暨南大學
JINAN UNIVERSITY

0701M450
Numerical Analysis I

Instructor: TBA

Time: December 14, 2026 - January 15, 2027

Office Hours: by appointment

Contact Hours: 60 (50 minutes each)

Credits: 4

E-mail: TBA

Course Description

This course will focus on numerical differentiation and integration, approximation, statistical analysis, finite difference methods and numerical solution to ordinary and partial differential equations, methods of numerical linear algebra, and modeling of stochastic processes. Basic concepts and methods in numerical analysis: Solution of equations in one variable; Polynomial interpolation and approximation; Numerical differentiation and integration; Initial-value problems for ordinary differential equations; Direct methods for solving linear systems.

Prerequisites

Calculus I and Calculus II or consent of instructor.

Required Textbook(s)

Numerical Analysis 10e, CENGAGE Learning by Richard L. Burden, J. Douglas Faires, and Annette M. Burden

Numerical Analysis 3e, PEARSON by Timothy Sauer

Course Outline

Please note that the outline is meant to give an overview of the major concepts of this course. Changes may occur in this outline as needed to aid in the student's development.

Module 1

- Course Introduction
- Round-off error and computer arithmetic
- Data types
- Algorithms

Homework 1

Module 2

- Programming languages
- OS and computer environment
- Solutions of equations in one variable
- The Bisection Method

Programming 1

Module 3

- Fixed-Point Iteration
- Newton's method
- Numerical analysis of one-dimensional data sets

- Numerical differentiation and integration

Programming 2

Homework 2

Module 4

- Statistical analysis
- Linear regression
- Numerical solutions of systems of linear equations

Programming 3

Midterm Exam

Module 5

- Tri-diagonal matrices. Application: Interpolation of numerical data by cubic splines
- Gaussian exclusion
- Steepest descent

Programming 4

Module 6

- Conjugate-gradients method
- Eigenvalues and Eigenvectors; Jacobi rotations
- One-dimensional problems
- Time evolution in nonlinear ODEs
- PDEs and multi-dimensional problems

Programming 5

Homework 3

Module 7

- (Pseudo)-random numbers
- Stochastic algorithms

- Stochastic aggregation of particles

Programming 6

Homework 4

Module 8

- Recursion and iteration – what are the difference?
- Revisit some of the algorithms studied previously
- Some cool examples of recursions

Final Exam

Grading Policy

Homework:	20%
Programming:	30%
Midterm exam:	25%
Final exam:	25%
Total	**100%**

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100
Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty, includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students` work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E for the entire course.