Syllabus for Math 1560, Calculus I, sections A and B

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1 Essential Information

We begin with a list of the essential (and mandatory) details for the course:

Course Instructor

Dr. Sean Fitzpatrick
Contact: via email (sean.fitzpatrick@uleth.ca)
Office: UH C540
Student hours:

- Drop-in: Monday 1:00 – 2:00 pm; Tuesday and Thursday 1:00 – 3:00 pm
- By appointment (calendly.com/dr-sean-fitzpatrick): Tuesday and Thursday 10:00 am – 12:00 pm

Any exceptions to this schedule will be announced on Moodle.

Course Website:

via Moodle (moodle.uleth.ca)

Course Textbook

APEX Calculus, by Hartman et al.. We will be using an interactive version of the textbook (with built-in homework) hosted on a local Runestone server (runestone.uleth.ca). Links to both readings and homework will be provided on Moodle.

You can also access an HTML version (opentext.uleth.ca/apex-standard) online, and PDF versions of the book are also available to download, in both colour (opentext.uleth.ca/PDF/APEX-1560-colour.pdf) and black and white (opentext.uleth.ca/PDF/APEX-1560-print.pdf). You are free to print these if you would prefer a hard copy.

All of these formats are provided at no cost to students.

Class Meetings

- *Math 1560A.*

  Wednesday & Friday, 10:30 - 11:45 am in SA 6008

- *Math 1560B.*

  Wednesday & Friday 1:30 - 2:45 pm in SA 6008

First day of class is Wednesday, September 10th

Tutorial Instructors

Sean Legge, together with graduate and undergraduate TAs
Contact: via email (sean.legge@uleth.ca)

Tutorial Meetings

Tutorials meet on Thursdays in University Hall C756 at the following times:

- Tutorial 1: 8:00 am
- Tutorial 2: 12:00 pm
- Tutorial 3: 1:00 pm
- Tutorial 4: 2:00 pm

Course Description

(As per the Academic Calendar. See Section 5, p. 5 for a more useful description.)

> Functions. Limits. Continuity. Differentiation and integration of polynomial, rational, root, trigonometric, exponential, and logarithmic functions. Inverse functions, including inverse trigonometric functions. Applications of derivatives, including linear approximations and Taylor polynomials. Curve sketching, optimization, and related rates. Anti-derivatives. Definite integrals and Fundamental Theorem of Calculus. Change of variables.

2 Welcome!

Welcome to the University of Lethbridge. Oki, and welcome to the University of Lethbridge. Our University's Blackfoot name is Iniskim, meaning Sacred Buffalo Stone. The University of Lethbridge acknowledges and deeply appreciates the Siksikaitsitapii peoples' connection to their traditional territory. We, as people living and benefiting from Blackfoot Confederacy traditional territory, honour the traditions of people who have cared for this land since time immemorial. We recognize the diverse population of Indigenous Peoples who attend the University of Lethbridge and the contributions these Indigenous Peoples have made in shaping and strengthening the University community in the past, present, and in the future.

Most of your courses, including this one, will be facilitated using the Moodle (`moodle.uleth.ca`) learning management system. You'll want to spend time as soon as you can familiarizing yourself with your course Moodle pages, and plan to check each one on a daily basis.

Don't hesitate to reach out if you have questions. If you have questions that are not related to the course, you can ask those too, and we'll try to answer, or to direct you to someone who can.

There's some great general advice for first year students (`www.uleth.ca/services-for-students/what-do-i-do-if`) on the U of L website, including links to Academic Advising and advice on study skills from the Student Success Centre. Other resources can be found on the University's Health and Safety website (`www.uleth.ca/services-for-students/health-safety`).

Welcome to Math 1560, Calculus I. I'm glad you've chosen to embark on this journey through a mathematical classic. (If you're here against your will, I'm still happy to have you join us.)

We assume that everyone in this course has taken some sort of high school pre-calculus class that covered things like polynomials, algebra, functions, graphs, logarithms, and trigonometry. We do *not* assume you have previously seen calculus. You don't have to be a genius to do well in thise course, but you do have to be willing to put in some work and develop some basic time management skills.

