

SIO 203A/ MAE 294A: Fall 2024  
Introduction to Applied Mathematics I, NH 101 MWF 2-2:50pm  
Instructor: Janet M. Becker, jmbecker@ucsd.edu

## Goals

A goal of this course is to help you to obtain and demonstrate proficiency in a variety of advanced mathematical topics that are foundational in science and engineering applications. This is the first course in a three-quarter series in applied mathematics (SIO 203ABC, MAE 294ABC).

## Problem sessions and Office hours

Instructor: Office hours: directly after class Mondays and Fridays in NH 101 (we have NH 101 reserved from 3-4pm) or by appointment (e-mail me).

## Lecture format

SIO 203A/MAE 294A lecture will be delivered in person in NH 101 at 2pm on the board. Class participation means that part of our meetings may have students present homework solutions or answer questions about class examples. The lectures will be podcast and the recordings posted to the Media Gallery in Canvas.

## Course Text and Website

The text is *Mathematical Methods for Physics and Engineering* by Riley, Hobson and Bence, 3rd edition, (RHB3), which is available online through the UCSD library (EBSCO Host) using your campus login. Assignments, solutions, announcements and grades will be posted to the Canvas website. Other references include (but are not limited to) Philip Morse and K. Uno Ingard, *Theoretical Acoustics*, Gilbert Strang, *Linear Algebra and its Applications*, Arfkin, Weber and Harris, *Mathematical Methods for Physicists, 13th edition: A Comprehensive Guide* (available through UCSD library), Mathews and Walker, *Methods of Mathematical Physics*, and Bender and Orszag *Advanced Mathematical Methods for Scientists and Engineers* (1978, 1999).

## Homework, Examinations and Grading

We will have approximately five homework assignments that will be assessed with a 0 (missed assignment), 1, 2, 3 point rubric. A score of 3 means complete and accurate work, a score of 2 means some work is incomplete or inaccurate, and a 1 means work with significant deficiencies. Solutions to the assignments will be posted, and you are responsible for correcting mistakes in your homework (even if you receive a 3, you are responsible for checking your work with the solutions).

There will be two midterms and one final.

**Midterm 1:** 25 October 2024 (Friday), 2:00-2:50pm, NH 101 (in person)

**Midterm 2:** 15 November 2024 (Friday), 2:00-2:50pm, NH 101 (in person)

**Final:** 11 December 2024 (Wednesday), 3:00pm-5:59pm, TBD (in person)

**Course grades** are determined according to 20% Class participation and homework, 30% Midterms, and 50% Course final

## Course content

(Chapters below refer to RHB3, topics may be modified depending upon the background of the class members)

### Introduction

What you already know. How the course content may be useful in your other courses and research.

### Ordinary differential equations (ODEs) I

First-order ODEs, briefly, review (Chapter 14)

Higher-order linear ODEs (Chapter 15)

Variation of Parameters, Green's functions

### Ordinary differential equations (ODEs) II

Series solutions (Chapters 16 )

Eigenfunction methods (Chapter 17)

Special functions (Chapter 18)

### Matrices and linear algebra

Systems of linear equations (algebraic and ODEs), Eigenvalues and eigenvectors,

Quadratic forms, Singular Value Decomposition (Chapter 8)

Pseudoinverses (e.g. Gilbert Strang, *Linear Algebra and its applications*)

### Fourier Analysis and Integral Transforms

Fourier Series (review, Chapter 12)

Fourier transforms (Chapter 13)

### Course policy and Academic integrity:

1. All students are expected to adhere to the UCSD Policy on Integrity of Scholarship. You may discuss homework problems, but must prepare homework reports on your own. Exams will have clear rules provided to students, and will be designed and administered to uphold academic integrity. For problems assigned from the textbook, the use of online solutions is prohibited.

2. Lecture participation is encouraged, appreciated and assessed. This means that you will need to come prepared to lecture (readings and homeworks).

**Disability Resources:** Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students should present their AFA letters to Faculty (please make arrangements to contact me privately) at least two weeks prior to an exam to ensure that accommodations may be arranged.

Contact the OSD for further information:

T: 858.534.4382

E: [osd@ucsd.edu](mailto:osd@ucsd.edu)

W: <http://disabilities.ucsd.edu>

**Disability Resources, Triton Testing Center:** Exams requiring accommodation will be administered by the Triton Testing Center (TTC). Students authorized for accommodation must register with the TTC by completing the student registration form. Once the form is completed (they need only do this once), TTC will review their request and create or update their RegisterBlast/TTC account. Then, TTC will send the students the RegisterBlast log-in information. If they are a student with accommodations and received their AFA letter(s) for the course(s) they have at the TTC, they can copy and paste their accommodations into the registration form.

**How to access your TTC account:**

To log into your account for the first time please visit this website, enter your UCSD email address, and select a new password:

<https://www.registerblast.com/ucsd/ResetRequest/Password/4>

Once you have your password, you can access your account at this link:

<https://www.registerblast.com/ucsd/User/Authenticate>

Answers to frequently asked questions and information on how to schedule a test may be found at the TTC webpage.

**Students must schedule their test with TTC at least 3 days in advance.**