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[1]
Office: UH C540
Student hours: Monday 1:30 – 3:30 pm, Tuesday and Thursday 9:30 – 11:30 am and Wednesday by appointment[2].
Any exceptions to this schedule will be announced on Moodle.

Course Website:
via Moodle[3]

Course Textbook
APEX Calculus, by Hartman et al. Available online[4], at no cost.
PDF versions of the book are also available to download, in both colour[5] and black and white[6]. You are free to print these if you would prefer a hard copy.

Class Meetings

- *Math 1560A.*
  Tuesday, Thursday, and Friday at 2 pm in SA 6008
- *Math 1560B.*
  Tuesday, Thursday, and Friday at 8 am in SA 6008

First day of class is Thursday, September 5th

Tutorial Instructors
Sean Legge, together with graduate and undergraduate TAs
Contact: via email[7]

[1] sean.fitzpatrick@uleth.ca
[2] calendly.com/dr-sean-fitzpatrick
[3] moodle.uleth.ca
[4] opentext.uleth.ca/apex-standard
[5] opentext.uleth.ca/PDF/APEX-1560-colour.pdf
[6] opentext.uleth.ca/PDF/APEX-1560-print.pdf
[7] sean.legge@uleth.ca

Tutorial Meetings

- *Tutorial 1.*
  Friday at 9 am in UH C756
- *Tutorial 2.*
  Friday at 10 am in UH C756
- *Tutorial 3.*
  Friday at 1 pm in UH C756
- *Tutorial 4.*
  Friday at 3 pm in UH C756

Course Description

(As per the Academic Calendar. See Section 5, p. 4 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[1] 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. (See Section 7, p. 8 for details on how to get in touch.) 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[2] 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[3].

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.)

Some of you might be worried about doing well in this course. Perhaps you were told that fewer than half of students enrolled in calculus pass the course. I can assure you this is false. (Unless you consider an A to be a pass. And even then…)

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.

[1] `moodle.uleth.ca`
[2] `www.uleth.ca/services-for-students/what-do-i-do-if`
[3] `www.uleth.ca/services-for-students/health-safety`

(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[4].)

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.

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. Our Tuesday and Thursday meetings will involve a lot of hands-on work and discussion. You'll be working in groups to solve problems, while I (and a couple of TAs) move through the room to answer questions.

How you prepare for these classes probably depends on your personality. Some will find it useful to use class as a way to determine what topics need further study after class. Some will want to prepare before class, because they don't want to be stumped in front of their peers.

Friday classes will be a mix of Q&A and review, since you also have your tutorial on Friday, and one problem solving class in a day seems like enough.

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. 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] `www.youtube.com/channel/UCNTQSJzbc90IjFJjlCIQpGQ`

4. Finally, try some of the exercises. If you find that you're getting most problems in an exercise group correct, it's probably safe to skip ahead to the next exercise group.

   If you find that you're getting them wrong, go back into the section and look for a similar example.

   You can also look for similar problems in the online homework.

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 2024. 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[1] 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.

[1] `campuswire.com`

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. You will, however, be introduced to these concepts in tutorial, as part of a compute-based lab assignment.
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 begin with a **Readiness Assurance Process (RAT)**. This process is designed for you to assess whether or not you are familiar with the prerequisites needed for a unit. It takes the form of an in-class quiz with two parts: you first take the quiz individually, and then you re-take the quiz with a group.

A small part of your grade will be earned by completing each RAT, but it is participation-based. It does not depend on the score you receive on the quiz.

Each unit will end with a unit test, which will be written in the ***Testing Centre***. The tests will consist of a short Moodle quiz (primarily multiple-choice) and one or two written-response long answer questions. You will be able to complete the written questions on the attendance sheet provided by the Testing Centre.

6 Assessments and Grading

Traditionally Math 1560 has been a mostly skills-focused course: the focus was on learning how to compute limits and derivatives, and the tests mostly checked your proficiency in these skills. Our course will still cover these skills, through the online homework and tutorials. However, tests will focus more on conceptual understanding and problem solving, and our activities during class will be geared toward this approach.

The various graded components of the course are explained below.

Tutorials (18%) 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 received a grade of 1, you will then have an opportunity to submit corrections. This can be done on paper, or during office hours. Successful submission of corrections will increase your grade from 1 to 2.
Some of the tutorials will take the form of *lab assignments*. These will be computer-based, in the form of a *Jupyter notebook*. Each notebook will walk you through using Python to complete computational calculus tasks. No programming experience is required: we provide the code; you just have to run it and observe what happens.

