Math 0290: Differential Equations, Departmental Syllabus, Spring 2022

Overview: Differential equations represent an important branch of mathematics. Many of their properties have been understood mathematically and they have a history of being successfully applied to important problems in all areas of science and engineering. This course will introduce primarily linear, first-order, and second-order differential equations. Solution techniques for separable equations and homogeneous and inhomogeneous equations as well as a range of modeling-based applications arising in the context of engineering, physics and chemistry will be presented. The application of Laplace transforms to differential equations, systems of linear differential equations, linearization of nonlinear systems, and phase plane methods will be covered. Fourier series, a useful tool in signal processing, will also be introduced, and we will discuss how the Fourier series arises in solving the famous heat equation by separation of variables. The idea of approximating and visualizing solutions using a computer, such as with Matlab, will be introduced early in the term and students are expected to use Matlab as a resource in their work for this course.

Textbooks: Polking, Boggess and Arnold, *Differential Equations with Boundary Value Problems*, second edition, Pearson Prentice-Hall.

All students who register for this course are automatically enrolled in the RedShelf Inclusive Access program and will be charged on their Pitt student bill unless they opt out before the end of the add/drop period. This program provides students with discounted access to the digital version of the textbook and the publisher's WebAssign content, but only the textbook itself will be required. If you already have a copy of the textbook or would prefer to purchase it from a different source (for example, you may be able to find a used copy of the first or second edition at a lower cost), then you should opt out of Inclusive Access. You will be able to opt out by clicking on the "RedShelf Inclusive Access" link in your course on Canvas. More detailed instructions for opting out can be found here. If you do not opt out of Inclusive Access, then you will be able to access the digital textbook through a link to WebAssign in Canvas.

Grades:
Homework 20%, Two midterm exams 40% (20% each), Final exam 40%.

Assessments: (1) Weekly homework assignments will be collect at the beginning of the lecture every Monday. (2) There will be two in-class Midterm Exams. The second midterm will not be cumulative to the first. (3) **The Departmental Final Exam is cumulative and the date will be announced later. Your course grade will not exceed your Final Exam grade by more than one letter grade.**

Grading scale: A/A±:90-100%, B/B±: 80-89%, C/C±: 70-79%, D/D±: 60−69%, F:<60%.

Matlab: Computers are often used to study solutions to differential equations in physics, biology, chemistry, and engineering. Right from the outset, we will discuss how Matlab can help us to visualize the behavior of solutions of differential equations and to approximate these solutions and we will give an introduction to numerical solution techniques. Matlab will not be available on quizzes/exams, however, and will not factor heavily into statements of homework problems; mostly, it is a tool that can help you understand the material better and check your solutions.

Homework policies: Students are required to complete the homework problems; very few students can learn this material without constant practice. Students are welcome to work together on homework. However, each student must turn in his or her own assignments, and no copying from another student's work is permitted. Deadline extensions for homework will not be given. Please feel free to come ask me questions about homework and other course material during office hours or to contact me to schedule alternative appointments. **Your questions are always welcome**.

Midterm exams: These assessments are to be completed in class at the assigned times. The only exception to this policy is as follows: if you have a legitimate medical or academic conflict that will prevent you from being in class for a midterm, then contact me well ahead of time to discuss alternative arrangements.

Final Exam policy: All students must take the departmental Final Exam at the time and place scheduled by the registrar.

Final Grade policy: Your final grade will not exceed your Final Exam grade by more than one letter grade.

Exam Dates: See the class schedule for the dates of the two midterm exams. The date and time of the final exam

will be announced by your instructor and in PeopleSoft.

Getting Help

Tutoring: The Math Assistance Center offers free tutoring by appointment, including same-day appointments for those who need immediate assistance. Appointments can be made within Pathways. The MAC offers assistance with all courses in the math department in the range 0010-0413. In particular, the MAC is able to assist with MATH 0290. Please see the MAC's website for instructions on how appointments are made as well as an outline of what you can expect. MAC Website at http://www.mathematics.pitt.edu/undergraduate/math-assistance-centerposvar-computing-lab.
Office Hours: Your instructor and grader will announce their office hours, which will typically be conducted through Zoom.

Disability Resource Services: If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services, 140 William Pitt Union, 412-648-7890 Êas early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

Course Policies

Academic Integrity: Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity may incur a zero score for the assessment in question. Additional sanctions may be imposed, depending on the severity of the infraction. Even during this COVID-19 pandemic, Academic Integrity policies will be enforced. If there is any doubt about the originality of a student's submission for an assessment, they may be asked to explain their work during a one-on-one meeting with their instructor. If the student's explanations are unsatisfactory, they may receive a zero score for the assessment, or the instructor may choose to administer an alternative assessment in a different format.

Please note, in particular, that Pitt has a data sharing arrangement with Chegg.com that enables us to identify instances in which Chegg.com has been used to cheat on assessments. Consequences of being caught in this academic integrity violation have included zero scores on assessments and F grades for the course.

Health and Safety: In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering and comply with physical distancing requirements; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit coronavirus.pitt.edu and check your Pitt email for updates before each class.

Diversity and Inclusion: The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, see: https://www.diversity.pitt.edu/civil-rights-title-ix-compliance/policies-procedures-and-practices.

We ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing titleixcoordinator@pitt.edu. Reports can also be filed online: https://www.diversity.pitt.edu/make-report/report-form. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

Classroom Recording: To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities not already recorded by the instructor, without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.