SCUPI
Sichuan University - Pittsburgh Institute

Calculus 1 Sec 1
Course Syllabus

Fall 2020

Catalog Description

This is the first of a sequence of three basic calculus courses. It covers the derivative and integral of functions of one variable and their applications.

Schedule

Lecture/Studio, Room 3-104

Wednesdays	10:15 – 11:55
Fridays	08:15 – 09:55

Instructors

Prof. Tony Ho tonyho@scu.edu.cn

Teaching Assistant:

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When emailing the instructors, include "MATH" 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.

Textbook

Calculus, Early Transcendentals, 2nd Edition, by William L. Briggs, Lyle Cochran, and Bernard Gillett (published by Pearson).

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

Software

We will use a powerful software tool, Matlab, to perform calculations and draw graphs. Matlab is installed on the class computers, and you will also need a copy for your own computer.

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. Learn to tap into these resources so you can make the best use of the program.

Web Site

This course uses the Blackboard system; the web site is

https://learn.scupi.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.

Class Format and Studio Assignments

When you enter a university, you are transitioning from a cocoon to a beautiful butterfly. The difference between a high school education and a university one is that in a university setting, we prepare you to start learning independently. So, it is my belief that the sooner you start taking ownership and an active role for your own mathematics education, the better off you will be before you enter your next chapter in life, may it be working for a company, or doing university research on your own.

In case you wonder what my role will be for this reasoning, I disclose to you that I offer guidance. Calculus courses are not different from any other mathematics courses you have ever taken before. But perhaps you have always waited for your teacher to show you how to make calculations. Some of you have not realized that learning mathematics is not different from riding a bicycle. In other words, you cannot say that you have learned how to ride a bicycle once you have watched someone else riding a bicycle. Likewise, you cannot say that you have learned how to make mathematics calculations once you have watched someone else making mathematical calculations.

The way I ask you to take ownership and an active role for your own mathematics education is simple. I ask you to study the examples given in the textbook, and I will also ask you to figure out how to make calculations for problems similar to the examples in the textbook on papers. These are your studio assignments. I will come by to visit you to see your progress. After the calculations, you will exchange your paper with someone else's in the class. If you do not agree with any solution, then you will either figure out the correct solution together, or let me know, and the whole class can collaborate to find the correct solution.

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.

You are also expected to follow and critique the presentations of your classmates, and provide useful feedback to them so they can learn from the experience.

It is imperative that you will 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, I will, occasionally, give a 10-minute quiz. These quiz scores will count as studio assignments and class participation.

Presentations

Whenever two or more classmates find it difficult to agree on a solution, you can volunteer to come up to the board to present a solution for which you believe to be correct. Priorities will be given to harder problems and whoever has not volunteered as many times as before.

When you are selected to present, follow these guidelines:

- Introduce yourself.
- Succinctly state the problem and the appropriate definition(s), theorem(s) or principle(s), and etc. you used to solve the problem.
- Describe your solution as if your audience is unfamiliar with the problem.
- Describe how you verified your solution if necessary.
- Speak as LOUDLY and clearly as possible, or use the microphone. The people at the back of the room have to hear and understand every word.

If I do not see that you are working toward a solution, I will ask you to step down.

Following the presentation, however, the entire class will critique your presentation. Five minutes can be allotted for questions and discussions following your presentation, although we may continue past five minutes if necessary. Here are our evaluation criteria: (1) Use of English: 30% (2) Preparation of the presentation: 30%, (3) Correctness: 20%, (4) Time limit: 20%. Good presentations that help more people understand will earn extra credits towards your total score. **Please also make sure to turn in a copy of your presentation on paper afterwards for possible extra credit**.

Homework Assignments

Homework assignments are most of the exercise problems at the end of each section we cover, and will be assigned every week. We will 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.

