Math 1560 Course Outline

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Abstract

As you embark upon your study of calculus in this course (Math 1560), you likely have many questions, such as: "What is Calculus, anyway?" and "Is this on the test?"

For Fall 2022, we're back in person, and restrictions are lifted, but COVID is still here. How will this affect our semester? What accommodations will be provided?

All of these questions (and more!) will be answered in this syllabus.

1 Introduction to Math 1560

Welcome to Math 1560, Calculus I. I'm glad you've chosen to embark on this journey through a mathematical classic. For Fall 2022, Math 1560 is running with three sections, each taught by a different instructor. All three sections will be *coordinated*, meaning that we will have a common Moodle page, assignments, tests, etc..

Let's get one thing out of the way before we begin: Calculus I isn't nearly as bad as its reputation might suggest. Most students who put in the work do well in Math 1560. We will do our best to support you in your learning, and ensure that students continue to do well in this course.

There are many of us in this class, coming from many different backgrounds and situations. I want our classroom to be an inclusive space for all students. If the "default settings" for the class don't work for you, please don't hesitate to ask for accommodation. Not everyone has reliable high speed internet. Not everyone is able to attend scheduled classes without work/family/life getting in the way. But everyone deserves a fulfilling, enjoyable learning experience in each class.

We begin with some introductions: to the university, to the staff, and to the course.

1.1 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 Aboriginal peoples who attend the University of Lethbridge and the contributions these Aboriginal 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.

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[1] `moodle.uleth.ca`

Transitioning to learning in the university environment is a challenge at the best of times. Doing so while a pandemic refuses to go away will be additionally challenging. Everyone here at U of L will be doing our best to help you through this time.

Don't hesitate to reach out if you have questions. (See Section 3 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].

1.2 Course staff and contact information

Math 1560 is running in three sections for Fall 2022: A, B, and C. The course coordinator is Sean Fitzpatrick[4]. Sean is also the instructor for Math 1560C. He can be reached via email at sean.fitzpatrick@uleth.ca[5].

Math 1560A will be taught by Felix Baril Boudreau.

Math 1560B will be taught by Kübra Benli.

Tutorials will be coordinated by Sean Legge[6], a.k.a. "The Original Sean". Sean is teaching the tutorials associated with Math 1560B. Tutorials for Math 1560A and Math 1560C will be taught by graduate students. Additional information will be posted to Moodle once it is available.

Student hours: you are not going to get everything you need during class time. Your instructors will be available outside of class time for "student hours" (also known as office hours). During student hours, you are encouraged to drop in with any questions you might have, about the course, your homework, your university plans, or just to introduce yoursef. Details (times and locations) will be posted on Moodle.

1.3 Universal learning accommodations

Although Math 1560 is being offered "fully in-person", and the University of Lethbridge no longer has protections in place to mitigate the spread of COVID-19, we recognize that the risk of contracting this disease remains high. To accommodate students who need to isolate due to an active infection, or students who would prefer to minimize their risk, the following policies will remain in effect for Math 1560 this semester:

1. Math 1560C will be taught in a hybrid format. For those who want to attend live, but remotely, a Zoom link will be provided.

2. The Math 1560C classes will be recorded, and recordings will be provided on Moodle for students in all sections. [7]

3. All assessments can be completed online: tests will be online by default, and in-class assignments (including tutorial assignments) will have a remote submission option.

4. Extensions can be requested for almost any assessment. An online form will be provided for extension requests.

   You generally do not need to give a reason for requesting an extension, and documentation will never be required. As in the "real world", most deadlines act as planning guidelines, and when you can't meet one, you ask for more time. This is usually no big

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[2]`www.uleth.ca/services-for-students/what-do-i-do-if`

[3]`www.uleth.ca/services-for-students/health-safety`

[4]`www.cs.uleth.ca/~fitzpat`

[5]`mailto:sean.fitzpatrick@uleth.ca`

[6]`mailto:sean.legge@uleth.ca`

[7]Some class time will consist of students working on problems, often in groups. This part of class will not be recorded.

deal, unless it happens a lot, in which case we might check to make sure you're doing okay.

Please also note that it's quite likely that some of your instructors will become ill, or have family members who are ill. None of us want to risk spreading infection to an entire class! In the event that your instructor is sick (but not so sick that they're unable to teach), classes will be temporarily moved online, via Zoom.

If this should happen, we will do our best to give you plenty of notice, and to minimize disruption, to the extent this is possible.

1.4 Course description

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

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.

