

## Course Syllabus

# Math 220 Analytic Geometry and Calculus 1

Fall, 2024 - 2025

Credits: 4

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**Instructor** Prof. Tony Ho

**Office** SCUPI building room 515.

**Email** [zh\\_ho01@scupi.cn](mailto:zh_ho01@scupi.cn)

When emailing the instructors, include "MATH" and your section number in the subject field of your message. Use your university email account (student\_number@stu.scu.edu.cn); mail from other accounts such as qq.com and 163.com will be stopped by the SCU spam filter.

### Office Hours

If you do not understand something, and talking to your classmates does not help, then you should be seeking help from me or your TA(s).

Office hours are times we have specifically set aside to be available to students. During office hours, you can come to my office; you do not need an appointment. I am usually in my office in the afternoons after my 13:30 class on Tuesdays, after lunch on Wednesdays, Thursdays, and Fridays. I am also available at other times; please email to schedule a time. If you do not do well on your exams, I will also ask you to come to my office.

### Schedule

#### Lecture/Studio, Teaching Building 1

Section 2: Wednesdays	08:15 – 09:55	A607
Fridays	10:15 – 11:55	A607
Section 3: Tuesdays	08:15 – 09:55	A411
Fridays	08:15 – 09:55	A403
Section 4: Tuesdays	13:50 – 15:30	A301
Thursdays	10:15 – 11:55	A308
Section 5: Tuesdays	10:15 – 11:55	A507
Thursdays	08:15 – 09:55	A411

### Recitation

Please plan on attending additional hours of recitation outside of class per week to be held by our TA(s) with possible quizzes given, locations and hours to be determined.

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## Textbook

*Essential Calculus*, Metric Version, 2<sup>nd</sup> International Edition, by James Stewart (published by CENGAGE Learning).

We will cover approximately two or three sections per week. Textbook reading assignments will be posted to the class website. Read the assigned sections in chapters BEFORE class.

## Teaching Assistants

### Section 2

Yihang Yang ([2021141520201@stu.scu.edu.cn](mailto:2021141520201@stu.scu.edu.cn))

QQ Group 871934423

### Section 3

Quyiran Qu ([2022141520248@stu.scu.edu.cn](mailto:2022141520248@stu.scu.edu.cn)) & Yizhen Ren ([renyizhen@stu.scu.edu.cn](mailto:renyizhen@stu.scu.edu.cn))

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### Section 4

Xiangrong Jia ([2021141520027@stu.scu.edu.cn](mailto:2021141520027@stu.scu.edu.cn)) & Wenhui Zhu ([15192880055@139.com](mailto:15192880055@139.com))

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### Section 5

Alison Wu ([2022141520042@stu.scu.edu.cn](mailto:2022141520042@stu.scu.edu.cn)) & Zihan Zhang ([2022141520021@stu.scu.edu.cn](mailto:2022141520021@stu.scu.edu.cn))

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## Description

This is the first in a sequence of three calculus courses for science and engineering students. The goal is to prepare you to make use of calculus as a practical problem-solving tool.

## Prerequisite

Students are expected to have strong algebra and trigonometry skills, not forgetting what math was learned before, and able to attend and paying attention in classes without playing games.

## Course Objectives

To prepare students to make use of calculus as a practical problem-solving tool.

## Learning Outcomes

1. Students will develop a basic understanding of two and three-dimensional vectors, the geometry of the three-dimensional space, equations of lines and planes in three dimensions, and be able to apply these concepts when working on applied problems.
2. Students will develop a basic understanding of limits, derivatives, and antiderivatives.
3. Students will be able to obtain various limit problems.

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4. Students will learn various techniques of getting derivatives of various functions.
5. Students will be able to apply differentiation techniques to solve a range of applied problems, including optimization problems, related rates problems, and applications from physics and other disciplines.
6. Students will develop a deep understanding of fundamental theorem of calculus.
7. Students will understand basic skills for finding integrals.

## Web Site

This course uses the Blackboard system; the web site is <https://pibb.scu.edu.cn/>.

(Note: the **https** is important, otherwise it may not load.) There you will find the course syllabus, studio and homework assignments, and other materials. Current announcements and assignments will be posted on the home page. All assignments will be uploaded through the Blackboard system. Please check the class page frequently.