Online Homework (16%)

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 delivered through the **WeBWorK** online homework system. See Section 8, p. 8 for details.

Online homework will be due every ***Tuesday*** at 11:59 pm, beginning with Homework 1 on September 17th.

Readiness assurance tests (6%)

The readiness assurance tests (RATs) are intended as a diagnostic tool, to ensure you're aware of what prerequisite material is expected for a unit, and whether or not you're familiar with that material.

Readiness assurance tests will take place in class on September 6th, September 27th, October 18th, and November 8th. There will also be a "syllabus quiz" on the first day of class using the same format as the RATs. The syllabus quiz does not count toward your grade.

You will receive full credit for completing each RAT, regardless of your score on the test.

Unit Tests (30%)

Each of the four units will conclude with a test. The tests will take place in the ***Testing Centre***. Each test will have several multiple choice questions, which will focus primarily on conceptual understanding, and two written questions, which will be completed on the Testing Centre attendance sheet, and collected by Testing Centre staff.

Each test will be available over a three-day window, as follows:

- *Test 1.*

  Oct. 1, 9 am to Oct. 3, 9 pm

- *Test 2.*

  Oct. 22, 9 am to Oct. 24, 9 pm

- *Test 3.*

  Nov. 19, 9 am to Nov. 21, 9 pm

- *Test 4.*

  Dec. 3, 9 am to Dec. 5, 9 pm

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+	98-100
A	92-97
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.)

  A due date extension request form will be available via Moodle. If you need more time to complete an assessment, simply fill out the form. Unless you are contacted to say otherwise, you can assume that your request has been granted.

- *Revisions.*

  For both unit tests and tutorial assignments, you will be invited to submit revisions for any incorrect work. Revisions must be submitted within ***one week*** of receiving your feedback. Tutorial revisions can be handed in during the following week's tutorial. On any tutorial assignment, satisfactory revisions will raise your score to 100%.

  For test revisions, there will be a submission form available on Moodle. You may choose any ***one*** question on which you did not receive full marks, and submit a revision to your work. Note that you cannot revise a question that was left blank. There must be original work on which you received feedback for you to submit a revision.

  Your revision must contain not only corrected work, but also a reflection on your original work:

  - What was incorrect on your previous attempt?
  - What factors contributed to getting the question wrong?
  - What have you learned in the meantime that changed your understanding of the question?

  Your grade on the revised attempt will replace your original grade on that question.

  Note that you will not be able to submit revisions for the fourth test, since we will not be able to have feedback returned to you before the end of the semester, and we cannot ask for term work to be submitted during the exam period.

- *Dropping lowest grades.*

  For unit tests and RATs, your lowest grade will be dropped. For tutorials, and online homework, your lowest two grades will be dropped. If you are unable to write one of the tests during the scheduled test window, please let me know and I will try to reschedule it for you. If you miss a test completely, it will count as the lowest grade that is dropped.

7 Communication

The following communication channels are available in this course:

1. *Forums.*

   There will be a primary course Q&A forum using Campuswire[1]. A registration link and PIN code will be provided on Moodle. If you do not want to use your U of L email, we can send you an invite to a different address.

   Some reasons we like Campuswire:

   (a) Students can choose to remain anonymous (to their peers) when asking a question.

   (b) You can set up chat rooms, either public or private, dedicated to specific topics.

   (c) You can create a *live room* with support for video chat.

   The Campuswire forum should be your primary communication channel. In particular, any questions about homework and course content should be asked on Campuswire, since I can reply there with mathematical notation. You will also get a much faster reply on the forum than you will from email.

   There is one exception: in our WeBWorK online homework system, there is an "Email Instructor" button you can click to send feedback. This is useful if you think there's an error in the question, or if you've tried it several times and can't figure out why you're wrong. See Section 8, p. 8 for details.

2. *Email.*

   You can email your instructors for questions that aren't related to course content. For example, if you have to miss class, or a test, you can email us to let us know.

8 Online homework

Online homework is delivered via WeBWorK. WeBWorK is an open source homework system that I maintain on a local server. This service is provided to you free of charge, and your data never leaves campus. [1]

The value of WeBWorK is that questions are automatically graded, providing you with immediate feedback on your work. This is an excellent source of guided practice. ***Note:*** WeBWorK sends grades to Moodle once every 24 hours. Don't expect to be able to complete an assignment and *immediately* see the results on Moodle.

To access WeBWorK: simply click the relevant link in Moodle. You will be signed in automatically — there is no user name or password. But keep in mind that if your session times out due to inactivity, you have to return to Moodle to log in again.