In this course, you should expect:

- More emphasis on:

  - Conceptual understanding
  - Discussion
  - Context (the whole "what is this good for?" routine)
  - Being generally swell human beings

- Less emphasis on:

  - Memorization (because how am I gonna stop you from looking stuff up, anyway?)
  - Routine computational proficiency (let's be honest: the computer can do this better than us most of the time)
  - Tests and exams (so I can spend more time teaching and less time as the Math Police)

The course is meant to be done in person, and for best results, on the schedule that will be laid out in Moodle. But please do not come to class if you're sick. Accommodations are available; see Subsection 1.3.

In Subsection 2.4 you're going to see that there are lots of pieces to your grade. And yes, most of them have deadlines. But don't worry! Most of those pieces are small: designed to be done in class, or to take up no more than an hour or so of your time. Learning any kind of math is a marathon, not a sprint. So we're giving you a little bit to do every day. Keep at it, and you'll do well.

2 Essential course information

This section covers essential course information, including the meeting times, textbook, and grading scheme.

2.1 Course website

The primary course website is Moodle[1]. On Moodle, you can expect to find:

1. Links to important resources, like this syllabus, and the textbook.

2. Links to key course activities, including the online homework, and the discussion forum. (The links will log you into those services automatically.)

3. Details about your grades and assessments.

4. A weekly topics schedule.

The weekly topics schedules will be key to staying on top of your course material. Every week you can expect to receive details on readings, videos, homework, and assessments, as well as information on what will be taking place in class, and how to access those classes.

In case there's a day when Moodle isn't working properly and you need access to course materials, you can find some of them (like this syllabus) on Sean Fitzpatrick's personal website[2]. The textbook for this course (and many others) is available on our Open Textbook Server[3].

2.2 Scheduled classes

This year's classes are as follows:

Math 1560A   Tuesday and Thursday, 12:00 - 1:15 pm, in Science Commons SA6010.

Math 1560B   Tuesday and Thursday, 4:30 - 5:45 pm, in UHall C756.

Math 1560C   Monday and Wednesday, 9:00 - 10:15 am, in Science Commons SA6008.

Classes will be used for a mix of homework Q&A, examples, and time to work on assignments. For assignments, group work will be encouraged, but not required.

There is also a weekly *tutorial*. Tutorials take place on Tuesday (for 1560C) and Wednesday (for 1560A and B). Once we know who all the instructors are, details will be added on Moodle.

Tutorials will be facilitated by a tutorial instructor. You will use tutorials to work on the basic computational skills essential to success in calculus. Work in tutorial can be done in groups, and grading will focus on feedback.

For both classes and tutorials, you will get the best results in person, where you can discuss things with classmates and get help from the instructor. But we do not want you coming to class if you're sick! Remote submission options will be available for assignments, and our class forum on Campuswire can be used to organize group chats among students who couldn't attend class.

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[1] `moodle.uleth.ca`
[2] `www.cs.uleth.ca/~fitzpat/teaching.html`
[3] `opentext.uleth.ca`

2.3 Course textbook

Our course textbook is APEX Calculus, by Greg Hartman. This book is an **open education resource** (OER). That means that the book is fully free, both in terms of cost, your freedom to use and share the book however you see fit.

There is a PDF version (the original format of the book), which will be available on Moodle. The PDF version is useful if you want to print the book, or simply want to be able to read when there is no access to internet.

The real advantage of PreTeXt is that we can output to HTML format. The HTML version of the textbook[4] can be read on both desktop and mobile web browsers. It also contains a number of nice features, including embedded videos, interactive graphics, and annotation tools.

YouTube: `https://www.youtube.com/watch?v=wELGr5mUNt4`

Figure 2.1 Features of the HTML textbook

If getting the book for free somehow feels wrong, or you worry you're missing out by not buying anything, here are two great books you can buy:

1. Mathematics for Human Flourishing[5], by Francis Su

2. Change is the Only Constant[6], by Ben Orlin

Neither of these books are in any way needed for the course. But they're cool books, and they're about math. (The second is even about Calculus!) So if you feel like you need to spend money on a book, you can. (Or I don't know, go to the library or something.)

2.4 Grading scheme

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. This doesn't work well for remote assessments, when most routine calculations can be done easily on the computer! Our assessment principles:

- No big high stakes assessments: lots of little ones instead.

- More concepts, and less rote computation. (Less — not none. Your follow-on courses will still assume you know how to take a derivative.)

- Some of your time in class will be used to work on assignments.

- Group work is good for you. (But we won't force you to do it.)

The various graded components of the course are explained below. At first it will seem like there's a lot to do! But most items are small, and many can be done during class time.

