

Math 1024 Honors Calculus II

Course Outline - Spring 2025

1. Instructor(s)

Name: Min Yan

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2. Teaching Assistant(s)

Name: Hengyang Wang (T1A)

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Name: Shuai Zong (T1B)

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3. Meeting Time and Venue

Lecture: L1

Date/Time: Monday 15:00 - 16:20, Friday 10:30 - 11:50

Venue: Lecture Theatre C

Tutorial: T1A

Date/Time: Monday 16:30-17:20

Venue: LSK1033

Tutorial: T1B

Date/Time: Monday 12:00-12:50

Venue: 1527

4. Course Description

Credit Points: 3

Pre-requisite: Math1023

Exclusion: MATH 1014, MATH 1020

Brief Information/synopsis:

This is the second in the sequence MATH 1023 - MATH 1024 of honors courses in one-variable calculus, with particular emphasis on rigorous mathematical reasoning. Topics include integral calculus, techniques of integration, improper integrals, applications of integrals, infinite series. Some rigorous theoretical results on integration and infinite series will be discussed.

5. Intended Learning Outcomes

Upon successful completion of this course, students should be able to:

1. Understand and calculate definite and indefinite integrations. Understand properties of series, and determine the convergence of series.
2. Understand the important theorems in analysis, and prove the calculation related theorems.

3. Able to argue the calculations and manipulations of concrete integrations and series in rigorous way.
4. Apply integrations to model, solve, and analyse geometrical and physical problems.

6. Assessment Scheme

Composition:

20% homework (~10 assignments, ILO 1, 2, 3, 4)

30% midterm exam (3 hours, ILO 1, 2, 3, 4)

50% final exam (3 hours, ILO 1, 2, 3, 4)

Grading scheme:

A: 85 points, the student has fully mastered all the concepts and theorems, and can do all the corresponding calculations and arguments.

B: 60 points, the student has mastered enough concepts and theorems, but may have missed some more advanced parts, and can do most of the corresponding calculations and arguments.

C: 35 points, the student has mastered the minimum concepts and theorems, and can do minimum of the corresponding calculations and arguments.

D and F: the student does not understand some major parts, and cannot do most calculations or arguments. The line between D and F is whether the student shows enough effort. If the gap in grade from C is too much, or the student did not submit most of the homework, then he/she gets F. Otherwise the student gets D.

7. Student Learning Resources

Text(s): Calculus, lecture note by the instructor.

8. Teaching and Learning Activities

Lecture:

Listen to the lectures delivered by the instructor. Learn the concepts through definitions, examples, and discussions.

Tutorial:

Learn how to solve problems. Instructor may provide additional material not covered in the lecture.

Online:

A WeChat group is set up, where the students, the instructor, and the TA can discuss and communicate all things about the course.

9. Course Schedule

1. *Theory of integration*: area, fundamental theorem of calculus, Newton-Leibniz formula, Darboux sum, Riemann sum, integrability
2. *Calculation of integration*: indefinite integral, integration by parts, change of variable, numerical integration
3. *Improper integral*: convergence test, relation to series
4. *Application of integration*: geometric application, physical application
5. *Series*: convergence test, power series, Fourier series