

MATH 0240: Analytic Geometry and Calculus 3

Fall, 2022-2023

Classroom: Room 4-216 SCUPI Building

Lectures: Monday & Wednesday 4:45-5:30 am, 5:40-6:25 am

Instructor: Kunpeng Wang

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Office hours: Mon./Wed. 9-11 am, Mon./Tue. 1:30-4 pm

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Tutorials: TBA

Course Description

Topics include review of parametric equations, polar coordinates, conic sections, coordinate systems and vectors, dot product and cross product, vector functions, derivatives and integrals of vector functions, arc length and curvature, functions of several variables and partial derivatives, directional derivatives and double and triple integrals, multiple integrals and changes of variables, and vector calculus, with an emphasis on Green's and Stokes' theorems.

Prerequisites

MATH 0220 & 0235 Analytic Geometry and Calculus 1 & 2

Course Objectives

At the completion of this course, students will be able to:

1. Extend many of the concepts learned in MATH 0220/0235 to three dimensions.
2. Have a clear understanding of vector fields, and how they apply to geometric and physical problems.
3. Understand what is meant by the partial derivative of a function of several variables, and be able to apply this to the concept of maximum and minimum points.
4. Set up and compute double and triple integrals over general regions.
5. Learn about generalizations of the Fundamental Theorem of Calculus and how to employ them in applications.

Course Content

We will cover most of the material from Chapters 9-13 in the textbook.

Class Structure

Lectures.

Tutorials

Tutorials run by our TAs will start in Week 04.

Course Materials

Textbook: Essential Calculus, 2nd Edition, International Metric Edition, by James Stewart.

Blackboard

Please regularly log on and check <https://learn.scupi.cn/>. We will upload there lecture notes, assignments, projects, announcements and your grades.

Course Assessment

Weekly assignments, quizzes, class activities, tests and final exams.

Schedule of Exams, Assignments and Quizzes

Exams

Date	Time	Component
Week 10	2 hours	Test 1
Week 15	2 hours	Test 2
Final exam week (Jan 2 to Jan 11)	2 hours	Final exam

Assignments

Homework assignments will be given out weekly. They will be due by the following week on Wednesday at the beginning of the class at 4:45 pm. Plagiarism will not be tolerated. However, discussions of the assignment problems will be permitted. Please also note each student must submit his/her individual assignment.

Quizzes

Students will be asked to complete a quiz in tutorials each week. Normally, a quiz will consist of a short question.

Grading Policy

The final grade will be computed according to the following scheme:

Scheme: Total grade = 15 % Assignments + 20 % Test 1 + 20 % Test 2 + 35 % Final Exam + 10 % Quizzes, Class Activities and Attendance.

Note: All tests and final exam will be closed-book.

Conversion of Numerical Grades to Final Letter Grades Follows the SCUPI Common Grade

A [90,100] A- [85,90) B+ [80,85) B [76,80) B- [73,76) C+ [70,73) C [66,70)
C- [63,66) D+ [61,63) D [60,61) F (60,0)

Schedule and weekly learning goals

The schedule is tentative and subject to change. The listed objects below should be viewed as the key concepts you should grasp after each week, and also as a study guide before each exam, and at the end of the semester. Each test will base on material that was taught up until the second last week prior to the test, namely, Test 1 covers Weeks 02-08, Test 2 is based on Weeks 09-13. The final exam will cover all topics taught in this semester.

Week 01, 08/29-09/02

- Classes cancelled.

Week 02, 09/05-09/09

- Cover Sections 9.1-9.2.
- Course introduction.
- Parametric equations and polar coordinates.
- Calculus with parametric curves.

Week 03, 09/13-09/16

- Cover Sections 9.3-9.4.
- Polar coordinates.
- Areas and length in polar coordinates.

Week 04, 09/19-09/23

- Cover Sections 10.4-10.6.
- The dot and cross product.
- Equations of lines and vector-valued functions.

Week 05, 09/26-09/30

- Cover Section 10.8.
- Planes and quadric surfaces.
- Arclength and curvature.

Week 06, 10/03-10/07

- National Day Holiday.

Week 07, 10/08-10/14

- Cover Sections 11.1-11.2.
- Functions of several variables.
- Limits and continuities.

Week 08, 10/17-10/21

- Cover Sections 11.3-11.4.
- Partial derivatives.
- Tangent planes and linear approximations.

Week 09, 10/24-10/28

- Cover Sections 11.5-11.6.
- The chain rule.
- Directional derivatives and the gradient vector.

Week 10, 10/31-11/04

- **Test 1.**
- Cover Section 11.7.
- Maximum and minimum values.

Week 11, 11/07-11/11

- Cover Section 11.8.
- Lagrange multipliers.

Week 12, 11/14-11/18

- Cover Sections 12.1-12.2.
- Double integrals over rectangular regions.

- Double integrals over general regions.

Week 13, 11/21-11/25

- Cover Sections 12.3 & 12.5.
- Double integrals in polar coordinates.
- Triple integrals.

Week 14, 11/28-12/02

- Cover Section 12.6-12.7.
- Triple integrals in cylindrical coordinates.
- Triple integrals in spherical coordinates.

Week 15, 12/05-12/09

- **Test 2.**
- Cover Sections 13.1-13.2.
- Vector fields and line integrals.

Week 16, 12/12-12/16

- Cover Sections 13.3-13.4.
- The fundamental theorem for line integrals.
- Green's Theorem.

Week 17, 12/19-12/23

- Cover Section 14.8.
- Curl and divergence.
- Parametric surfaces and their areas.

Week 18, 12/26-12/30

- Cover Section 14.8.
- Surface integrals.
- Stoke's theorem.
- Divergence Theorem.

Weeks 19 & 20, 01/02-01/11 Final Exam Week

Course Policies

There will be no special treatments for any students in this course! For example, if you have a heavy course load, you should expect a steep learning curve and be prepared for it. You will not be exempted from any assignments.

During Class

Computers may be allowed in class for the electronic recording of notes. But please refrain from using computers for any activities that are unrelated to the course. Phones are prohibited as they are rarely useful for anything in the course. Eating and drinking are allowed in class but please keep from it affecting the course.

Attendance Policy

Attendance is expected in all lectures. Valid excuses for absence will be accepted before class. In extenuating circumstances, valid excuses with proof will be accepted after class.

Policies on Late Assignments and Exams

Students should start their homework assignments immediately after the assignments are given, and **DO NOT** wait until the last minute to meet the deadlines. **Late assignments will be NOT accepted except for emergencies and health issues. Any other late assignments handed in will be marked but will be given 0.** At most **Two** extensions for assignments will be given in this course. All assignments will be counted in your total grade. **Late submission for previous assignments during the final exam period will NOT be accepted in any form for any excuses.**

All tests and the final exam are mandatory. There will be absolutely no makeup exam for each test. If you miss the final, a makeup exam may be given for the final exam if the student has the approval from the instructor or emergencies and health issues **with a valid proof**. I will not accept the student deceleration for absence form for the final exam.

Academic Integrity

At Sichuan University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do.

Everyone at SCUPI is expected to treat others with dignity and respect. The Code of

Student Conduct allows Sichuan University to take disciplinary action if students don't follow this community expectation.