Syllabus

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Chapter 1

Welcome!

Before we get into the details of the course, I want to share with you a few thoughts about my general approach to teaching and learning. My main goal as the professor in this course is to help you succeed, not just in learning the material but in growing as a learner. Learning takes effort, a willingness to try something that may not work, and an openness to learning from feedback.; my job is to create an environment in which all of you are supported in these aspects.

I am looking forward to getting to know each of you this semester and it is my sincere goal to make our time together (in class and out) productive and engaging. I want you to feel comfortable coming to me with any questions or concerns that arise, mathematical and otherwise. If you encounter any issues that interfere with your learning, whether they are physical, mental, emotional, economic, or otherwise, or if you experience discrimination or mistreatment of any sort, please contact me immediately. Other resources for support include the Chair of the Math Department or the CAS Dean of Students.

Much of the work for this course will be done within class or small group discussions for which we will rely on everyone in this class as a source for feedback and support. Because of this, it's incredibly important to me that we create an inclusive community that is respectful of our differences and offers space for the boundary-setting necessary for positive relationships to form. Our diversity is reflected by differences in race, gender, sexuality, ability, class, religion, nationality, and other cultural identities and material circumstances.

Chapter 2

Course Description

This course introduces the basic techniques and theory of ordinary differential equations, especially as related to problems in the physical sciences. It is aimed at math, engineering, and science majors that have taken the first two semesters of calculus.

Specific topics will include qualitative and analytic techniques for first and second order linear equations, separable equations, systems of linear equations, and Laplace transform methods. Other topics may be covered as time allows. A detailed list of learning objectives appears at the end of this document.

In addition to these specific topics, our learning goals also include: communicating effectively about course content and solution methods; persistence in solving challenging, multi-step problems; and developing a practice of reflection on one's own learning. Certain affective traits (i.e., dispositions and habits that are useful for all learners, regardless of topic) are also valued, such as persistence and growth mindset, and the development of these qualities will be fostered by the course.

Chapter 3

Course Learning Goals

1. I can communicate mathematics orally in a clear and complete manner
2. I can write correct and complete mathematical proofs of Real Analysis results using the conventions of mathematical writing
3. I can independently develop correct and complete proofs of Real Analysis results
4. I can demonstrate an understanding of the nature, approaches, and domain of mathematical inquiry.

Chapter 4

Fundamental Learning Outcomes

1. I can prove results using the axioms for an ordered field.
2. I can prove results involving suprema, infima, and/or the completeness axiom.
3. I can prove results using the formal limit definition for sequences.
4. I can prove results using a formal limit defintion for functions.
5. I can prove results using the definition of continuity.
6. I can prove results using a formal limit definition of the derivative.