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[4]`opentext.uleth.ca/apex-standard/part-calculus-I.html`
[5]`www.chapters.indigo.ca/en-ca/books/mathematics-for-human-flourishing/`
`9780300237139-item.html`
[6]`www.chapters.indigo.ca/en-ca/books/change-is-the-only-constant/`
`9780316509084-item.html`

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 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.

Online Homework (15%) 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 Subsection 4.1 for details.

Assignments (20%) Assignments will be done in groups where possible, and there will be time set aside in each class to work on them. Each assignment have only one or two problems, but these will typically involve multiple steps, and you will be graded as much on the quality of your explanation as on the validity of your mathematics.

Typically a written assignment is expected, but interested students are encouraged to explore alternative formats. For example, if a group wants to submit a video presentation instead of written work, that sounds like fun, and I will totally be on board with that.

Here is a fictitious (but possibly informative) grading rubric for assignments:

- A: wow, they clearly discussed this as a group, and nailed down all the key points! I also appreciate how the work is legible and relatively free of frustrated scribbling.

- B: everyone had something to say, but I'm not sure they all agreed. There's an obvious mistake that someone should have caught, suggesting that nobody thought to read it over before submitting.

- C: most of the details are there but this was clearly done in the last hour before the deadline. Also, it looks suspiciously like one person did all the work.

- D: looks like parts (a), (b), (c), and (d) were each done by a different person, and then arranged randomly on the page.

- F: nothing submitted. Or work is a crude drawing of what appears to be an integral attacking a kitten.

Tests   Each of the five chapters will conclude with a test. The test will be open book. There will be a time limit, but you will have some flexibility in terms of when you choose to begin. Details on test dates can be found in Section 7.

Tests consist of three stages. You may wish to think of all three stages together as a single test, or you may prefer to think of each separately, with only the take-home test being considered as "the test".

The stages of each test are as follows:

1. *Pre-test workshop (10%).*

   Prior to each test you will be assigned a few study questions, which you will answer on Moodle. You will then give anonymous feedback on the responses from some of your peers. Most reasonable efforts will receive full credit.

2. *Take-home test (30%).*

   You will write the test *individually*, and submit via **Crowdmark**. Tests will be completed remotely for all sections. Each test will open on a Friday, and close the following Monday. During this three day window, you will choose a time that is convenient for you to write the test.

3. *Exam wrapper (10%).*

   After your test has been graded, you will be asked to submit a short reflection piece, where you comment on your performance and the feedback you receive.

   Typically, you will be asked to comment on the following:

   (a) What did you do to prepare for the test?
   (b) What types of mistakes did you make on the test?
   (c) What (if anything) could you do differently next time?

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 2.2 Conversion of percentage scores to letter grades in Math 1560

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	F
98-100	93-97	90-92	86-89	80-85	76-79	72-75	65-71	62-64	58-61	50-57	0-49

2.5 Other grading policies

A note on deadlines: most deadlines are flexible, and provided primarily for your benefit, to help with planning. (A course without deadlines can be a disaster for those who procrastinate.) One exception is the workshop activity before each test. Because we can't begin the peer review portion of the workshop until the submission deadline passes, we have to have a deadline for the activity to proceed.

A deadline 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.

Dropping lowest grades: in each grade category, we will drop your lowest grade. This includes a grade of zero due to missed work. This is to accommodate anyone who is too ill to complete a test or an assignment on a given week.

3 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 Subsection 4.1 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.

4 Technology elements

To facilitate online teaching, our course will rely on several technological solutions. This section provides details on navigating the technology.

4.1 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.

YouTube: `https://www.youtube.com/watch?v=79kRzUV7f2U`

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[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.

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.

- 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.

4.2 Crowdmark

Tests and assignments will be submitted through Crowdmark. For tutorials, you will receive a worksheet on paper that you submit at the end of class. This worksheet will be scanned and uploaded to Crowdmark by your instructor. Other assessments will be done remotely, and you will be responsible for uploading the work yourself. Like WeBWorK, Crowdmark is connected to Moodle, so you just have to click a link in Moodle to access your assessement and submit your work. Unlike WeBWorK, Crowdmark lets you do your work using pencil and paper. For ease of reference, I've placed advice for using Crowdmark[2] on a separate page.

Basic advice:

- Start each question on a clean sheet of paper.

- Use a scanner, or a scanning app on your smartphone. PDF is best, but JPG and PNG files are also supported.

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[2]`www.cs.uleth.ca/~fitzpat/crowdmark.html`

- When you submit, make sure your pages are in order, and rotated correctly.

4.3 Zoom

Students who cannot attend in person will be able to join the Math 1560C class via Zoom, which is the officially supported meeting app for U of L classes. Note that students also have access to Microsoft Teams, if they need access to videoconference software outside of class.