## Attendance

We will follow Sichuan University's policy for attendance, and we will check attendance for every class. **If you miss a third of all semesters' classes, then you will receive a 0-score for this semester's grade.**

## Class Format and Studio Assignments

- (1) You will try to understand the materials covered in classes.
- (2) You can take turns to come to the front of the classroom to write down your solution on the board for discussion.
- (3) You will pay attention to any solutions that are different from yours.
- (4) There might be frequent quizzes given during class.

## Class Participation

As members of an academic community, all students are expected to actively participate in and contribute to class discussions. You are expected to engage with the class during the lecture/studio time, and to be prepared to think and answer questions on your feet. There is no penalty for not knowing the answer to a question, but you need to be able to "think out loud" and demonstrate the procedure you will follow to arrive at a solution. So, if you're asked a question in class, be prepared to figure out the answer.

**It is imperative that you spend the class time finding out what you do not understand.** My expectation is that you will ask questions once you find out that you do not understand something. Since there is no way for me to tell whether you are spending time finding out what you do not understand, or whether you even ask questions about what you do not understand, we will, occasionally, give a 10-minute quiz. These quiz scores will count as studio assignments and class participation.

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## Phones and Laptops

Out of respect for your fellow students, please mute and put away your phones, and close your laptops when class begins. Web surfing, emailing, text messaging, and the like during lecture is distracting to other students and the instructor, and is likely to result in your missing some important information. Don't do it.

## Grade

Your grade will be based on attendance (5%), homework assignments (10%), quizzes (5%), major exams (25%), final examination (30%), and playing games during class (-10 points every time).

The final letter grade is determined from the following table:

A: [90 – 100]	A-: [85 – 89]	B+: [80 – 84]	B: [76 – 79]	B-: [73 – 75]
C+: [70 – 72]	C: [66 – 69]	C-: [63 – 65]	D: [60 – 62]	F: < 60

## Exams

There will be two major exams, tentative scheduled during this semester, with the first exam during the weekend of November 4<sup>th</sup> week and the second exam during the weekend of December 9<sup>th</sup> week, and a comprehensive final examination during the final's week. Each major exam will be cumulative with more emphasis on the material since the previous exam. Although restroom breaks are allowed during exams, you are not allowed to have any electronic devices, such as Apple watch, smart phone(s) or laptop(s) with you. Once found, it is considered cheating.

## Quizzes

We will give occasional quizzes, either during class or during recitation.

## Grade Rebuttal

You must retrieve your own exam and quiz papers. For any exam or quiz, you have only one week to request corrections. No corrections will be made after a week after the test paper is returned.

## Homework

Homework assignments will be assigned almost every week on Blackboard. We may begin each lecture by looking at some of the exercise problems at the end of each section to discover what we can or cannot do yet. Working on homework assignment is the key to get a good grade.

## Make-up Policy

There will be **no makeup exams or quizzes**. You may provide a doctor's note or a legitimate reason, like attending a university competition, to replace a 0-score.

## Plagiarism and Academic Misconduct

Collaboration on studio problems and homework assignments is permitted and encouraged. Collaboration on exams is not.

Plagiarism, copying, and any other form of academic misconduct or dishonesty will not be tolerated. Cite all references, including books, technical reports, and web sites you have used. You may discuss the homework with other people currently taking this class, the instructors, and teaching assistants. Examples of disallowed sources include websites that offer homework help; course documents from previous semesters; people or agencies that do your work for you.

You are not to share materials distributed in class with people outside the University. Uploading of course materials, including homework, handouts, homework, and test solutions, etc. to the web is prohibited.

To reiterate: use of homework or test solutions from previous semesters or the web is not allowed. Getting homework help from the instructors and fellow students in the class is okay; looking up things on Google, Baidu, and Wikipedia is okay; getting help from websites offering homework help and problem solutions is NOT okay.

If you have any questions about referencing material, or the boundaries of acceptable collaboration, please talk to me.

## Software

We can use a powerful software tool, Matlab, to perform calculations and draw graphs. Matlab is a potent tool, used worldwide by engineering and science professionals in many fields. The effort you put in to master it will repay you many times over in this class and others. To make learning it easier, there is a wealth of information, examples, and documentation available within the program and on the web.

