AEP 3200/5100: Introductory Mathematical Physics
Spring 2023

Instructor

Ankit Disa
asd47@cornell.edu

Office Hours: Fri 2:30–3:30pm
205 Clark Hall

Teaching Assistants/Graders

Dias Tulegenov
dt483@cornell.edu

Office Hours: Mon 4:30–5:30pm
247 Clark Hall

Rishabh Singh
rs2282@cornell.edu

Office Hours: Tue 4:30–5:30pm
247 Clark Hall

Brady Sites
bas339@cornell.edu

Office Hours: TBA

Lectures: Mon, Wed, Fri 12:20–1:15pm, PSB 120

Discussion Section: Mon 1:30–2:20pm, PSB 120

Course Materials

Course website: AEP 3200/5100 page on Canvas, https://canvas.cornell.edu

Required Textbook

Mathematical Physics: Applied Mathematics for Scientists and Engineers, 2nd Edition
by B. R. Kusse and E. A. Westwig

Supplemental Reading

Consulting outside resources is often useful for getting alternative explanations of concepts and additional practice problems. The following books are all available electronically or in hard copy from the Cornell Library:

- *Mathematical Methods of Physics* by J. Mathews and R. L. Walker
- *Introduction to Complex Variables* by R. V. Churchill
- *Mathematical Methods for Physicists* by G. B. Arfken
- *Mathematical Physics* by E. Butkov

Course Description

This course is the first in the mathematical methods sequence for Applied & Engineering Physics and related disciplines. Topics include vector analysis, curvilinear coordinate systems, tensor calculus, the Dirac Delta function, complex variable theory, Cauchy-Riemann conditions, complex Taylor and Laurent series, Cauchy integral formula and residue techniques, conformal mapping, calculus of variations, Fourier Series, Fourier transforms, and Laplace transforms.

The main goal of the course is to supplement the basic training of the introductory math sequence to give students the mathematical intuition and rigorous foundation needed to study intermediate/advanced topics in physics, applied sciences, and engineering.

Prerequisite: MATH 2930 (Differential Equations). Corequisite: MATH 2940 (Linear Algebra)

Course Structure

Student Participation and Responsibilities

The hope for the class is that students participate actively as this is the best way to engage you in learning the material (and it makes lectures more fun). In that spirit, part of the course grade will be based on your participation in lectures, discussion section, the Ed discussion board, and course assessments/evaluations.

The content of the course will be disseminated through various means, including lectures, homework problems, and textbook reading. To get the most out of the class, it is important to realize that the lectures serve as only *one* source of information for you, not the sole source. The problem sets, textbook, discussion sections, and office hours all play equally important roles in your learning. In particular, you are expected follow along with the material by reading the textbook. In many cases, the textbook will go into more detail on a given topic than I am able to provide in the lecture, and you will learn more from the lecture if you come prepared.

Homework

Homework comes in the form of problem sets, which will be assigned each week on Wednesday and will be due the following Tuesday at 11:59 pm (unless otherwise announced). All problem sets will be submitted electronically on Gradescope, a link to which is on the course Canvas site. Late homeworks can be turned in for 75% credit until the following Friday of that week at 11:59pm. Beyond that, no later submissions will be accepted. When calculating your final homework score for the course, your lowest two problem set grades will be dropped. This policy is meant to provide flexibility to accommodate your needs; however, students are highly encouraged to work through all problem sets to learn the course material.

It is important to understand that the purpose of problem sets is *not* to test you on the lecture material (that is what the exams are for). The homeworks are a learning tool for understanding how to approach mathematical problem solving and, in some cases, to discover new concepts on your own. As a result, the assigned problems may and often will cover material that is not explicitly explained in the lecture.

A note on group work: you are encouraged to collaborate and work together on the problem sets, but you must turn in your own work. You may not copy in part or in whole, by hand or otherwise, someone else's work and turn it in as your own. Please see the course policies below for more information.