If you took calculus in high school, this course might be a little different. There is more focus on theory and concepts than procedures (this is a common theme in university). I hope there will also be a lot more time spent on discussion and activities, and less time spent listening to me drone on about calculus.

(If you were really hoping to spend the semester listening to me drone on about calculus, you're in luck! I recorded myself doing just that a few years ago. Those videos are embedded throughout the textbook, or you can go binge them on my YouTube channel (`www.youtube.com/channel/UCNTQSJzbc90IjFJjlCIQpGQ`).)

3 Navigating the Course (a short how-to guide)

Doing well in calculus doesn't require any special talent. It mostly requires good organization, a bit of perserverance, and knowing when to ask for help. (See Section 4, p. 4 for ways to get help.)

We try to keep the workload fairly consistent throughout the semester, which may be unlike other courses that tend to ramp up toward a midterm or big assignment. Figure out what needs to be done each week, set aside time to get it done, and stick to your schedule.

There are a few non-mathematical skills that you might lack coming into the course that take time to develop, but will come in handy throughout your education:

- Reading the textbook. The way you read a textbook is very different than other books! You should expect to jump around, skim in some places, read deeply in others, and always be willing to pause to ask questions, try examples, etc. See below for more details.
- Managing your time. You are probably going to be annoyed with all the due dates in this course. Yes, there are a lot. But they're designed to reflect a recommended pacing of the course material. Many items (like the reading assignments) are meant to be short (an hour or less), and ideally completed the night (or morning) before you come to class.

  The more you can stay on top of things, or even work ahead, the easier you'll find this course.
- Studying. Keeping up with the homework should give you some confidence that you can manage the computational problems, but you can expect to be tested on your knowledge of definitions, concepts, theorems, etc.. A great way to set yourself up for success is to take notes as you read the book. If something has a heading (like Definition, Theorem, or Key Idea), it is probably something you want to make a note of! When you review your notes, try to come up with examples on your own, and think of where you've seen these things used during class.

Online homework. Online homework is assigned every week. Your answers are graded automatically by the computer, you get immediate feedback on whether or not your answer is correct, and you usually get unlimited attempts to get a question right if you make a mistake on your first try. (Multiple choice questions are a notable exeception to this policy.)

One of the best things you can do is to start the online homework right away. The exercises will be more useful to you if you work on them at the same time that you are seeing similar problems in class, and/or in the textbook.

Doing the problems early gives you plenty of time to ask for help on the ones you get stuck on, and doing a few each night is much less stressful than leaving them all for an hour before the homework is due.

Class meetings. We have two 75 minute classes and one 50 minute tutorial every week. Before each class there will be a short reading assignment to complete. The intention is to help make sure that you arrive in class prepared to discuss the course material. It's quite common that something won't make sense the first time you see it, so don't worry if you're confused by some of the assigned reading. The second exposure in class should hopefully make a little more sense, and by the time you try things for the third time on the homework, it'll be starting to sink in.

In each class you can expect:

- A short "mini-lecture" on the assigned reading for that class, with some time to ask questions.
- An in-class discussion assignment: this will consist of multiple-choice quiz questions, but the grading will be strictly for participation. After initial, individual poll responses are gathered, there will be a few minutes to discuss the results with your classmates, and then a second poll, to see how answers have shifted after discussion.
- A few examples at the end. Often these examples will include homework questions that students are stuck on.

The tutorial each week will involve a short assignment that you will be able to work together on, with help from the instructors in the room. The point of the tutorial assignment is to give you some initial exposure to the types of questions we expect you to be able to do, as well as some feedback on how you're doing. This is a low-stakes opportunity to find out if you don't know how to do a certain type of problem, or if the way that you've been doing a question is not the way we'll expect you to do it on a test.

Using the textbook. Reading a textbook (especially for a technical subject like mathematics) is a skill you have to learn and practice. A math book can't be read like a novel. It requires some effort and interaction.