## Other Useful Information

Although there are no formal prerequisites except Math 220 for this course, you are expected to know how, or learn how, to do the following:

- Use your newly acquired knowledge to make calculations instead of hanging onto using your older knowledge. It is a strong indication of whether you understand the materials or not.
- Use an internet browser to find things on the web.
- Use Matlab to evaluate numerical results, make graphs, and do multistep calculations.
- Open, read, and print Acrobat pdf files.
- Be proficient in basic pre-calculus mathematics, including plane geometry, trigonometry, and algebra.

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For most of you, this will be your second college calculus with analytic geometry course where, I ask you to take a more active role in learning. You are not going to have an instructor showing you how to make mathematical calculations all your life. At times, you might not even be able to find a textbook showing you how to solve your problems.

By virtue of your being admitted to SCUPI, we know that you are smart, capable, and hardworking. You may find this course challenging and demanding and might even wonder if you've made a mistake coming here. Fear not! You will do okay if keep a few things in mind:

- This and other classes at SCUPI are being taught using a Western-style approach. This involves a lot of questioning and interaction with the instructor, probably much more than you are used to.
- It's okay to be frustrated. You will be learning a lot of new things, at a fast pace, in a language you're still getting comfortable with. The best way to learn is to ask lots of questions. If you don't understand something in class, ASK! Remember that if you're unsure about something, there is a good chance that many of the people sitting around you are also unsure.
- Develop a good studying habit. Don't fall behind on your course material.
- When working with equations, use variables to denote the quantities and parameters specific to the problem. Delay substituting numerical values if possible; this will make it easier to check your work and find errors.

An important skill to acquire is the art of baloney detection (also known as BS detection). Statements are called baloney (or BS) when they are unsupported by facts and are often used to deceive unwary people. For example, a salesperson might make unjustified claims regarding the performance of a system or product to make a sale; as a mathematics student, you need to learn how to be skeptical about unsupported claims. To acquire this skill, you need to always be questioning: how do you know a calculation is correct? Do you understand why it is true? Are there counterexamples that show it is not true?

When you get your graded homework back, you should go over any problems you did not do well on. Homework solutions will not be distributed, but you may contact your teaching assistant if you need help in understanding where you went wrong.

You should be having fun and learning mathematics because figuring out something in mathematics is fun.

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## Approximate Schedule

Tentative sequence of the sections covered in this class is:

Week	Contents	Descriptions
3 (09/16)	10.1 – 10.3	Three-dimensional Coordinate Systems, Vectors, The Dot and Cross Products
4 (09/23)	10.4 – 10.5	The Cross Product, Equations of Lines and Planes
5 (09/30)		National Holidays
6 (10/07)	10.5, 1.1 – 1.3	Equations of Lines and Planes, Functions and Their Representations, A Catalog of Essential Functions, The Limit of a Function
7 (10/14)	1.4 – 1.5	Calculating Limits, Continuity
8 (10/21)	1.6 – 2.2	Limits Involving Infinity, Derivatives and Rates of Change, The Derivative as a Function
9 (10/28)	2.3 – 2.5	Basic Differentiation Formulas, Product & Quotient Rules, Chain Rule
10 (11/04)	2.6 – 2.7	Implicit Differentiation, Related Rates
11 (11/11)	2.8, 5.8	Linear Approximations & Differentials, Indeterminate Forms & L'Hospital's Rule
12 (11/18)	3.1 – 3.2	Maximum and Minimum Values, The Mean Value Theorem
13 (11/25)	3.3, 3.5	Derivatives and Shapes of Graphs, Optimization Problems
14 (12/02)	3.7, 4.1	Antiderivatives, Areas and Distances
15 (12/09)	4.2 – 4.3	The Definite Integral, Evaluating Definite Integrals
16 (12/16)	4.4 – 4.5	The Fundamental Theorem of Calculus, The Substitution Rule
17 (12/23)	5.1 – 5.3	Inverse Functions, The Natural Logarithmic Function & Exponential Function
18 (12/30)	5.6, 5.8	Inverse Trigonometric Functions, Indeterminate Forms & L'Hospital's Rule
19 (01/06)		Final Exam Week