We will *not* use class time exclusively for "content delivery". This is the job of the textbook and the prerecorded videos. Those videos are embedded into the textbook, so you can watch them as you read. Alternatively, you can subscribe to my channel on YouTube[3].

Where appropriate, the Math 1560C classes will be recorded using Zoom, and posted on Moodle for anyone who is unable to attend during their scheduled class time.

5 Course policies (an FAQ)

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

1. *I don't think I can attend the classes regularly. Can I still take the course?*

   Short answer: yes. Most assessments can be done remotely and asynchronously. But the "optimal" experience is in person, or at least synchronous. Students attempting to take the course asynchronously will need to work a bit harder to stay on top of things.

2. *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.

3. *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 (like Symbolab[1]) that give 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, family members, and online "homework help" sites. If you submit work that somebody else did for you, you are committing an academic offence.

   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.

4. *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

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[3]www.youtube.com/channel/UCNTQSJzbc9OIjFJjlCIQpGQ
[1]www.symbolab.com/
[2]www.uleth.ca/policy/resources/student-discipline-policy-academic-offences-undergraduate-students

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. (We saw plenty of examples of this last Spring, and yes, all those students now have discipline reports on file.)

5. *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 *five* tests, and I only count *four* 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.

6. *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.

7. *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.

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

   First, make sure that you have registered with the University's Accommodated Learning Centre[3]. No need to let me know: they notify me of every student with accommodations.

   Some accommodations will look a bit different this year, but exam accommodations such as extra time are still possible.

   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. However, we have not had the time (or paid help) necessary to add elements such as alt-text descriptions for images. It's on the to-do list, but that list is long, and growing.

9. *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.

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[3]www.uleth.ca/ross/accommodated-learning-centre

6 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. Understand the meaning of continuity, both precisely and intuitively. (1.6)
6. Understand and apply the **Intermediate Value Theorem**. (1.6)
7. Evaluate limits involving infinity and determine asymptotic behaviour of a function. (1.5)

Chapter 2: Derivatives

1. Understand and apply the limit definition of the derivative. (2.1)
2. Understand the practical meaning of the derivative in terms of rates of change. (2.2)
3. Understand and apply derivative rules (sum, constant, power, product, quotient). (2.3, 2.4)
4. Calculate derivatives using the chain rule. (2.5)
5. Understand and apply implicit and logarithmic differentiation. (2.6)
6. Understand 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. Understand the significance of the **Mean Value Theorem**. (3.2)
3. Understand 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)
5. Understand the practical significance of differential calculus.

Chapter 5: Integration

1. Compute antiderivatives and solve initial value problems. (5.1)

2. Understand and apply properties of definite integrals. (5.2)

3. Understand 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)

7 Course schedule

I will attempt to follow the schedule below, bearing in mind that some adjustments are always needed, and this is probably more likely as we attempt to navigate an online environment. Numbers below refer to textbook sections.

Every class will have some time for Q&A, and for discussion. You will be given time during class to work on assignments.

Online homework assignments will be due Tuesday. (The actual closing time will be 3 a.m. Wednesday morning.) Tests will open Thursdays at 6 pm (after Math 1560B meets) and close Mondays at 8 am (before Math 1560C meets). Depending on class preference, Test 5 could be scheduled earlier in the last week, or moved to the exam period.

Table 7.1 Schedule for Fall 2022

Monday/Tuesday	Wednesday/Thursday	Notes
	Sept. 7/8	Welcome!
	Intro	No tutorial this week
Sept. 12/13	Sept. 14/15	
1.1 and 1.3	1.4	
Sept. 19/20	Sept. 21/22	
1.5	1.6	Group Assignment 1
Sept. 26/27	Sept. 28/29	
2.1-2.3	2.4	Test 1
Oct. 3/4	Oct. 5/6	
2.5	2.6	Group Assignment 2
Oct. 10/11	Oct. 12/13	Thanksgiving Monday
No class	2.7	
Oct. 17/18	Oct. 19/20	
3.1	3.2	Test 2
Oct. 24/25	Oct. 25/26	
3.3 and 3.4	3.5	Group Assignment 3
Oct.31/Nov. 1	Nov. 2/3	
4.2	4.3	Test 3
November 7 – 12: Reading Week (no classes)		
Nov. 14/15	Nov. 16/17	
4.4	4.5	Group Assignment 4
Nov. 21/22	Nov. 23/24	
5.1	5.2	Test 4
Nov. 28/29	Nov. 30/Dec. 1	
5.3	5.4	Group Assignment 5
Dec. 5/6	Dec. 7/8	
6.1	Review	Test 5