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MAP 6505: Mathematical Physics I (online), Syllabus

Prerequisites

UF Calculus 3, Linear algebra, and Differential equations (necessary), Introduction to Partial Differential Equations (recommended), UF Advanced Calculus or Mathematical Analysis or their equivalents (helpful, but not mandatory)

Recommended Texts

L. Schwartz, Mathematics for Physical Sciences,
V.S. Vladimirov, Equations of Mathematical Physics,

Course Content

Functional sequences and series. Review of the Riemann integration theory in Euclidean spaces. The Lebesgue theory of integration. Functions defined by Lebesgue integrals. The theory of distributions (the main part of the course). This includes regular, singular, tempered distributions, differentiation and integration of a distribution, convolution of distributions, Fourier transform of tempered distributions. Basics equations of mathematical physics. Distributional solutions to linear partial differential equations. Fundamental solutions for a differential operator (Laplace and Helmholtz operators in various dimensions). The Cauchy (initial value) problem for basic equations of mathematical physics (Heat, Wave, and Schroedinger equations). Applications to wave scattering (time permitted). The emphasis will be put on applications of the discussed mathematical concepts. However, all the concepts and statements will be rigorously formulated. If a proof is not given in class, a reference to a text where it can be found will be provided.

Lectures

This course will be a combination of **asynchronous and synchronous** online classes. This means that some parts of the course can be delivered as prerecorded lectures and the other parts via zoom meetings. Since in-class discussions of the key concepts of the course were crucial for understanding, and this course has never been taught online, both options will be tried during the first two weeks to decide which one is better. In addition, notes for each lecture will be posted. The notes should be sufficient for all graded assignments. A brief description of each lecture will be posted in **the course page** along with recommended texts useful for further reading on the topic discussed. The first class meeting will be scheduled via Zoom. The link will be posted in Canvas. Make sure that you are officially registered in one of

the two sections (grad or undergrad) to get access to the Canvas shell for this course. If the course is asynchronous, then there will be one or two Zoom Q&A sessions every week. The schedule with links will be posted via Canvas.

Written assignments and Homework

Homework: Lecture Notes contain exercise problems almost for every lecture. They are not mandatory but doing them would be of great help to do well on written assignments.

Exams: Every 2-3 weeks there will be a graded assignment. It will be posted in the course page. Each assignment is not cumulative and covers only the material discussed after the previous assignment. It should be completed in a few days and submitted by the posted due time. The submission should be prepared as follows. Pick any problem from the assignment, mark its number, write your solution with ALL technical details clearly indicating how the final answer is obtained. Box the final answer. For example, if you use a particular theorem in your solution, make sure that the hypotheses of this theorem are shown to hold (otherwise no credit). Do the same for as many problems as you know how to solve. Enumerate all pages as 1/n, 2/n, …, n/n where n is the total number of pages in your submission. In the bottom of the last page write and sign the academic honesty pledge (the text will be provided with the exam). Scan your work into a single PDF file and name the file as LastNameFirstNameHW# (where # is the assignment number, 1, 2, etc.). Here are some useful Apps for scanning: CamScanner, Adobe Scan, Scanbot, Microsoft Office Lens, Evernote Scannable, Google Drive, TapScanner, PhotoScan, TurboScan among others.

Grading

Each assignment contains some number of problems and each problem is worth a point if solved correctly. If N is the total number of problems in all assignments and M is the total number of points earned, then your course score is G=100(M/N) rounded to the nearest integer. The grade thresholds are:

A: G>90; A-: G>85; B+: G>80; B: G>75; B-: G>70; C+: G>65; C: G>60; C-: G>55; D+: G>50; D: G>45; D-: G>40; E: G<40

Extra credit: Occasionally an extra credit problem will be added to an assignment. It does not increase N, but it would increase M if solved correctly.

Policies

Attendance: No credit for attendance of Zoom meetings.

Special accommodation: Students requesting special accommodation for exams must first register with the Dean of Student Office. The Dean of Student Office will provide documentation to the student who must then provide this documentation to me when requesting accommodation.

Student honor code: When turning in an assignment, please write “I did the assignment myself and received no help from anybody” and sign it. Assignments turned in after the due date and/or without a signed academic honesty pledge will not be accepted.