Differential Equations Syllabus
Math 0290
Spring term 2021

University of Pittsburgh
January 2021

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.

Overview

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 Maple, Mathematica or Matlab, will be introduced early in the term and students are expected to use these resources in their work for this course.

Prerequisite, Textbook

- The prerequisite for this course is **Math 0230**, so all of the calculus of functions of one real variable.
- The texbook for the course is:

Polking, Boggess and Arnold,
Differential Equations with Boundary Value Problems,
Second edition, Pearson Prentice-Hall.

There is a link in Canvas which includes the purchase of the textbook onto your tuition statement if you do not opt out.
This purchase offers more than what is necessary.
The only requirement for this course is the textbook itself.
You may choose to use the first edition of the text or a used second edition.

If you wish to do that you should choose the opt out option prior to the add/drop deadline.

Textbook

Quote from Ms Alice Doolittle, Library Specialist:
"Yes, we have 2 copies of Polking (2nd ed.) on reserve.
We also have the MATLAB companion (ODE using MATLAB, 3rd ed., by Polking and Arnold) on reserve if that is needed."

From the catalog record, click on the link next to "Click for Web Access" to access the e-book. You and your students can navigate to the library catalog record for this e-book by searching for your course on the library's course reserve search page
http://pittcat.pitt.edu/cgi-bin/Pwebrecon.cgi?DB=local&PAGE=rbSearch

Grading Scheme

- **Homework and quizzes: 25%**,
- **Two midterm examinations, each at 20 percent, 40%**,
- **Final examination 35%.**

Grading will be based on your total score for the term and your performance on the Final.

- The timing and nature of the Final Examination have yet to be specified.

Practice Problems

- In the class schedule you are provided with a list of practice problems from the textbook (see below).
- You are expected to solve the scheduled problems, although they will not be collected and graded.
- Exam and quiz problems may well be modeled on these problems.

Computers

Computers are often used to study solutions to differential equations in physics, biology, chemistry, and engineering.

Right from the outset, we will discuss how computers 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.

However computers will not be used on quizzes and exams.

Materials

In addition to the textbook, you will need at least a scientific calculator.
Any calculator with logarithms, exponentials, and trigonometric functions will do.
Programmability is desirable but not essential.
A graphing calculator, such as the TI83 or TI86, is better still.

Computer Accounts

As a University of Pittsburgh student, you should already have a Pitt computer account.
You will need to know your username and password to access the computer resources of the University.

Getting Help

If you need help you can use the MAC:

- The Math Assistance Center offers free tutoring by appointment, including same-day appointments for those who need immediate assistance.
- Click here: MAC website
- The MAC offers assistance with all courses in the math department in the range 0010-0413.
- Please see the MAC's website for instructions on how appointments are made as well as an outline of what you can expect.

Policy on Academic Integrity

The University of Pittsburgh Academic Integrity Code is available at **Academic Integrity**

The code states in particular that:

"A student has an obligation to exhibit honesty and to respect the ethical standards of the academy in carrying out his or her academic assignments."

The website lists examples of actions that violate this code. Students are expected to adhere to the Academic Integrity Code, and violations of the code will be dealt with seriously.

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 as early as possible in the term.
- DRS will verify your disability and determine reasonable accommodations for this course.

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: Diversity.

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 covid-19 and check your Pitt email for updates before each class.

Postures

- The University has adopted the Flex@Pitt teaching model for this semester, and instruction will vary in form depending on the University's current operational posture.
- In the Elevated Risk and High Risk postures, all instruction will be conducted remotely, and there will be no in-person class meetings.
  In practice this means we will hold virtual class meetings through Zoom at the scheduled class time, and the links to join these synchronous meetings will be posted.
  The class meetings will be recorded and made available for viewing online.