MATH 250
Ordinary Differential Equations
Sample Syllabus

Description

In this course, students will learn how derivatives commonly appear in equations used to describe the world. Equations involving derivatives are called differential equations. Differential equations play an important role in modeling the real world. Newton's laws, Maxwell's laws of electromagnetism, Einstein's equations of general relativity, Euler and Bernoulli's beam equation, the Black-Scholes equation from finance, Perelson's viral-dynamics equations in biology, and the million-dollar NavierStokes equations are all differential equations used daily in their respective disciplines. Today, differential equations are one of the fundamental mathematical tools for the study of systems that change over time, and are used in most areas of science, engineering, and mathematics. MATH 250 is an introductory course on ordinary differential equations. Ordinary differential equations are equations that involve derivative of a function with respect to only one variable. The goal of this course is to teach the students some of the elementary techniques in dealing with several fundamental types of equations. Some topics include linear equations involving only first and second derivatives, Laplace transforms, systems of linear equations involving only first derivatives, and phase-plane analysis.

Prerequisite

MATH 141, MATH 141B, or MATH 141H. Students who have passed Math 250 and Math 252 cannot schedule Math 251 for credit.

Objectives

In this course, our focus will be on the study of Ordinary Differential Equations (ODEs). Topics include, but are not limited to the following:

- Classify ODEs in terms of type and order
- Analyze the asymptotic behavior of autonomous differential equations
- Learn methods for solving first, second, and some higher-order differential equations. Methods will include, but not limited to:
    - Separation of variables
    - Integrating factor method for first order linear differential equations
    - Method of characteristic equation
    - Laplace transform solutions
    - Initial value problems
- Solving linear and nonlinear systems of differential equations
- Stability of critical points
- Analyze behavior of linear and nonlinear systems of differential equations,
- Apply the knowledge of differential equations to explain real life phenomena (population dynamics (including Logistic Growth), exponential growth and decay, circuit equations, spring-mass, linear and non-linear predator-pray models, linear and non-linear cooperation models, and others)

Textbook

I encourage everyone to purchase the WebAssign Access, which comes with the eBook access (this is the best value). However, if one prefers a hard copy of the textbook, then it is Differential Equations with Boundary value problems, 9th ed, by Dennis Zill. Students must also have to purchase access to WebAssign if they purchase a text not packaged with WebAssign access code.

Homework

Homework sets will be assigned weekly and need to be accessed and completed through WebAssign. Students are given five chances to answer each problem, use these attempts as a mean to comprehend the material. Homework is essential to success in this course. For each homework assignment, there will be 5 attempts per each question.

Quizzes

After each homework assignment, there will be a quiz to complete on WebAssign. For each quiz, there will be 3 attempts per each question.

Exams

During the semester we will have two midterm examinations each one worth 100 points, and a comprehensive final examination that is worth 150 points. Dates of the exams are all set on CNAVAS. You, the student, must sign up for the exam to secure a proctor, which instructions are also available on CANVAS.

Grading

Assignment	Points
Homework	75
Quizzes	75
Midterm Exam 1	100
Midterm Exam 2	100
Final Exam	150
Total	500

Grade Scale

Letter Grade	Total Points
A	465-500
A-	450-464
B+	435-449
B	415-434
B-	400-414
C+	385-399
C	350-384
D	300-349
F	0-299

Examity

In this class you may take your tests remotely and they will be proctored by a service called Examity®. Please log in as soon as possible to set up your profile. You will not be able to schedule exams until your profile is complete. Examity® system requirements are:

- Desktop computer or laptop (tablets, Chromebook and cell phones do not meet our requirements).
- Webcam and microphone (built-in or external).
- Connection to network with sufficient internet speed: at least 2 Mbps download speed and 2 Mbps upload.
- Operating systems: Windows XP–Windows 10, Mac OS X 10.8 (Mountain Lion)–10.11 (El Capitan).
- Browser with pop-up blocker disabled: Google Chrome v39 or later, Mozilla Firefox v34 or later, Internet Explorer v8 or later, Microsoft Edge, Apple Safari v6 or later.

After you create your Examity profile, you will have the option to schedule proctoring times for each of your exams. On the day of your exam, go to your Examity dashboard using the single sign-on link and select the ‘Start Exam’ button to meet the proctor.

Examity Proctors

Examity’s proctors are highly-trained individuals who go through a rigorous process of selection, including background checks and comprehensive training. All proctors have a college degree, advanced technical and communication skills, and have completed online courses.

Proctoring Terms of Service

This course may require you to take exams using certain proctoring software that uses your computer's webcam or other technology to monitor and/or record your activity during exams. The proctoring software may be listening to you, monitoring your computer screen, viewing you and your surroundings, recording and storing any and all activity (including visual and audio recordings) during the proctoring process. By enrolling in this course, you consent to the use of the proctoring software selected by your instructor, including but not limited to any audio and/or visual monitoring which may be recorded. Please contact your instructor with any questions.

This information is provided by Penn State World Campus

If you have any technical questions or concerns, contact Examity's support team 24/7 via email or phone at (855) 392-6489.

Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Accommodating Disabilities

Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. The Student Disability Resources (SDR) website provides contact information for every Penn State campus . For further information, please visit Student Disability Resources website.

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines . If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Counseling and Psychological Services

Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

- Counseling and Psychological Services at University Park (CAPS): 814-863-0395
- Counseling and Psychological Services at Commonwealth Campuses
- Penn State Crisis Line (Available 24 hrs, 7 days a week): 877-229-6400
- Crisis Text Line (Available 24 hrs, 7 days a week): Text LIONS to 741741

Educational Equity / Report Bias

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, or harassment due to age, ancestry, color, disability, gender, gender identity, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity via the Report Bias website.
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