

MATH 4336

Applied Analysis II

CRN: 23995

Term: Spring 2023

Credit Hours: 3

Instructor: Dr. Anass Bouchnita

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Instructor office: Bell Hall 202

Time and location: TR from 12 p.m. to 1:20 p.m. in Education Building 309

Office hours: Fridays 1-3 p.m., in person and by appointment.

Drop deadline: March 30, 2023.

Prerequisites

The course assumes that you have already taken differential equations. In particular, good knowledge of applications and analytical solutions of differential equations is required.

Course description

Differential equations are commonly used to describe a wide range of problems in engineering, physics, chemistry, and biology. In MATH 4336 (3 credits), we will cover several analytical methods that can solve differential equations. The first part of the course (Chapters 5 and 11) focuses on the resolution of some differential equations using series and particular equations. In particular, we will discuss the applications of power series, Legendre polynomials, Bessel functions, Fourier series, and the Sturm-Liouville theorem.

In the second part of the course (Chapter 12), we will introduce some basic partial differential equations such as the wave, heat, and Laplace equations. We will discuss some of the analytical methods used for the solution of these equations and a few of their applications in mathematical modeling. By the end of the course, the students are expected to acquire some analytical tools that will allow them to solve some ordinary and partial differential equations. They will also be initiated into the art of mathematical modeling and its various applications in engineering, physics, biology, and chemistry.

Course objectives

This course aims to achieve the following learning objectives:

- Assimilate some analytical tools to solve ordinary differential equations
- Apply Fourier series analysis to gain insights into dynamic systems
- Discover basic partial differential equations
- Solve some partial differential equations using analytical methods

Learning modules

The course consists of 14 learning modules. Each module will be covered in one week. The modules cover Chapters 5, 11, and 12 of the textbook. A typical week will consist of a lecture with some practice problems. The tentative schedule of the modules is represented in Table 1.

Table 1: Tentative schedule of the course modules and examinations. The schedule is subject to change depending on the achievement of the learning outcomes. Any changes will be announced during the class or over Blackboard.

Week	Content
Jan 17 - Jan 20	Introduction to MATH 4336, 5.1, quiz 1
Jan 23 - Jan 27	5.2, 5.3
Jan 30 - Feb 03	5.4, 5.5, quiz 2
Feb 06 - Feb 10	Chapter 5 review, Midterm exam I
Feb 13 - Feb 17	11.1, 11.2
Feb 20 - Feb 24	11.3, 11.4
Feb 27 - Mar 03	11.5, 11.6, quiz 3
Mar 06 - Mar 10	11.7, 11.8
Mar 13 - Mar 17	Spring break
Mar 20 - Mar 24	11.9, chapter 11 review
Mar 27 - Mar 31	Midterm exam II, 12.1
Apr 03 - Apr 07	12.2, 12.3, quiz 3
Apr 10 - Apr 14	12.4, 12.5
Apr 17 - Apr 21	12.6, 12.7, 12.8
Apr 24 - Apr 28	12.9, 12.10, 12.11, quiz 5
May 01 - May 05	12.12, comprehensive course review
Ma 08 - May 12	Final exam

Required materials

- Textbook: Erwin Kreyszig. Advanced Engineering Mathematics. Wiley, 10th Edition (the cover is shown in Figure 1).
- Scientific calculator (with or without graphing ability).
- A smartphone that supports iClicker.

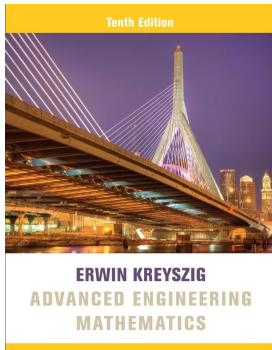


Figure 1: The textbook cover.

Course assignments and grading

The final grade will be calculated based on attendance and participation, five quizzes, two midterm exams and one final exam. Exams will be taken during class classes, while quizzes should be completed over Blackboard. The two lowest grades obtained in quizzes will be dropped when calculating the overall grade.

