The Hong Kong University of Science and Technology

UG Course Syllabus

Numerical Analysis

Math 3312

No. of Credits : 3

Prerequisite(s)

COMP 1021 / COMP 1022P / COMP 1022Q (prior to 2020-21)) AND (MATH 2111 / MATH 2121 / MATH 2131 / MATH 2350) AND (MATH 2031 / MATH 2033 / MATH 2043

Exclusion(s)

MECH 4740, PHYS 3142

Instructor Name : Zhichao Peng

Email: pengzhic@ust.hk

Office Hours:

Monday 13:30-14:20, office no.3484

Course Description

This course presents numerical methods for solving mathematical problems. It focuses on the theory and application of numerical approximation techniques as well as their computer implementation. It covers computer arithmetic, solution of nonlinear equations, interpolation and approximation, numerical integration and differentiation, solution of ordinary differential equations, and matrix computation.

These materials will be covered through lectures, visual and coding demonstrations and course homework involving both theoretical analysis, mathematical derivation and practical implementation of algorithms.

Intended Learning Outcomes (ILOs)

By the end of this course, students should be able to:

1. Deep understanding mathematical theories for numerical algorithms

2. Able to implement basic numerical methods

3. Able to understand and evaluate results of numerical algorithms

Assessment and Grading

This course will be assessed using criterion-referencing and grades will not be assigned using a curve. Detailed rubrics for each assignment are provided below, outlining the criteria used for evaluation.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage, and due dates; perhaps, add a summary table as below, to precede the details for each assessment.]

Assessment Task	Contribution to Overall Course grade (%)	Due date
Mid-Term	30%	15/10/2025
Homework	10%	NA
Final examination	60%	TBD

* Assessment marks for individual assessed tasks will be released within two weeks of the due date.

Mapping of Course ILOs to Assessment Tasks

[add to/delete table as appropriate]

Assessed Task	Mapped ILOs	Explanation
Homework	ILO1, ILO2, ILO3	Homework include theoretical questions and coding questions, which covers both the implementation and analysis part of learning goals.
Mid-Term	ILO1, ILO2, ILO3	Exam include theoretical analysis, algorithm questions on how to apply it for specific problems, and explanation problem on numerical resultswhich covers both the implementation and analysis part of learning goals.
Final examination	ILO1, ILO2, ILO3	Exam include theoretical analysis, algorithm questions on how to apply it for specific problems, and explanation problem on numerical resultswhich covers both the implementation and analysis part of learning goals.

Grading Rubrics

Detailed rubrics for each assignment will be provided. These rubrics clearly outline the criteria used for evaluation. Students can refer to these rubrics to understand how their work will be assessed.

Final Grade Descriptors:

Grades	Short Description	Elaboration on subject grading description
A	Excellent Performance	Deep understanding mathematical theories for numerical algorithms and great ability to implement basic numerical methods
B	Good Performance	Show good understanding of mathematical theories for numerical algorithms and able to implement basic numerical methods
C	Satisfactory Performance	Show reasonable understanding of mathematical theories for numerical algorithms and able to implement basic numerical methods
D	Marginal Pass	Know some mathematical theories for numerical algorithms and roughly able to implement basic numerical methods
F	Fail	Lack understanding of mathematical theories for numerical algorithms and insufficient ability to implement basic numerical methods

Course AI Policy

[State the course policy on the use of generative artificial intelligence tools to complete assessment tasks.]

We encourage using AI tools to assist completing the coding component of homework. If it is used for other parts of homework, students are required to make an explicit statement on how it is applied. AI tools are not allowed in exams.

Communication and Feedback

Assessment marks for individual assessed tasks will be communicated via Canvas within two weeks of submission. Feedback on assignments will include the grade, where students made mistake and sample solutions for homework. Students who have further questions about the feedback including marks should consult the instructor within five working days after the feedback is received.

Resubmission Policy

[If applicable, explain the policy for resubmitting work or reassessment opportunities, including conditions and deadlines.]

No resubmission is allowed.

Required Texts and Materials

[List required textbooks, readings, and any other materials]

- Numerical Analysis (10^{th} Ed), by R.L. Burden and J. D. Faires
- Numerical Analysis: A Graduate Course by D.E. Stewart
- Numerical Methods for Engineers by J.R. Chasnov

Academic Integrity

Students are expected to adhere to the university's academic integrity policy. Students are expected to uphold HKUST's Academic Honor Code and to maintain the highest standards of academic integrity. The University has zero tolerance of academic misconduct. Please refer to Academic Integrity | HKUST – Academic Registry for the University's definition of plagiarism and ways to avoid cheating and plagiarism.

[Optional] Additional Resources

[List any additional resources, such as online platforms, library resources, etc.]