

Department of Civil Engineering
University of Texas at El Paso

CE 4375/4376/4377/5390 - Mathematical Modeling of Environmental & Water Resources Systems

(Adv Topics in Civ Engr I/Adv Topics in Civ Engr II/Adv Topics in Civ Engr III/Special Topics Civil Engr)

Spring 2022
3.000 Credit hours
3.000 Lecture hours

Professor Alex Mayer

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Office Hours: Monday, Wednesday, Friday 12-1pm, in person (Kelly Hall 204) or virtually via [Zoom](#)

COURSE VENUE

The course lectures will be held in Classroom Building C304.

COURSE DESCRIPTION

This course will introduce students to numerical techniques for mathematical modeling of various earth system phenomena. Students will code their own mathematical models using the programming platform of their choice (R, Python, MATLAB,...).

COURSE OBJECTIVES

Upon successful completion of this course, students will be able to

- solve several types of differential equations relevant to earth systems using numerical methods
- convert numerical solutions to solution algorithms and computer code
- assess the validity of numerical solutions and codes

LEARNING MODULES

This course is designed on Blackboard using a modular format. Each week is packaged so that the materials are contained in one Blackboard module for a given week. Materials include the following.

- PowerPoint lectures
- Assignments: homeworks

REQUIRED TEXT

- Chapra, S., 2023. Applied Numerical Methods with MATLAB for Engineers and Scientists, McGraw-Hill, 5th Edition (older editions are probably ok)
- Mayer class notes (see Blackboard)

COURSE ASSIGNMENTS AND GRADING

The basis of grading for this course will consist of 9 homework assignments, each worth 100 points each. Letter grades for graduate students will be assigned as follows:

- A 90 - 100%
- B 80 - 89%

- C 70 - 79%
- D 60 - 69%
- F < 60%

Homework: Homeworks will be assigned with one to two weeks given for completion of each assignment. Homework assignments will focus on the material covered in lecture and each will typically require writing a computer code and solving a sample problem. I will give you a chance to make up points on homeworks, but you will have to turn in the homeworks for regrading no more than two days after the assignment is handed back. I reserve the right to assign a failing grade to any student not turning in 75% of the homework assignments for this course.

Each student will turn in the homework assignments on their own. The homework assignments that you turn in are intended to represent your own work. I encourage you to work together in terms of understanding problems, and helping each other learn the material, but the actual work should be yours alone.

Homework assignments will be submitted for grading via Blackboard as a **single pdf document**. I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue with the course website, network, and/or your computer. If you are experiencing difficulties submitting your work through the course website, please contact the UTEP Help Desk. You can email me your documents as a last resort.

Exams: no exams!

TECHNOLOGY REQUIREMENTS

You will need to access and use a programming environment, such as MATLAB, R, or Python.

COURSE COMMUNICATION

- **Office Hours:** My office hours will be held Tuesday, Wednesday, and Thursday 12:00-1:00 in-person at my office or on Zoom using this [link](#).
- **Email:** UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. When e-mailing me, be sure to email from your UTEP student account and please put the course number in the subject line. In the body of your e-mail, clearly state your question.
- **Announcements:** Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

ATTENDANCE AND PARTICIPATION

Your participation in the course lectures is important not only for your learning and success but also to create a community of learners. As we know, sometimes communication can be challenging. It's possible to miscommunicate what we mean or to misunderstand what our classmates mean. Therefore, please keep these etiquette guidelines in mind. Failure to observe them may result in disciplinary action.

- Always consider audience. All communication should reflect polite consideration of other's ideas.
- Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- When reacting to someone else's comments or responses to questions, 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 on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

ACCOMMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the [UTEP Center for Accommodations and Support Services](#) (CASS). Contact the Center for Accommodations and Support Services at 915-747-5148, or email them at cass@utep.edu, or apply for accommodations online via the [CASS portal](#).

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

CLASS RECORDINGS

No recordings will be made.

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

COVID-19 PRECAUTIONS

Please stay home if you have been diagnosed with COVID-19 or are experiencing COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, so that we can work on appropriate accommodations. If you have tested positive for COVID-19, you are encouraged to report your results to covidaction@utep.edu, so that the Dean of Students Office can provide you with support and help with communication with your professors. The Student Health Center is equipped to provide COVID-19 testing.

The Center for Disease Control and Prevention recommends that people in areas of substantial or high COVID-19 transmission wear face masks when indoors in groups of people. The best way that Miners can take care of Miners is to get the vaccine. If you still need the vaccine, it is

widely available in the El Paso area, and will be available at no charge on campus during the first week of classes. For more information about the current rates, testing, and vaccinations, please visit epstrong.org.

UNIVERSITY RESOURCES

UTEP provides a variety of student services and support:

Technology Resources

- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources

- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center \(HTC\)](#): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

Individual Resources

- [Military Student Success Center](#): Assists personnel in any branch of service to reach their educational goals.
- [Center for Accommodations and Support Services](#): Assists students with ADA-related accommodations for coursework, housing, and internships.
- [Counseling and Psychological Services](#): Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.