Some general suggestions:

1. On your first pass through a section, just scan. Skip the explanatory text. Make a note of the significant parts, like definitions and theorems. (You may even want to keep a notebook where you record all the definitions and theorems for yourself.)

2. Next, read the content of the definitions and theorems. ***Take notes*** as you read this material, and use them later for studying. Do you understand what they're saying? (On first glance, it's quite likely that you don't.) Now you can read the surrounding explanatory text, to see if it sheds any light.

3. Next, move on to the examples. At this point you might know what the definitions and examples *say*, but this doesn't mean you know how they are *used*. The examples will help illustrate this.

   In the HTML version of the book, the solutions to each example are initially hidden. Write down the problem in the example, and see if you can solve it yourself. Don't worry if you get stuck. Just make a reasonable attempt. Now you're ready to look at the solution, and see how it compares to your attempt. If your results differ from the results in the solution, stop and think. See if you can see where you went wrong.

   Note that many examples have two types of solution: written, and video. You can pick whichever format works better for you.

4. Finally, try the exercises! There are some exercises that are designed to be done as you read; these are included in the reading assignments and are marked as "PROTEUS Exercise". (The PROTEUS name comes from an NSF research study that is looking into the use of these exercises.)

   At the end of each section you'll find the homework problems. Not all of them will be assigned, although you are of course free to do more than the assigned problems.

One last bit of advice would be to find a study group. You will learn more by sharing (and critiquing) ideas with classmates, and meeting regularly will help you stay on track with your homework.

4 Getting Help

It is normal — in fact, one might say *expected* — that you will need help with understanding the material at some point during the course. (There's a reason the university pays to keep all these instructors around.)

The easiest place to ask for help is during class! Both lectures and tutorials will involve small group discussion, with an instructor and TAs circulating through the room. Put up your hand, and we'll come over as soon as we can.

There are also ways to ask for help outside of class.

Student Hours. Student hours (sometimes called office hours) are times set aside by the course instructor to be available to the students in the course. You can come for help with the course material, to ask more general questions, or simply to introduce yourself.

Our class are big, so it's unlikely that I'll get to know everyone during class time. But it's worth your time to make sure that your instructors get to know you! At some point in the future, you'll find yourself looking for a reference: for a job, a scholarship, or perhaps for graduate school. If I've never had a conversation with you outside of class, chances are the best I can write in a letter will be, "I can confirm that this person took Calculus with me in Fall 2025. They earned a A- in the course." Chances are that you'd want someone writing a letter to be able to say a bit more about you.

Campuswire discussion forum. We use Campuswire (`campuswire.com`) as an online homework Q&A forum. Instructions on how to sign up will be posted on Moodle.

Campuswire has some nice features, including support for mathematical notation, easy uploading of screenshots, and the ability to remain anonymous to your peers when asking a question.

5 Course description

Math 1560, Calculus I, is a first course in calculus, covering limits, derivatives, and integrals of functions of one variable.

We do not assume that you took calculus in high school, but we do assume that you're familiar with algebra, functions, and trigonometry.

We'll be dealing with all your favourite functions from high school: polynomials, logarithms, exponentials, even trigonometric functions.

- **Limits** tell us about the value of a function near a point. A limit is simulataneously approximate and precise. In fact, most of calculus could be described as "the art of precise approximation"
- **Derivatives** tell us about how a function is *changing* near a point. Most rates of change in the sciences, from speed to population growth, are quantified using derivatives.
- **Integrals** will be defined in the context of calculating area, but they also appear whenever aggregates or averages are being considered.

Both derivatives and integrals are defined using limits, and the two are related in a (possibly) surprising way.

The course will follow the order of the textbook. We cover everything, with the following exceptions:

1. We do not cover Section 1.2, on the precise definition of the limit.
2. Sections 4.1 (Newton's method) and 5.5 (numerical integration) will not be covered in class, or on the tests, although you may see them in tutorial.
3. Section 2.2 (interpretations of the derivative) is recommended reading for conceptual understanding, but won't be covered directly in class.
4. Section 3.2 (Mean Value Theorem) will be discussed, since it is needed to explain some of the results in Chapter 3, but it won't be assessed on homework or tests.