Exams and Grading

There will be three 90-minute major exams tentative scheduled during the October 25, November 29, and December 27's weeks, and a comprehensive final examination at the end of the semester. Each major exam will be cumulative with more emphasis on the material since the previous test. Each exam may earn bonus points if the immediate subsequent test score is higher. The bonus is half of the difference of the two tests. There is no bonus for the third or the final exam. The quizzes will be given during recitation.

Your grade will be based on studio assignments and class participation / quizzes (25%), major exams (40%), final examination (35%). Here is an example: if a student's scores are: class participation / quiz total (80), presentation extra credit (5), exams (70, 75, 80), final (80), and playing games on phones during class (-10), then your grade determination is $80 \times 25\% + 5 + (70+75+80)/3 \times 40\% + 80 \times 35\% - 10 = 73$. There is NO makeup for all the quizzes and exams, but if your final exam score is higher, your lowest exam score will be replaced by your final exam score.

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+: 61 – 62	D: 60	F: < 60

For any quiz or exam, you only have one week to request for a score correction. No score correction will be made one week after the test paper has been returned in class.

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. My office is 4-221.

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 Tuesday, Thursday, and Friday afternoons. We are also available at other times; please email to schedule a time.

Plagiarism and Academic Misconduct

Collaboration on studio problems and homework assignments is permitted and encouraged. Collaboration on exams are 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 the Google, Baidu, and the 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.

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.

Although restroom breaks are allowed during exams, you are not allowed to take any phone(s) or laptop(s) with you.

Other Useful Information

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

- 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.

For most of you, this will be your first introduction to calculus with analytic geometry where, I ask you to take a more active role in learning. In reality, 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 as long as 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.

Course Goals

Students will develop a basic understanding of the concepts of calculus including limits, continuity, differentiation, and integration. Students will be able to find limits, calculate (and simplify) derivatives and integrals involving exponential, trigonometric, inverse trigonometric, and hyperbolic functions. Students will be able to apply the concepts and techniques of calculus to solve applied problems. Evaluation of students will be determined by tests, quizzes, homework, and class presentations.

Learning Outcomes for This Course

- Students will develop a basic understanding of limits, derivatives, and antiderivatives
- Students will be able to obtain various limit problems.
- Students will learn various techniques of getting derivatives of various functions.
- 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.
- Students will develop a deep understanding of fundamental theorem of calculus.
- Students will understand basic skills for finding integrals.

Approximate Schedule

Tentative sequence of the sections covered in this class is:

Week	Contents	Descriptions
5 (9/27)	1.1 – 2.2	Review of Functions, Representing Functions, Inverse, Exponential and Logarithmic Functions, Trigonometric Functions and Their Inverses, The Idea of Limits, Definitions of Limits
7 (10/11)	2.3 – 2.4	Techniques for Computing Limits, Infinite limits
8 (10/18)	2.5 – 2.6	Limits at Infinity, Continuity
9 (10/25)	3.1 – 3.3	Introduction of derivatives, Working with Derivatives, Rules of Differentiations
10 (11/1)	3.4 – 3.5	Product and Quotient Rules, Derivatives of Trigonometric Functions
11 (11/8)	3.6 – 3.7	Derivatives as Rates of Change, The Chain Rule
12 (11/15)	3.8 – 3.9	Implicit Differentiation, Derivatives of Log. & Exponential Functions
13 (11/22)	3.10 – 3.11	Derivatives of Inverse Trigonometric Functions, Related Rates
14 (11/29)	4.1 – 4.2	Maxima and Minima, What Derivatives Tell us
15 (12/6)	4.3 – 4.4	Graphing Functions, Mean Value Theorem
16 (12/13)	4.5 – 4.6	Optimization Problems, Linear Approximation and Differentials
17 (12/20)	4.7 – 4.8	L'Hôpital Rule, Newton's Method
18 (12/27)	4.9 – 5.1	Antiderivatives, Approximating Areas under Curves
19 (1/3)	5.2 – 5.3	Definite Integrals, Fundamental Theorem of Calculus
20 (1/10)	5.4 – 5.5	Working with Integrals, Substitution Method
21 (1/17)		Final Exam