ZJU-UIUC Institute – Course Syllabus

1. **Course number and name**

   MATH 241, Calculus III, Fall Semester 2025

2. **Credits and contact hours**

   4 credits

   5 contact hours (3 h lecture, 2 h discussion)

3. **Instructor**

   Prof. Hao Yang, ZJU-UIUC Institute

4. **Teaching Assistants**

   Gevorg Khalafyan, Jun Liang, Yufan He, Chenyue Tang, Ziyi Li

5. **Textbook**

   [Ste21] James Stewart, *Calculus: Early Transcendentals*, 9th edition, metric version, Cengage Learning 2021

   (a) **Other supplemental materials**

   Teaching material: Lecture slides, whiteboard illustrations, worksheets, homework sheets

   Supplementary references for Real Analysis: David Bressoud, *Second Year Calculus*, Springer 1991; Walter Rudin, *Principles of Mathematical Analysis*, 3rd edition, McGraw-Hill 1976

6. **Specific course information**

   (a) **Brief description** The course offers an introduction to basic concepts and techniques of vector and multivariable calculus, covering essentially the material in [Ste21], Chapters 12–16. Stewart's non-rigorous approach to the subject is supplemented by more details and proofs of important results in the lecture.

   (b) **Prerequisites or co-requisites**

   Pre-required: MATH 221 Calculus I, MATH 231 Calculus II

   Co-required: MATH 257 Linear Algebra with Computational Applications

   Co-recommended: MATH 213 Discrete Mathematics

   (c) **Course status**

   Mandatory course

7. **Specific goals of the course**

   (a) Upon successful completion of the course, students should

   - know the basic concepts and techniques of multivariable/vector calculus (calculus of space curves, differentiation and integration of multivariable functions, fundamental results of vector analysis)

- be able to model certain real-world problems in the language of multivariable/vector calculus and solve them through standard calculus techniques.

(b) For acquiring a good working knowledge of multivariable/vector calculus students need to practice a lot. This goal is addressed in the accompanying weekly worksheet and homework assignments with exercises of varying difficulty.

8. **Teaching calendar (tentative)**

Week 1/2 Analytic Geometry ([Ste21])

Vectors, equations of lines and planes, length and dot product, orthogonal projections, distance computations, determinants, cross and triple product

Week 3/4 Vector functions ([Ste21])

Vector functions and space curves, derivatives and integrals of curves, arc length and curvature, motion in space, Kepler's Laws

Week 5–8 Differentiation ([Ste21])

Functions of several variables, limits and continuity, partial derivatives, total differential, chain rule, directional derivatives, gradient, contours, maxima and minima, Lagrange multipliers

Week 9–12 Integration ([Ste21])

Double integrals over rectangles, iterated integrals, introduction to the Lebesgue integral, monotone and bounded convergence theorem, integrals with a parameter, Fubini's Theorem, change of variables, polar and spherical coordinates, *n*-dimensional volume, applications

Week 13/14 Vector Calculus ([Ste21])

Vector fields and differential 1-forms, line integrals, exactness and local exactness, simply-connected regions, curl and divergence, parametric surfaces, surface integrals, Theorems of Green, Stokes, Gauss

Week 15 Final Review([Ste21])

9. **Schedule of Lectures**

Section A: Tuesday 10:30-11:50, Residential College-2 Multifunctional Hall

Section B: Thursday 10:30-11:50, Residential College-2 Multifunctional Hall

29 lectures from Sep 16 to Dec 25 (no lectures on Oct 2)

10. **Schedule of Discussion sessions**

Group	Time	Venue	TA
A1	Tue 6-8 pm	LTN-A404	Gevorg Khalafyan
A2	Tue 6-8 pm	LTN-A426	Jun Liang
A3	Tue 6-8 pm	LTN-A425	Yufan He
A4	Tue 6-8 pm	LTN-A410	Chenyue Tang (Zili Li)

13 discussion sessions (est.) on Sep 23, Sep 30, Oct 7, Oct 14, Oct 21, Oct 28, Nov 4, Nov 11, Nov 18, Nov 25, Dec 2, Dec 9, Dec 16

11. **Schedule of Homework**

13 homework assignments (est.), due on Sep 23, Sep 30, Oct 7, Oct 14, Oct 21, Oct 28, Nov 4, Nov 11, Nov 18, Nov 25, Dec 2, Dec 9, Dec 16

12. **Examination Schedule (tentative)**

Midterm Exam: 2 hours

Final Exam: 3 hours, during examination week

13. **Grading Policy**

The final score is calculated as follows:

40 % final exam (closed book)

20 % midterm exam (closed book)

20 % homework

15 % discussion session work

5 % attendance

5 % in-class quiz bonus

For a full homework score (20) students must solve ca. 80 % of the mandatory homework exercises. If the relative homework score obtained in this way is worse than the relative final exam score (a rare case), the homework will be discarded and the final exam will weigh 60 %.

14. **Attendance Control**

Class attendance is mandatory. Unauthorized absence from lectures is penalized as follows: The attendance score decreases linearly as absence number increases; the 5th unauthorized absence decreases attendance score to zero.