The remainder of the content is divided into four units:

- ***Unit 1***: Sections 1.1, 1.3, 1.4, 1.5, 1.6, and 2.1
- ***Unit 2***: Sections 2.3, 2.4, 2.5, 2.6, 2.7, and 3.1
- ***Unit 3***: Sections 3.3, 3.4, 3.5, 4.2, 4.3, and 4.4
- ***Unit 4***: Sections 4.5, 5.1, 5.2, 5.3, 5.4, and 6.1

Each unit will end with a unit test, which will be completed in class. The tests will follow a *two-stage test* format. First, you will write a test individually. The test will consist of a couple of written (long answer) questions, and a page of multiple-choice conceptual problems.

Once you hand in the test, you will form into groups, and then retake the multiple-choice portion of the test. The group test uses *scratch cards*: if you think "(b)" is the correct answer to the first question, scratch off the B in the first row, and if you're right, you'll reveal a symbol. If not, the box will be empty. The group score is based on how many attempts were needed to find the correct answers.

6 Assessments and Grading

Math 1560 will involve a combination of computational and conceptual assessment. We need to make sure you're good at computing derivatives and integrals, because that's expected by your physics, chemistry, and economics instructors. (They also probably expect that you know why we care about the points where a derivative is zero.)

But some of you will also go on to take other mathematics courses, and (perhaps contrary to your prior experience) math is more about working with definitions and theorems than it is about calculating things.

Note that the reading assignments, in-class assignments, and homework assignments are all completed *in the textbook* using the Runestone platform. For each assignment there will be a link in Moodle that takes you directly to the assignments.

You can complete the reading and homework assignments on the assignment page, but you can also simply answer the questions directly in the textbook, as you read. Either way, your answers will be recorded, and you will get credit for doing the problems. (I do not assign *all* of the exercises as homework, so you may prefer to look at these on the assignment page, so you know which ones are assigned.)

The various graded components of the course are explained below.

Reading Assignments (10%)

Before every class (except test days), you will be expected to complete a reading assignment. These are short assignments, designed to give both you and me some quick diagnostic information. A reading assignment will consist of reading one or two sections in the textbook, and completing some related "reading questions".

Reading questions come in different forms: written response (you type into a box), multiple choice, matching, and "Parsons" problems. [1]

These questions are designed to get you to pause and think about the material you've just read, and the results give me information on what topics the class is struggling with, so that I know what to cover in class.

For written response questions, you will get full marks for any reasonable attempt at an answer, even if your answer is incorrect. The other question types will give you immediate feedback on your answer, and if you're incorrect, you can keep trying until you get the correct answer.

In-class assignments (5%)

In-class assignments will be administered through the textbook on Runestone, and, as the name suggests, are done in class. Each assignment will consist of two or three conceptual multiple-choice problems.

Everyone will answer the questions individually first. Once responses are collected, you will be given time to discucss your answers, and then you will vote again. The goal is to reach something close to consensus in the second round; if we don't, we'll take further time to discuss what the correct answer is.

Grading for in-class assignments will be entirely participation-based.

Online Homework (10%)

The homework, like tutorial, will focus on building fluency with the computational procedures of calculus. You can expect a new problem set every week. Homework will be assigned (and completed) in the textbook, via Runestone.

Online homework will be due every ***Tuesday*** at 11:59 pm, beginning with Homework 1 on September 16th.

[1] A Parsons problem asks you to rearrange blocks into a specific order to form a correct solution.

Tutorials (15%) Every tutorial will involve an assignment to be completed. You will be encouraged to work on these problems (and submit) in groups. Evaluation will be strictly *formative*: you will receive feedback on the work that you submit, and a grade of 1 or 2.

A grade of 2 indicates that you have done the work correctly, or that any errors are minor, and don't indicate misunderstanding. A grade of 1 indicates that you've made mistakes that need to be corrected. We will do our best to return your feedback prior to the next tutorial.