The overall grade will be calculated as the weighted sum of the grades obtained in the final exam, the two midterm exams, and the five quizzes, in addition to attendance and participation. The grade will be calculated based on the final score as follows:

1000-800 = A; 800-600 = B; 600-400 = C; 400-200 = D; 200 and Below = F

The final score will be calculated as the weighted sum of the grades obtained in the following tests:

- o 300 points: Final Exam
- o 200 Points: 1st Midterm Exam
- o 200 Points: 2nd Midterm Exam
- o 150 Points: quizzes
- o 150 Points: attendance and participation

Technology requirements

Course contents will be delivered via the Blackboard learning management system. Communication between students and the instructor will be mediated by the Blackboard discussion board or using UTEP email accounts. The student must have the last version of a stable browser like Google Chrome or Mozilla Firefox to explore Blackboard. If you still encounter any difficulties, update your browser, clear your cache, or use a different browser. The Blackboard software will be used for quizzes, surveys, announcements, and additional course material. ADA students are advised to use word-processing software like Microsoft Office programs which is available for free via the UTEP Microsoft Office Portal. In addition, please reach out at the beginning of the course to accommodate the course for you. A tutorial for this software is available upon notice.

Further, the app iClicker will be used to take attendance and complete surveys in class.

IMPORTANT: If you encounter technical difficulties beyond your scope of troubleshooting, please contact the UTEP Help Desk as they are trained specifically in assisting with the technological needs of students. Please do not contact me for this type of assistance. The Help Desk is much better equipped than I am to assist you!

Course communication

This is an in-person course, we will use the following communication channels to stay in contact:

Office Hours: My office hours will be held during the following time:

Fridays: 1-3 p.m. Mountain Time in person, by appointment. Please send an e-mail to me at least 12 hours if you want to meet.

Email: UTEP e-mail can be used if you have any inquiries regarding the course. I will attempt to answer within 24-48 hours. In the case the question requires a discussion, it is better to come to see me during office hours. Make sure to add the course number and use the UTEP e-mail. Also, make sure that the subject line clearly describes the inquiry. Finally, please provide your full name and university identification number at the end of the e-mail. A typical e-mail should look like this:

To: abouchnita@utep.edu

Cc: ...

Subject: [MATH 3446] Inquiry about homework assignment n° 6, Section 5.2

Hi ...

...

...

...

Best regards,
First name Last time
ID

Announcements: Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

Netiquette

Online communication can be challenging because of the lack of body language and immediate feedback. Therefore, it is essential to follow some netiquette (network etiquette) guidelines to keep a positive and productive environment in the classroom. Failure to comply with these guidelines may result in disciplinary action.

- o Communication should reflect polite consideration of others' ideas.
- o Respect and courtesy must be provided to classmates and to the instructor at all times. No harassment or inappropriate postings will be tolerated.
- o 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.
- o 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 instructor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space.

Attendance and participation

Attendance is necessary to complete the quizzes and exams with a satisfactory grade. Further, students are expected to read the textbook and work through the examples covered in class. Further, attendance and participation are explicitly taken into the final grade. Students are expected to attend class and arrive on time. Absent students are responsible to find out the material and homework that need to be made up. Absences due to illness or other emergencies can be justified with appropriate documentation. Participation in the class covers the following aspects:

- o Taking iClicker surveys.
- o Participation in Blackboard surveys.
- o Asking questions and participating in class discussions.

Excused absences and drop policy

I will not drop you from the course. However, if you feel that you are unable to complete the course successfully, please let me know and then contact the Registrar's Office to initiate the drop process. If you do not, you are at risk of receiving an "F" for the course. The deadline to drop the course is March 30, 2022.

Deadlines, late work and absence policy

Exams will be held in person during class. Quizzes will be completed over Blackboard. The exact time and modalities will be specified in separate announcements.

Make-up work

Missed exams cannot be made up, either. Again, exceptions can be given only in extraordinary and unavoidable circumstances with reasonable proof, and with advance notice in writing. Make-up work will be given only in case of a documented exceptional emergency.

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 for the University. Students requesting 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, 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 one's 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.

Copyright statement and 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.

Course resources

UTEP provides a variety of student services and support:

Technology Resources

Help Desk: Students experiencing technological challenges (email, Blackboard, iClicker, 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.

Math Tutoring Center (MaRCS): Ask a tutor for help and explore other available math resources.

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.