Calculus 1 – MATH 220
Fall 2024

Instructor

Mushtaq Loan
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Office: N516 New Building

Classroom: **Teaching Building I – A411**
Lectures: Section 1 - **Wednesday** 8:15 – 9:55
Friday 10:15 – 11.55

Office Hours: Wednesday 2 – 3 PM

Teaching Assistants

Bowen: 2022141520238@stu.scu.edu.cn
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Tutorials: TBA

Course Description

Calculus is a transition course to upper-division mathematics and engineering science courses. Students will extend their experience with functions as they study the fundamental concepts of calculus: limiting behaviours, difference quotients and the derivative, Riemann sums and the definite integral, antiderivatives and indefinite integrals, and the Fundamental Theorem of Calculus. Students review and extend their knowledge of trigonometry and basic analytic geometry. Important objectives of the calculus sequence are to develop and strengthen the students' conceptual understanding, comprehensive knowledge, problem-solving skills, applications of the mathematical knowledge to real-world applications in engineering programs, and to teach them to read, write, speak, and think in the language of mathematics. In particular, students learn how to apply the tools of calculus to a variety of problem situations.

The framework also encourages instruction that prepares students to connect across domains through a broader way of thinking about the mathematical world.

Prerequisites

Students are assumed to have a basic understanding of the principles and practices of Senior Secondary Mathematics.

Course Learning Objectives (CLOs)

A primary objective of a course in calculus is to provide a bridge for the student from secondary school mathematics courses to advanced applied mathematics in engineering programs. The student will be challenged to grow in mathematical maturity, and to develop and strengthen problem-solving skills. Beyond the content of individual courses, the major in mathematics is designed to prepare students for the 21st century by helping students to become problem solvers, effective communicators, users of appropriate technology, and team players. In this course, students will be engaged in a variety of activities which will help them to move toward achieving these goals.

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

1. Understand concepts rather than merely mimic techniques.
2. Demonstrate understanding by explaining in written or oral form the meanings and important applications of concepts.
3. Construct and analyse mathematical models of real-world phenomena,
4. Distinguish between discrete and continuous models and make judgments about the appropriateness of the choice for a given problem.
5. Understand the relationship between a process and the corresponding inverse process.
6. Select between formal and approximate methods for solution of a problem and make judgments about the appropriateness of the choice.

Student Learning Outcomes (SLOs)

On satisfying the requirements of this course, students will have the knowledge and skills to:

1. Demonstrate conceptual understanding of physics and skills to creatively and concisely summarize, synthesize, and interpret information into grammatically correct sentences through written communication.
2. Use mathematics to structure their understanding of the world around them and demonstrate the ability to use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems .
3. investigate real-world problems interesting questions in this world.
4. Be able to combine multiple concepts and apply them to real-world concepts you are likely to see in a career in science, technology, or engineering.
5. Use technology as an integral part of the process of formulation and solution of problems, and communication of their solutions to others.

Resources

***Prescribed Textbook**:*

Calculus, Early Transcendentals, 8/9th Edition (Metric Version), James Stewart, Daniel Clegg and Saleem Watson, Cengage Learning Inc. 2021

Technological Resources (Virtual Lab)

Students may find the virtual simulations an effective tool for the operations of real-world processes or systems. The computer simulations are widely used and are available for free at
https://phet.colorado.edu/en/simulations/category/math
https://www.geogebra.org/m/r4A2xSSp

Blackboard

Please regularly log on and check https://pibb.scu.cn/. Lecture notes, online quizzes, assignments, projects, announcements, and your grades will be uploaded on the MATH220 page of the Blackboard.

Class Structure: Lectures.

Tutorials

Tutorials run by our TAs will start in Week 04.

Course Assessment

The final grade will be computed based on the score of weekly assignments, quizzes, midterm, and final exams.

Exams

Two midterm exams and a final exam will be given in the semester. All exams are closed-book, and cheating is not tolerated. No electronic devices will be permitted during exams. Note that the final exam is comprehensive.