If you receive a grade of 1 on a tutorial, you can upgrade your score to a 2 by attending office hours to demonstrate how to do the question correctly.

Unit Tests (30%) Each of the four units will conclude with a test. Each test will have several multiple choice questions, which will focus primarily on conceptual understanding, and two or three written questions, which test computation and problem solving.

The tests will have two stages: individual, and group. You will have 50 minutes to complete the individual stage of the test. Once the individual tests are collected, you will use the remaining time to redo the multiple choice questions in groups.

Your grade on each test will be 80% individual and 20% group, unless your individual score is better, in which case only the individual score counts.

Tests will take place on the following dates:

- *Test 1*: Wednesday, October 1st
- *Test 2*:Wednesday, October 22nd
- *Test 3*: Wednesday, November 19th
- *Test 4*: Wednesday, December 3rd

Final exam (30%) There will be a standard, cumulative final exam during the exam period. The exam will be in person, but you will be allowed to bring a formula sheet and a calculator.

Final exams are scheduled by the Registrar's Office toward the end of September. I will post an announcement on Moodle once the exam timetable is available.

Each of the grade components above will be assigned a numerical score. These will be added to get a score out of 100. Your score out of 100 is converted into a letter grade according to the following table.

Table 6.1 Conversion of percentage scores to letter grades in Math 1560

A+	97-100
A	92-96
A-	89-91
B+	86-88
B	80-85
B-	77-79
C+	74-76
C	68-73
C-	65-67
D+	60-64
D	50-59
F	0-49

Other grading policies.

- *Due dates.*

  Homework due dates are flexible, and provided primarily for your benefit, to help with planning. (A course without deadlines can be a disaster for those who procrastinate.) I will grade each reading and homework assignment twice: once the day after it's due, and again a week later.

Unless you have made arrangements with me due to exceptional circumstances, work that is more than one week late will not be graded.

- *Dropping lowest grades.*

  I will drop your lowest test grade (so your best three out of four will count). Generally, if you miss a test, it will count as the one that gets dropped. For tutorials and homework assignments, your lowest two grades will be dropped, and for reading and in-class assignments, your lowest four grades will be dropped.

7 Course policies (an FAQ)

This section deals with questions about accommodations, missed tests, and other exceptional (yet common) cases.

1. *Can I email you if I have a question?*

   If it's about the homework, please use the Campusewire discussion forum. Otherwise, yes. In particular, please feel free to get in touch about scheduling conflicts, learning accommodations, etc.

   You don't need to let me know every time you miss a class. If your question might require a longer answer, it's probably better if you ask me in person, in my office.

2. *What calculator should I buy?*

   Unless you already own one, or need it for another class, don't waste your money on a graphing calculator. There are websites/apps like Desmos (`desmos.com`) that are free, and much more powerful (and user-friendly) than a graphing calculator.

   For tests and the final exam, any ***non-graphing*** calculator will be permitted.

3. *This week is super busy and I don't think I can finish the homework on time. Can I have an extension?*

   Yes. I grade each homework and reading assignment twice: once the morning after it's due, and again a week later. If you're more than a week behind you will need to come see me.

4. *I'm really not comfortable talking to other people. What can I do?*

   The group discussions are a learning tool, with a lot of very good evidence to support their effectiveness. But they are an alternative to lecture, and not part of the assessment. If you can learn better by working on your own, you can. For in-class discussions, there will be a text chat option.

5. *What happens if I get sick?*

   First and foremost, do not come to class and make everyone else sick! I'll do my best to be accommodating of any illness that interrupts your studies. There is no need to provide details of the illness. If you miss a week or more of work, please get in touch to make a plan for catching up. One of the biggest challenges in math is that once you fall behind, it's difficult to catch up on your own.

6. *What exactly does academic honesty mean?*

   In short, that any work you represent as your own, is your own. Much of your work can be done in groups, but not all of it. I will assume that you have access to a calculator, including online software that gives you step-by-step solutions.

