**Zoom Meeting ID:** 987 0426 1289, **password:** Available on Canvas. The meeting link will be active for 15 minutes before class until 15 minutes after class.

**Instructor:** Aaron Barrett, Phillips 415, barrett@math.utah.edu

**Office Hours:** Will be held virtually on Tuesdays 1:00-2:00, Fridays 10:00-11:00 or by appointment.

**Textbook:** No textbook required. Students will need a computer with both the MATLAB and Mathematica programming environment. MATLAB and Mathematica are available to students at the student store. Suggested texts include:

- *Numerical Analysis* by Burden and Faires

**Prerequisites:** “C” or better in MATH 5610.

**Course Description:** Numerical solution of initial and boundary value problems of ordinary and partial differential equations.

**Course Objectives:** Students will gain an understanding of numerical methods for initial and boundary value problems of ordinary and partial differential equations. The exploration of the topics will include both the analysis of the stability and convergence of the numerical methods as well as various applications of the methods in real world examples. Numerical tools such as MATLAB and Mathematica will be used to reinforce the course objectives.

**Course Resources:** All lectures will be recorded and immediately posted to Canvas following the end of class. Notes will also be posted to Canvas. There are no textbooks required, but students may find the MATLAB documentation located at [https://www.mathworks.com/help/matlab](https://www.mathworks.com/help/matlab) to be helpful.

**Course Policies:** The class is listed as Interactive Video Conferencing. This means that the class will be delivered live and at the time listed but entirely online. Students are still expected to attend all class meetings; however, given the nature of the semester, lectures will be recorded and uploaded as soon as possible. If I notice a pattern of significant numbers of students missing class without prior approval, I reserve the right to stop recording lectures. Please be on time and prepared for class. If students need additional support during the semester or there’s a significant change in someone’s situation, please reach out as soon as possible.

**Homework:** Homework will be assigned weekly and due the following week. The homework will consist of both analytic and coding problems. Analytic problems should be either typed or...
**NEATLY** written. I retain the right to not grade a problem if it is illegible. Write-ups should be emailed to me, submitted on canvas, or placed in my mailbox in the front office of the Mathematics department. Code should be neatly formatted and commented, and should be turned in via email or canvas. Homework will be accepted late at a cost of 10 percentage points per day it is late. In lieu of this, the two lowest homework grades will be dropped at the end of the semester. For students in MATH 6865, extra homework problems may be assigned. MATH 5620 students may attempt these problems for extra credit.

**Midterm:** There will be a midterm approximately halfway through the semester. The midterm will consist of a take-home exam to be completed **independently**. More information, including the date, on the midterm will be announced later in the semester.

**Project:** In lieu of a final, there will be final projects. Students will choose a topic of their own interest within the realm of scientific computing, and present an expository paper on the topic. The project can be coding heavy, analytic heavy, or a combination of the two. Students may work in groups of up to three people, but more depth is expected of group projects. For students in MATH 6865, students are expected to work alone. The presentation will consist of a short in-person (virtual) presentation during the time allotted for the final exam as well as a short paper describing the results. More information, as well as a list of possible topics, will be given during the semester.

**Grades:** The final grade will be determined by:

- 40% Homework
- 30% Midterm
- 30% Final project

**Course Outline:**

- Math 5610 Review ......................... approx 1-2 weeks
- ODE Review .............................. approx 1 week
- ODE Numerics and Error analysis .... approx 3 weeks
- Stability Analysis ....................... approx 2 weeks
- Boundary Value Problems .............. approx 1 week
- MIDTERM PDE Review ................. approx 0.5 weeks
- Elliptic PDEs ............................ approx 2 weeks
- Parabolic PDEs ........................... approx 1 week
- Hyperbolic PDEs ......................... approx 2 weeks
- Finite Volume Methods .................. remaining time

**Important Dates:**
Last day to add without a permission code ....... Friday, January 22
Last day to add, drop, audit .................. Friday, January 29
Presidents Day holiday ......................... Monday, February 15
Non-Instructional Day ......................... Friday, March 5
Last day to withdraw from classes .......... Friday, March 12
Non-Instructional Day ......................... Monday, April 5
Last Day of Classes ......................... Tuesday, April 27
Final Presentations ............. Thursday, April 29, 2021 8:00 - 10:00 am

**Academic Honesty:** Students are expected to turn in their own independent work. Students are encouraged to discuss the homework and material with other students, but must turn in their own work. If you work together on a problem, please acknowledge who you worked with on the write-up. Students may use online resources. Students are expected to uphold the Honor Code.

**Syllabus Changes:** The instructor reserves the right to make changes to the syllabus, including project due dates and test dates. These changes will be announced as early as possible.

**University of Utah Resources and Policies**

**ADA Statement:** The University of Utah is fully committed to policies of nondiscrimination and equal opportunity. The Americans with Disabilities Act requires that reasonable accommodations be provided for students with physical, cognitive, systemic learning, and psychiatric disabilities, and the University seeks to provide equal access to its programs, services, and activities for people with disabilities. Reasonable prior notice is necessary to arrange such accommodations, and students are responsible for obtaining the accommodations and notifying the instructor through official channels early in the semester.

**Addressing Sexual Misconduct:** Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veterans status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, SSB 328, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677.

**Campus Safety:** The University of Utah values the safety of all campus community members. To report suspicious activity, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

**Diversity and Inclusivity Statement:** It is my intent that students from all diverse backgrounds
and perspectives be well served by this course, that students learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

**Undocumented Student Support Statement:** Immigration is a complex phenomenon with broad impactthose who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801-213-3697 or visit [https://dream.utah.edu](https://dream.utah.edu)

**Wellness Statement:** Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student’s ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at [https://wellness.utah.edu](https://wellness.utah.edu) or 801-581-7776.