



蘇州大學  
Soochow University

# **MAT 161 Mathematical Methods I**

**Winter 2024**

**Course Credits:** 4

**Contact Hours:** 56 hours

**Instructor:** TBA

**Email:**TBA

## **COURSE OBJECTIVES**

This course provides a comprehensive introduction to the mathematical methods used in physics and engineering. It focuses on the theory and application of Banach and Hilbert spaces, as well as various types of Fourier transforms for continuous- and discrete-time signals. Students will learn how to analyze signals and solve problems using Fourier series and Fourier integrals.

Upon Completion of this Course, students will be able to:

1. Apply advanced calculus, including differentiation, integration, and differential equations, to solve engineering and physics problems
2. Utilize linear algebra concepts, such as matrices, vectors, and systems of linear equations, to model and solve engineering and physics problems
3. Apply numerical methods, including approximation techniques, interpolation, and numerical integration, to solve complex engineering and physics problems
4. Identify and formulate engineering and physics problems in mathematical terms.

## **PREREQUISITES**

MAT 130 Linear Algebra

## **GRADING**

Grades will be determined by accumulating points, with 100 points being the maximum, as follows:



ITEM	POINTS
Quizzes	20 Points
Midterm	20 Points
Individual Project	20 Points
Final Exam	40 Points
Total	100 Points

Late submissions will be graded at the end of the course. Grades will be assigned according to the following rule:

$$A \geq 90 > B \geq 80 > C \geq 70 > D \geq 60 > F.$$

We reserve the right to make adjustments to the overall grading policy.

## COURSE MATERIALS

### Required Texts:

*Mathematical Methods for Physics and Engineering*, K. F. Riley, M. P. Hobson and S. J. Bence 2006, Third Edition, Published in the United States of America by Cambridge University Press.

### Recommended (Optional) Texts or Other Materials:

None

## COURSE TOPICS

MODULE	TASKS
Module 1	<p><b>Topics:</b>            Topic 1: Banach and Hilbert Spaces            Topic 2: Inner Product Spaces and Norms            Topic 3: Spaces of Continuous and Not Necessarily Continuous Signals            Topic 4: Fourier Series</p> <p><b>Assessments:</b>            Quiz#1</p>
Module 2	<p><b>Topics:</b>            Topic 5: Discontinuous Functions            Topic 6: Non-periodic Functions            Topic 7: Integration and Differentiation            Topic 8: Parseval's Theorem</p> <p><b>Assessments:</b></p>



	Quiz#2
Module 3	<b>Topics:</b> Topic 9: Integral Transforms Topic 10: Fourier Transforms Topic 11: Laplace Transforms Topic 12: First-order Ordinary Differential Equations <b>Assessments:</b> Midterm
Module 4	<b>Topics:</b> Topic 13: Higher-order Ordinary Differential Equations Topic 14: Linear Equations with Variable Coefficients Topic 15: Series Solutions of Ordinary Differential Equations Topic 16: Second-order Linear Ordinary Differential Equations <b>Assessments:</b> Individual Project
Module 5	<b>Topics:</b> Topic 17: Eigenfunction Methods for Differential Equations Topic 18: Sets of Functions Topic 19: Properties of Hermitian Operators Topic 20: Sturm–Liouville Equations <b>Assessments:</b> Final Exam

## ATTENDANCE

1) Class attendance is required. Missing classes without permission will lead to decrease in overall grade.

Missing less than two classes: no penalty.

Missing more than two classes: 7% will be taken off from the overall grade.

If the instructor reports a student's frequent missing of class to the Soochow University Academic Administration Office, the student might get a written warning and might be prohibited from attending final exam.

2) Participants in this course are expected to arrive in class promptly and adequately prepared. The primary objective of this course is to critically engage with the readings and the subject matter. Therefore, course participants are expected to have completed the reading prior to class and prepare thoughtful reflections/commentaries to share with fellow colleagues.



## **LEARNING REQUIREMENTS**

- 1) Late assignments are not acceptable and are subjected to grade deductions.
- 2) Assignments submitted in the wrong format will be counted as not submitted.
- 3) Failure to submit or fulfill any required course component results in failure of the class.
- 4) Make-up for midterm and final exams only with valid excuses, as defined by the University.
- 5) In order to earn a Certificate of Completion, participants must thoughtfully complete all assignments by stated deadlines and earn an average quiz score of 50% or greater.

## **TECHNOLOGY POLICY**

The use of electronic devices in class is distracting, both for the user and for the rest of the class. Only non-programmable calculators can be used in the tests and exam. Any attempts to use cell phones and other electronic communication devices will be seemed as cheating. Laptops are discouraged, unless you use them for activities DIRECTLY related to the course (eg., note taking, reading course documents).

## **ACADEMIC INTEGRITY POLICY**

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

## **DISABILITY ACCOMMODATION**

Soochow University is committed to maintaining a barrier-free environment so that students with disabilities can fully access programs, courses, services, and activities at Soochow University. Students with disabilities who require accommodations for access to and/or participation in this course are welcome.

Note:

Please contact the University Administrative Office immediately if you have a



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learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.