Exams

There will be one prelim and one final exam:

- Prelim: Tuesday, March 14, 7:30-10:00pm. PSB 120
- Final Exam: TBD

If you have a conflict, please let me know as soon as possible. Make-up exams are not generally offered, unless arrangements are made well in advance.

Grading Policy

The final course grade will be calculated from the aforementioned assessments as follows:

- 25% Problem Sets
- 30% Prelim
- 40% Final Exam
- 5% Participation

Course Policies

Classroom Etiquette

I understand that some of you may use your computers or tablets during class to electronically record your notes. Please refrain from using computers for anything else and keep your phones away. Eating and drinking are allowed in class, but please keep it from it affecting the course or the other students.

Communication

The preferred channel of communication for the class is Canvas and Ed Discussion, which is linked to on the course Canvas site. Class-wide announcements will be made on Canvas. Lecture notes, problem sets, solutions, and other resources will also be posted on Canvas.

General questions about the course (concepts, logistics, problem sets) should be asked to the instructor and TAs using the Ed Discussion board. E-mails to the instructional team should should be kept to a minimum. Please include "AEP 3200" in the subject line of any e-mails (the following link may be useful: How to e-mail a professor). In all cases, please allow 24 hours for a reply. Note: as a rule, you are more likely to get a quicker reply on Ed Discussion. Still, it is important to avoid urgent questions that must be answered right away... the night that a problem set is due, for example...

Academic Integrity

Each student is expected to abide by the Cornell University Code of Integrity. As a rule, all work presented as your own must be your own, no exceptions. As stated above, you may collaborate on homeworks, but copying from solution manuals or each other is strictly forbidden. To be prepared for the exams you will need to be able to do all the problems on your own. If you do make use of an outside resource, you must state it explicitly in any work you hand in.

In addition, all course materials provided during this course are intellectual property belonging to the author. Students are not permitted to buy, sell, trade or share any course materials without the express permission of the instructor. Such unauthorized behavior constitutes academic misconduct. All violations will be dealt with through the Academic Integrity Hearing process and and may result in disciplinary action including failing the course.

Access and Accommodations

Your access in this course is important. Reasonable accommodations will be made for students with verifiable need. In order to take advantage of available accommodations, students should register with Student Disability Services (SDS) **no later than February 8**. For students with testing accommodations, this course is participating in the SDS Alternative Testing Program for the Spring 2023 semester. If you have an approved testing accommodation, you must request it for this course *and* complete an Exam Request Form for each exam via the SDS student portal. If a need arises after the deadline, you must request your accommodation letter at least 7 days prior to the exam date. All exam logistics will be communicated to you from SDS. Questions should be sent to sds-testing@cornell.edu. For other types of academic accommodations (non-testing-related), please register with SDS and follow up with me early in the semester so that we have adequate time to arrange the necessary logistics.

Inclusion

Students in this course come from a variety of backgrounds, abilities, and identities. To promote learning for all, each member of this course is expected to contribute at all times to an inclusive and respectful environment in and out of class. If you feel that this is not happening, please contact me.

COVID-19 Related Topics

Masks

Masks are encouraged but not required in classrooms for Fall 2022, according to university policy. However, the University strongly endorses compliance with requests to mask from students, staff, or faculty who are health compromised. If you are health compromised and would like me to request that the class be masked, please send me an e-mail with any rationale that you are comfortable with me sharing. I do not need to identify you unless you would prefer that I do.

Illnesses and Absences

Lectures will not be recorded; however, the lecture notes will be posted on Canvas after each class. If you are absent due to illness, you are expected to keep up with course material on your own or by working with a peer. If you need help finding a peer work partner, please send me an e-mail and I will help facilitate.

If you have symptoms of COVID-19:

1. Do not come to class
2. Take a test. The university provides free tests for students.

3. If positive, upload the result to Daily Check and follow the instructions. You will also be provided with a letter of temporary accommodation, which you can forward to me, if needed.
4. When your isolation period ends, you may return to class, but please wear a mask in class at least through the 10th day after symptoms begin.