Midterm Exam 1:	Week 10,	2 hours duration - TBD
Midterm Exam 2:	Week 15,	2 hours duration - TBD
Final Exam:	Final Week,	2 hours Comprehensive

Final Grade

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

Homework Assignments and Attendance:	10%
Quizzes :	10%
Midterm 1:	25%
Midterm 2:	25%
Final Exam:	30%

Cutoffs

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).

Assignments

Homework will be assigned on Friday every week and due by the following week on Friday at the beginning of the class. No late homework is accepted, and plagiarism is not tolerated. The lowest grade of the assignment will be dropped when computing the final grade. Discussions of the assignment problems are encouraged, but each student must submit his/her assignment. Each homework must include a Name, Student ID, and Assignment Title. Homework must be done in a structured, logical, and orderly manner, enabling the grader to verify steps, equations, and methods used readily. For collaborative assignments, grading rubrics are used for *objective and consistent assessment of various performances, assignments, and activities.* The rubrics for the collaborative projects/assignments will be uploaded to the Blackboard.

Quizzes: In-class/online quizzes will be given on some lecture days and every tutorial session.

Course Policies

During Class

Computers may be allowed in class for the electronic recording of notes. But please refrain from using computers for any activities unrelated to the course. Phones are prohibited as they are rarely helpful 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 they 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 a zero mark. 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 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 approval from the instructor or emergencies and health issues with valid proof. I will not accept the student deceleration for absence form for the final exam.

Academic Assistance

You are encouraged to attend office hours if you have questions regarding class materials, homework problems, grading issues, etc. Otherwise, you may email the TA or the instructor. Please allow 24 to 48 hours for any response to emails. The subject of each email must include "[MATH 220]". For example, if you have a question regarding a homework problem, the email's subject could be [MATH 220] Question about Problem X of Assignment X. Please make sure that you sign off with your official name (the one that appears in Blackboard). You are encouraged to use academic language in your posts.

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 Centre for Academic Integrity, Duke University, 1999). As a student, you must demonstrate these values in all your work. 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 do not follow this community expectation.

***Special Needs*:**

The Office of Special Needs Services at Sichuan University ensures that students with special needs have equal access to the campus and course materials. We will work with the Office of Special Needs to provide adequate services to students with special needs.

Course Outline and Weekly Learning Schedule

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 be based on material taught until the second week before the test; namely, Test 1 covers Weeks 03-07, and Test 2 is based on Weeks 08-14. The final exam will cover all topics taught in this semester.

Week	Contents	Descriptions
3 (09/16)	12.1 – 12.2	Vectors in 3 D – Vector Operations
4 (09/23)	12.3 – 12.4	Scalar and Vector Products
5 (09/30		National Holidays
6 (10/07)	12.5, 2.1	Lines and Planes - The Limit of a Function
7 (10/14)	2.2 – 2.3	Calculating Limits, Continuity
8(10/21)	2.4 – 2.6	Limits Involving Infinity, Derivatives and Rates of Change
9 (10/28)	2.7– 2.8	The Derivative as a Function, Basic Differentiation Formulas Product & Quotient Rule
10 (11/04)	3.1 – 3.6	Chain Rule, Implicit Differentiation, Related Rates - **Midterm 1**
11(11/11)	3.7 – 3.10	Linear Approximations & Differentials, Maximum and Minimum Values
12(11/18)	4.1 – 4.4	Applications of Differentiation
13 (11/25)	4.5 – 4.7	Applications of Differentiation (Contd.)
14 (12/02)	4.8 – 4.9	Newton's Method, Antiderivatives
15 (12/09)	5.1 – 5.2	Areas and Distances, The Definite Integral - **Midterm 2**
16 (12/16)	5.3 – 5.4	Evaluating Definite Integrals, The Fundamental Theorem of Calculus
17 (12/23)	5.4	Indefinite Integrals and Net Change Theorem
18 (12/30)	5.5	The Substitution Rule, Trigonometric Functions, Inverse Functions
19 (01/06)	4.5, 5.1	**Final Exam Week**
20 (01/13)	5.2 – 5.3	**Final Exam Week**