Syllabus MA/CS 615 Spring 2024

Course Information

- **MA/CS 615** Numerical Methods For Partial Differential Equations
- **Location & time:** BRNG B268 Tue/Thurs 1:30pm-2:45pm
- **Course webpage:** https://www.math.purdue.edu/~zhan1966/teaching/615/615_2024S.html

Instructor Contact Information

- **Name of the instructor** Xiangxiong Zhang (feel free to call me X)
- **Office Location** MATH 406
- **Email** zhan1966@purdue.edu
- **Office hours** on Wed, by appointment.

Course Description

This is an introductory course of numerical solutions to partial differential equations for any graduate students interested in computational mathematics, with emphasis on breadth rather than depth. The course will cover key concepts with a balance between analysis and implementation, including accuracy, stability and convergence of finite difference methods for time-dependent problems such as wave equations, parabolic equations and conservation laws. The finite element method for elliptic equations will also be introduced. Linear system solvers such as the conjugate gradient method and the multigrid method, and ODE solvers such as Runge-Kutta method will be discussed, if time permits. Homework and the final exam will consist of both analysis and coding by MATLAB. Sample MATLAB codes will be provided thus prior knowledge of coding is not required. Recommended prerequisites include linear partial differential equations, linear algebra, and Fourier analysis, all of which will be reviewed during the lectures.

Learning Resources, Technology & Texts

- Lecture notes will be posted on course webpage.
- Homework solutions will be posted on brightspace after due day.
- Feel free to discuss homework problems on piazza (Brightspace->Content->piazza, **sign up link is under announcements on Brightspace**). But you have to write your own homework. On your first page of hw, write down the name of your collaborators.
- Recommended reference books can be found on the course webpage.

Homework Assignments & Final Exam

1. We will have about 3-5 sets of homework problems, and one take-home final exam. Both analysis and coding will be involved. MATLAB is the required coding tool. Sample MATLAB codes will be provided thus no prior coding skills are necessary.
2. Submit on gradescope (Brightspace->content->gradescope, Entry Code:743Y6B).
3. **Late homework will not be accepted**. Exceptions may be considered for either a well justified and documented reason with prior notifications or an emergency.

4. OK to discuss it on piazza (sign up in the announcement on brightspace) but you have to write your own homework.

Grading Scale

The final grade consists of 30% attendance, approximately 45% of homework and 25% of take-home final exam: 85% guarantees an A or A-, 70% guarantees a B. It's possible that at the end of the semester a somewhat lower percentage will be enough to get that grade.

Intellectual Property

Lecture notes, videos, homework solutions, exam problems and solutions are all copyrighted. **Uploading any of these to any forum/website is strictly prohibited.**

Usage of AI in Learning

It is OK to use generative AI tools such as ChatGPT, BingAI, Codex, etc to assist and teach yourself about MATLAB coding. **It is NOT OK to use AI tools for the take home final exam**. **It is strictly prohibited to upload any of course sample codes, lecture notes, and homework problems and solutions to such AI tools**.

Updated Drop/Add calendars

In accordance with the University Senate's adoption of Document 22-23, the course drop deadlines have been extended from the end of week 9 to the end of week 13 (April 24 for Spring 2024). You can access the updated Drop/Add calendars by visiting: https://purdue.edu/registrar/calendars

Quiet Period

Per university regulations, the week preceding the final exams week is designated as the "Quiet Period." During this time, no assignments (including homework) can be assigned or collected, unless your course has no exams scheduled for the final exam week.

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor's discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

Nondiscrimination Statement

A link to Purdue's Nondiscrimination Policy Statement can be found here:
https://www.purdue.edu/purdue/ea_eou_statement.php

Accessibility

Purdue University strives to make learning experiences as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Mental Health/Wellness Statement

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack**.** Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc. sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

Emergency Preparation

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.