MAT 341.02 APPLIED REAL ANALYSIS – FALL 2022
GENERAL INFORMATION

Instructor. Leon Takhtajan
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Office Hours: W 1:00pm-2:00pm, Th 2:00pm-4:00pm in 5-111 and by appointment.

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Course Description. The course is devoted to classical linear partial differential equations (PDE) of mathematical physics: the heat, wave, and Laplace equations. These equations are fundamental in numerous applications to physics, engineering, economics, etc. We will study solutions by the technique of separation of variables using orthogonal functions (e.g., Fourier series, Bessel functions, Legendre polynomials).

Prerequisites. C or higher in the following: MAT 203 or 205 or 307 or AMS 261; MAT 303 or 305 or AMS 361. Advisory Prerequisite: MAT 200. It is important to be familiar with the basic techniques in ordinary differential equations.

Measurable Learning Outcomes. Upon successful completion of the course, a student will:

- Learn the basic theory of Fourier series, Fourier integral and Sturm-Liouville boundary value problems.
- Understand the importance of orthogonal functions in the separation of variables method.
- Learn the basics of Bessel functions and Legendre polynomials.
- Be able to apply separation of variables method to solve classical PDE of mathematical physics.
- Be conversant with the specialized vocabulary of parabolic, elliptic and hyperbolic PDE.
- Appreciate the relationship of the topic to the undergraduate mathematics and physics curricula.

Lectures. MW 2:40pm-4:00pm in Frey Hall 317.

Textbook. The following textbook is required:
David L. Powers, *Boundary Value Problems and Partial Differential Equations*, 6th ed., Elsevier (Academic Press), 2009.

Blackboard. Grades and course administration will take place on the Blackboard. A weekly schedule of lectures and homework assignments will be accessible from the Blackboard link and will be updated regularly.

Homework. The weekly homework will be available from the weekly schedule, and from the Assignments section on the Blackboard. On the due date homework assignments (preferably in the pdf format) should be uploaded to the Blackboard. The lowest homework score will be dropped from the homework total grade. Late homework will not be accepted, unless there is a valid reason like a documented illness or emergency.

Exams. There will be two midterms and a final exam, scheduled as follows:
- Midterm 1 – Wednesday, September 28, 2:40pm-4:00pm, Frey Hall 317.
- Midterm 2 – Wednesday, November 2, 2:40pm-4:00pm, Frey Hall 317.
- Final Exam – Wednesday, December 7, 5:30pm-8:00pm, Frey Hall 317.

There will be no make-up exams. If a midterm exam is missed because of a serious (documented) illness or emergency, your semester grade will be determined on the basis of other work done in the course. Exams missed for other reasons will be counted as failures.

Grading policy. Grades will be computed using the following scheme:
- Homework 20%
- Midterm 1 20%
- Midterm 2 20%
- Final Exam 40%

Students are strongly encouraged to attend class regularly and to keep up with the material presented in the lecture and the assigned reading. It is important to read the corresponding section in the book before the lecture.

Extra Help. You are welcome to attend the office hours and ask questions about the lectures and the homework assignments. In addition, math tutors are available at the MLC: `http://www.math.sunysb.edu/MLC`.

Student Accessibility Support Center Statement. If you have a physical, psychological, medical, or learning disability that may impact your course work, please contact the Student Accessibility Support Center, Stony Brook Union Suite 107, (631) 632-6748, or at sasc@stonybrook.edu. They will determine with you what accommodations are necessary and appropriate. All information and documentation are confidential. Students who require assistance during emergency evacuation are encouraged to discuss their

needs with their professors and the Student Accessibility Support Center. For procedures and information go to the following website: `https://ehs.stonybrook.edu//programs/fire-safety/emergency-evacuation/evacuation-guide-disabiliti` and search Fire Safety and Evacuation and Disabilities.

Academic Integrity Statement. Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another persons work as your own is always wrong. Faculty are required to report any suspected instance of academic dishonesty to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at `https://www.stonybrook.edu/commcms/academic_integrity/index.html`

Critical Incident Management. Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.