



0701M450

Numerical Analysis I

Instructor: TBA

Time: Monday through Friday (June 28, 2027-July 30, 2027)

Office Hours: 2 hours (according to the teaching schedule)

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

Course Hours

The course has 25 sessions in total. Each class session is 120 minutes in length. The course meets from Monday to Friday.

Course Schedule

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

Week One

- Course Introduction
- Round-off error and computer arithmetic
- Data types
- Algorithms
- Programming languages
- OS and computer environment

Week Two

- Solutions of equations in one variable
- The Bisection Method
- Fixed-Point Iteration
- Newton's method
- Numerical analysis of one-dimensional data sets
- Numerical differentiation and integration
- Statistical analysis

Week Three

- Linear regression
- Numerical solutions of systems of linear equations
- Tri-diagonal matrices. Application: Interpolation of numerical data by cubic splines
- Gaussian exclusion
- Steepest descent
- Midterm Exam

Week Four

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

Week Five

- (Pseudo)-random numbers
- Stochastic algorithms
- Stochastic aggregation of particles
- Recursion and iteration – what are the difference?
- Revisit some of the algorithms studied previously
- Some cool examples of recursions
- Final Exam

Grading Policy

Homework:	30%
Quizzes:	10%
Midterm exam:	30%
Final exam:	30%
Toal	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

Attendance

For the purposes of learning assessment and strategic planning, all students must attend each class. Any students with more than three unexcused absences will automatically fail the course.

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.