Submitting answers: WeBWorK has an automatic preview feature. The mathematics in your answer will be rendered as you type. (You can turn this off in the user settings if you don't like it.) If everything looks good, click the Submit button. The system will immediately respond with "Correct" or "Incorrect". If your answer is correct, there is nothing more to do: your answer has been recorded, and you have credit for that problem. If your answer is incorrect, you get to try again. (*Exception*: you typically do not get unlimited attempts for true/false and multiple choice questions.)

Other notes:

- Some questions are "scaffolded" — there are multiple parts, and you need to complete one part before being allowed to access the next. For these, you want to click the Preview Answers button, rather than Submit, to check your work and move on to the next step.

- If you need to include scientific units in an answer, the automatic equation rendering can cause trouble. There's a little tool bar on the right hand side that lets you switch to *text mode* to enter units.

[1] `campuswire.com/c/GE9D3AEF8/feed`

[1] Okay, this is not entirely true. Since faculty sometimes work from home, your data does travel from campus to my house via the university VPN.

- At the bottom of each page is an "Email Instructor" button. If you are stuck on a problem, or if you think there is an error in the programming (it happens!) you can use this to let me know. WeBWorK will send me an email with your message, along with a link to the exact version of the problem you were working on. Often I can figure out where you're going wrong by looking at your answer.

  Please *do not* use the email button to ask me how to solve a problem. That's what the discussion forum is for. It should only be used afer you've made several attempts at the problem, or if you see an error message of some sort.

Finally, some general advice: WeBWorK is not a new addition for the online environment. I've used it for awhile. The students who do well in this course are the ones who start their problem sets early. Please do not wait until the due date to begin: it leaves you no time to ask questions! The most effective way to use WeBWorK is to read the relevant portion of the textbook, try the problems, and then ask for help on the ones you're stuck on.

Oh, and please do not wait until you've made 50 unsuccessful attempts at a problem to ask for help. If you haven't figured out a question after 5 or 6 attempts, set it aside, and come back to it a bit later. If you still can't figure it out, go the discussion forum.

9 Course policies (an FAQ)

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

1. *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[1] 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.

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

   Yes. There's a form for that, provided on Moodle. I don't need to know why you need the extension; just what you want extended, when you want it extended to, and whether you need anything from me to help complete the work.

3. *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. You might find that the classes are not as useful to you, but the textbook is a great resource, and you can always meet during office hours to ask questions one-on-one.

4. *What happens if I get sick?*

   First and foremost, do not come to class! 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.

5. *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 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,

[1] `desmos.com`

family members, and 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 Academic Calendar[2]. 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 courses. 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.

6. *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).

7. *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.

8. *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.

9. *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.

10. *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.

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

    First, make sure that you have registered with the University's Accessible Learning Centre[3]. 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.

[2] `www.uleth.ca/policy/resources/student-discipline-policy-academic-offences-undergraduate-students`
[3] `www.ulethbridge.ca/accessible-learning-centre`

12. *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.

10 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)

11 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.

The abbreviation "HW&EG" refers to a class used to go over homework and examples.

A tutorial is marked as a "lab" if there is a computer component. "RAP" refers to the Readiness Assurance Process days.

Online homework assignments will be due Tuesday. Tests will open Tuesdays at 9 am and close Thursdays at 9 pm. Opening dates for tests will be Oct. 1, Oct. 22, Nov. 19, and Dec. 3.

Table 11.1 Schedule for Fall 2024

Week	Tuesday	Thursday	Friday (class)	Friday (tutorial)
Sept. 4–6		Introduction	RAP 1	Lab: intro
Sept. 9–13	1.1, 1.3	1.4	HW&EG	Limits
Sept. 16–20	1.5	1.6	HW&EG	Continuity and infinity
Sept. 23–27	2.1	2.3	RAP 2	Lab: derivatives
Oct. 1–4	2.4	2.5	HW&EG	Derivatives
Oct. 7–11	2.6	2.7	HW&EG	Implicit and inverse
Oct. 15–18	3.1	3.3	RAP 3	Extrema and critical points
Oct. 21–25	3.4	3.5	HW&EG	Lab: graphing and Newton's method
Oct. 28–Nov. 1	4.2	4.3	HW&EG	Word problems
Nov. 4–8	4.4	4.5	RAP 4	Approximations
Nov. 18–22	5.1	5.2	HW&EG	Lab: approximation and integration
Nov. 25–29	5.3	5.4	HW&EG	Using the FTC
Dec. 2–6	6.1	Review	No class	Review