   Use of these tools while practicing is acceptable, but take care that you are not overly reliant on them. What is not acceptable is having someone else do your work for you. This includes tutors, classmates, friends, family members, online "homework help" sites. If you submit work that somebody else did for you, you are committing an academic offence.

   If you have someone else write a test or exam for you, not only have you committed an academic offense, but the person impersonating you is at risk of criminal fraud charges under Canadian law.

Penalties for academic dishonesty are outlined in the New student code of conduct (`www.ulethbridge.ca/policy/resources/new-student-code-conduct-policy`). Depending on the severity of the offence, penalties for a first offence can range from a grade of zero on an assessment, to an F in the course. Academic offences are also reported to the Dean of Arts & Sciences. They keep a record of each offence, and students with multiple offences can be subject to supplementary discipline.

7. *Do "acceptable online tools" include the use of AI?*

   If you are just doing extra practice and nobody better is around to talk to, you can use AI to check your work. If you use AI to do your homework (for marks) you're committing an academic offence.

   In either case, you're mostly cheating yourself. One thing researchers learned about AI is that it is very effective at circumventing critical thinking, and reducing learning.

   The point of everything you do in a university class is the process, not the outcome. The process is where learning takes place. If you hand it off to someone (or something) else, you're depriving yourself of that learning opportunity.

   One place where AI use is particularly obvious (and counterproductive) is the written answer reading questions. The point of these is for you to think about a concept, and occasionally get feedback on your thoughts. You get full marks for *literally any* reasonable attempt at answering, so there is no point in using AI to try to craft the best possible answer.

8. *Does that mean I'm not allowed to get help with my homework?*

   Not at all! Working with classmates on your homework is a great way to learn. But keep in mind that your course instructors will be available for help, free of charge. (OK, maybe not free of charge, but you've already paid for it with your tuition.) We will be responding on the discussion forum regularly, There will be time to ask questions in every class, and there will be online office hours. The Student Success Centre will also be running free help sessions (details TBA).

   Some of you may still decide to pay for tutoring, and that's fine. But you have a duty to disclose sources of help on an assignment, and the individual tests are still tests, even if you won't have someone watching over your shoulder.

   You should probably avoid the various paid "homework help" websites. Most of these don't offer help. They offer worked solutions for a price. Getting those solutions won't help with your understanding. More importantly, the people working for these sites are paid (poorly) per solution, and they often provide incorrect and/or badly written work. ChatGPT is not much better (at least, not yet).

9. *I missed a test! What do I do? Do I get a zero?*

   First, contact us as soon as possible for any missed test. There are *four* tests, and I only count your best *three* towards your grade. As long as you only miss one test, there is no penalty. This is true regardless of your reason for missing the test.

10. *What if I really wanted to write that test?*

    Inform us of this when you contact us to explain your absence. There's no guarantee that we can schedule a makeup test, but we'll try. You're more likely to get a makeup test if you've contacted us in advance.

11. *What about the final exam?*

    If you are unable to write the final exam, you will need to contact Academic Advising. They are responsible for authorizing rescheduling of exams. Usually if you miss an exam due to illness, an incomplete grade is recorded. You will write a makeup exam at a later date, at which point your grade will be updated.

12. *Do I need a doctor's note?*

    No. This wastes health care resources and your time. (That was my answer before the pandemic, and it's doubly so now.) Just email me to say you were sick. However, if you miss more than one test due to illness, we'll need to meet to discuss how to adjust your grade.

13. *I receive learning accommodations. What arrangements can I make?*

    First, make sure that you have registered with the University's Accessible Learning Centre (`www.ulethbridge.ca/accessible-learning-centre`). No need to let me know: they notify me of every student with accommodations.

    If there are any adjustments I can make to facilitate your learning, please do not hesitate to get in touch with me. All students deserve an equal opportunity to learn. Note that the HTML textbook is designed with accessibility in mind, and should work with screen readers.

14. *Life intervened and I can't keep up this week. What do I do?*

    Send me an email. Extensions are usually granted as long as they're granted ahead of time. Online homework extensions need to be in place before solutions become available. Book an appointment with me as soon as you feel like you're falling behind and I'll do my best to get you up to speed.

