

## 640:423:01 Elementary Partial Differential Equations

Instructor: Chenxi Wu

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**Office Hours: MF 3-4 pm or by appointment**

Textbook: J. D. Logan, Applied Partial Differential Equations, Third Ed. Springer 2015 ISBN: 978-3-319-30769-5 or 978-3-319-12493-3

**Prerequisite:** Multivariable calculus, ODE

**Course description** This is a first introduction to the theory of PDE. We will mostly focus on the three types of linear second order equations (wave, heat and Laplace equations) and study the solutions and their behavior under various initial or boundary conditions.

### Class Schedule (Tentative)

Week	Topic	Sections in textbook
1	PDE models, review of ODE, advection and diffusion	1.1, 1.2 (p. 12-14), 1.3
2	Method of characteristics	1.2
3	Diffusion and probability, one-dimensional wave equation	1.4, 1.5
4	Poisson's equation, types of PDE	1.7, 1.8, 1.9
5	Cauchy Problem	2.1, 2.2
6	Well-Posed Problem, <b>Midterm 1</b>	2.3
7	Semi-infinite Domains, sources	2.4, 2.5
8	Fourier and Laplace Transform	2.6, 2.7
9	Orthogonal Expansions	3.1, 3.2
10	Fourier series, <b>Midterm 2</b>	3.3
11	Separation of Variables, SLP	4.1, 4.2
12 (Thanksgiving week)	SLP	4.3
13	Heat and Laplace equations on disk and sphere	4.4, 4.5, 4.6
14	Heat and Laplace equations on disk and sphere	4.4, 4.5, 4.6
15 (Final week)	Review	

**Attendance:** Attendance is expected for this course. Please inform me ahead of time, preferably by emails, if you are going to be late or absent in class for a legitimate reason, and also self-report online per university policy. Please turn off your cellphone or keep it in silent mode during the lectures.

**Homework and quizzes:** Problem-solving is an important part in the study of mathematics, so please finish and hand in homework in time, and make sure that you fully understand the solution of each problem! The homework for each week will be posted online each Thursday, collected on the next Thursday and returned in one week. Sketch of solutions will be posted online after the homework for each week is collected. Only selected problems will be graded. The lowest 2 homework grades will be dropped.

There will be 5 quizzes throughout the semester and the lowest 1 quiz grade will be dropped. The date of the quizzes will not be announced in advance. The quizzes and the exams will be based on homework problems.

**Exam dates:** Midterms will be on Thursdays. The final exam is on Dec. 19, 8-11 pm.

**Grading:** 10% Homework, 10% Quizzes, 20% Midterm 1, 20% Midterm 2, 40% Final.

**Other policies:** There will be no make-ups for quizzes and midterms and no late homework allowed. However, if there is a legitimate, documented reason that you miss a homework, quiz or midterm please contact me as soon as possible so I can adjust your grade components accordingly. Make-up for the final exam for is allowed.

Policy and procedures regarding disability are indicated at <http://ods.rutgers.edu/>. If you need special accommodation, please present the Letter of Accommodation as early in the semester as possible.

All students are expected to be familiar with and abide by the academic integrity policy (<http://academicintegrity.rutgers.edu/academic-integrity-at-rutgers>). Violations will be taken very seriously.

### **Student-Wellness Services:**

- **Just in Case Web App** <http://codu.co/cee05e> Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.
- **Counseling, ADAP & Psychiatric Services (CAPS)** (848) 932-7884 17 Senior Street, New Brunswick NJ 08901 <http://www.rhscaps.rutgers.edu/> CAPS is a university mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professionals within Rutgers Health Services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.
- **Violence Prevention & Victim Assistance (VPVA)** (848) 932-1181 3 Bartlett Street, New Brunswick NJ 08901 <http://www.vpva.rutgers.edu/> The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours call 848-932-1181.
- **Disability Services** (848) 445-6800 Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway NJ 08854 <https://ods.rutgers.edu/> Rutgers University welcomes students with disabilities into all of the university's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation (<https://ods.rutgers.edu/students/documentation-guidelines>). If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodation. To begin this process, please complete the Registration form on the ODS website at <https://ods.rutgers.edu/students/registration-form>.
- **Scarlet Listeners** (732) 247-5555 <http://www.scarletlisteners.com> Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.