi enabled electronic device, including cell phones or other electronic communication devices or methods (wrist watches, earbuds, etc.). No wristwatch or other electronic device may be worn. No electronic version of the book, loose paper printouts of the book or extra sheets of paper of any kind are allowed unless explicitly mentioned in writing by the instructor. The instructor may choose to relax some of the requirements for specific assessments. Instructor will let you know in advance in such cases.

As a part of the zero-tolerance policy, if you have a cellphone or other electronic device capable of communication on your person; or if any proctor sees or hears any electronic device during the exam or if you share your work with someone else, you will be reported to the proper authorities and you may receive a zero on the exam and an F in the class. Other actions including suspension may also be pursued.

If you are suspected of scholastic dishonesty you may not be directly confronted about your conduct by the instructor or proctor. You will, however, be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) and your exam will not be admissible. Your grade in the class may not be available until OSCCR makes a final ruling, this may adversely impact your ability to enroll in other classes.

Instructors and/or proctors may record and/or use their personal cell phones to document activity during the exam. Recording devices may also be located at various locations in the room and may be out of sight of the students. These recordings will be managed according to the UTEP approved regulations for such media.

VII. Accommodation

Any student in this course who has a disability that may prevent him or her from demonstrating his or her abilities should contact me personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

IX. Make-up policy

There will be **no makeup** exams administered. If you have a university approved excuse, your instructor will have a process for determining how to handle the missing grade outlined in the syllabus. However, no makeup exams will be given. If you miss more than one exam, the instructor may choose to administratively drop you from the class. This may adversely impact a visa and financial aid.

VIII. Class Environment

In-class conversation will only be allowed during the class discussion session as allowed by the instructor. No other form of conversation will be allowed during the class. No food or drinks will be allowed in the examination room. Departmental policy allows for the use of assigned seats. All students must present their UTEP issued ID prior to and during every exam and may be required to sign in. Not having a UTEP issued ID when asked will result in forfeiture of the exam.

IX. Attendance Policy

Attendance is mandatory. Anyone with 5 or more absences will be dropped from the class. A drop for not attending will count toward the State Allowed Six Drop Limit. If you are failing the class at the time of the drop you may also be given a WF designation. Be advised that a drop could adversely impact visa status, financial aid and other programs. As per UTEP rules, you may be asked to show a UTEP ID at any time during class. Class work may be counted towards attendance. Students should resolve outstanding attendance issues within two weeks after the notification.

X. Harassment Policy

The department has a zero-tolerance policy for harassment. Engagement in any behavior considered harassment will be reported to the proper authorities. In addition to generally understood forms of harassment, the department also treats the following behavior as harassment:

- Repeated emails and/or calls regarding subjects that have already been addressed. Once a decision has been made or a question answered, a student who continues to ask the same question will be given a warning by the recipient of the email/call. If the student continues, the behavior will be reported. Questions that seek understanding of course material are not harassment; but repeated questions about a grade or an administrative decision are.
- Grades are NOT negotiable, ever. If you believe a grading mistake has been made, you must follow the process described in the UTEP catalog. Any request for a grade elevation that is NOT based on a mistake is considered harassment and will be reported immediately.

- Remaining in an office after the occupant requests you leave is considered harassment and potentially threatening. You will be reported immediately without warning and depending on the severity, may be reported to law enforcement.
- Similar behavior towards department staff and student advisors will also be treated as harassment, including persistent phone calls, emails, and badgering. Department staff and student advisors are there to help students and should be treated with due respect.