8 Learning outcomes for Math 1560

This page outlines the list of competencies each student is expected to achieve in Math 1560. There are five "big themes," corresponding to the five chapters of the textbook. (The number following each outcome below indicates the corresponding textbook section.) The online homework, tutorial assignments, and tests are all designed to help you achieve these outcomes.

By the end of the course, you should be able to:

Chapter 1: Limits and continuity

1. Explain the concept of a limit using graphical and numerical information. (1.1)
2. Apply limit laws in an abstract setting (explicit functions not given). (1.3)
3. Use algebraic (or trigonometric) manipulation to evaluate limits. (1.3)
4. Algebraically and graphically determine one-sided limits of piecewise-defined functions. (1.4)
5. Use correct notation throughout a limit calculation.(1.3, 1.4)
6. Explain the meaning of continuity, both precisely and intuitively. (1.5)
7. State and apply the **Intermediate Value Theorem**. (1.5)
8. Evaluate limits involving infinity and determine asymptotic behaviour of a function. (1.6)

Chapter 2: Derivatives

1. State and apply the limit definition of the derivative. (2.1)
2. Explain the meaning of the derivative in terms of rates of change. (2.1,2.2)
3. State and apply derivative rules (sum, constant, power, product, quotient). (2.3, 2.4)
4. Calculate derivatives using the chain rule. (2.5)
5. Use implicit and logarithmic differentiation. (2.6)
6. Work with inverse functions and their derivatives. (2.7)

Chapter 3: Graphical behaviour of functions

1. Determine maximum and minimum values of a continuous function on a closed interval. (3.1)
2. Identify and classify critical points (3.1, 3.3)
3. Explain the relationship between the first derivative and the shape of a graph. (3.3)
4. Use the second derivative to determine concavity, and understand its significance. (3.4)
5. Produce an accurate sketch of the graph of a function without the use of technology. (3.5)

Chapter 4: Applications of the derivative

1. Solve word problems involving related rates of change. (4.2)
2. Solve word problems involving optimization. (4.3)
3. Use linear approximations to estimate function values. (4.4)
4. Compute the Taylor polynomial of a function to a specified degree. (4.5)

Chapter 5: Integration

1. Compute antiderivatives and solve initial value problems. (5.1)
2. Know and apply properties of definite integrals. (5.2)
3. Explain the Riemann sum definition of the integral, and use it to approximate an integral. (5.3)
4. Use Part I of the FTC to compute derivatives of functions defined as integrals. (5.4)
5. Use Part II of the FTC to evaluate simple definite integrals. (5.4)
6. Use the method of substitution to evaluate definite and indefinite integrals. (6.1)
7. Set up and evaluate a definite integral to compute area between curves. (5.4)

9 Course schedule

I will attempt to follow the schedule below, bearing in mind that some adjustments are always needed Numbers below refer to textbook sections.

Online homework assignments will be due Tuesday. Reading assignments are due at 9 am on the day of each class. Tutorial assignments will cover the sections indicated in the schedule.

Table 9.1 Schedule for Fall 2025

Week	Wednesday	Thursday (tutorial)	Friday
Sept. 10–12	Intro, 1.1	Review	1.3
Sept. 17–19	1.4, 1.5	1.3, 1.4	1.6
Sept. 24–26	2.1	1.5, 1.6, 2.1	2.3, 2.4
Oct. 1–3	Test 1	2.3, 2.4	2.5
Oct. 8–10	2.6	2.5, 2.6	2.7
Oct. 15–17	3.1	2.7, 3.1	3.3, 3.4
Oct. 22–23	Test 2	3.3, 3.4	4.2
Oct. 29–31	4.3	4.2, 4.3	4.4, 4.5
Nov. 5–7	5.1	4.4, 4.5	5.2
Nov. 19–22	Test 3	5.1, 5.2	5.3
Nov. 26–28	5.4	5.3, 5.4	6.1
Dec. 3–5	Test 4	6.1	Review