Math 2565 Course Outline

Sean Fitzpatrick
University of Lethbridge

Spring 2020

Summary

Accelerated Calculus II: The second course in the accelerated calculus stream at U of L. This course moves significantly faster than its non-accelerated counterpart, Math 2560, primarily due to the inclusion of the chapter on sequences and series. The academic calendar imposes the following topics:

Techniques of integration. Improper integrals. Applications of integration, including volume, arc length, and surface area. Separable and linear first-order Ordinary Differential Equations. Sequences and series, power series. Parametric curves in the plane and space. Polar coordinates. Partial derivatives. Tangent planes to graphs of functions of two variables.

1 Welcome

Welcome to Math 2565, Accelerated Calculus II. This is the second course in our accelerated stream, which was created to server the Engineering Transfer Program, but is open to any students in Arts and Science meeting the prerequisites.

Students in Math 2565 can expect a more challenging course than Math 2560, the non-accelerated version of Calculus II. This is due not so much to the difficulty level of the problems (although this might be slightly higher), but to the amount of material in the course. We cover all material in Math 2560, in addition to sequences and series, and partial derivatives. Since many students in Math 2565 are coming from Math 1560, there will be a bit of review for Math 1565 students, but expect us to move quickly.

Over the summer, the University of Lethbridge adopted an official recognition of our location on traditional Blackfoot territory. This acknowledgement also serves as a welcome message, and I am pleased to be able to include it here:

> 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.

1.1 Course staff

My name is Sean Fitzpatrick. You'll see me twice each week in class (right?), and I also handle most of the day-to-day organization. For any questions that you don't find answered in this outline, [1] you can email me at sean.fitzpatrick@uleth.ca, or drop by my office: C540 in University Hall.

Tutorials are handled by Arie Bomhof. He can be found in C510, and emailed at a.bomhof@uleth.ca.

---

[1]Except questions about homework – there's a forum for that.

1.2 Basic course information

Course website via Moodle

Course textbook Our textbook is an OER (open education resource) textbook that I've adopted from the open-source APEX Calculus textbook, by Greg Hartman et al. Greg makes his book available online for free, including the source code used to produce it. For the last year I've been working with Greg and some others to convert the code from the original LaTeX to PreTeXt, which allows us to produce multiple formats, including HTML.

For most people, the most useful version of the text will be the HTML version. This version should look good on phones as well as computers, and has some nice features like embedded videos. However, this version of the book adheres more closely to the original organization of APEX. (And it uses American spelling.)

Students wanting a book that is more precisely adapted to the content of Math 2565, or who want something they can access offline, may prefer the older PDF edition. This version is still based on APEX, but has been edited to match the content of Math 2565 (and use Canadian spelling). There will be minor differences between the two versions, but they are mostly the same. The most substantial difference is in the chapter on differential equations.

If you want to *print* the book, you can order a copy from the Bookstore, using their print on demand service. If you'd rather print the book yourself, you'll probably want to use the black and white version.

All versions of the book will be posted on Moodle. If for some reason you temporarily lose access to Moodle, all open textbooks that I edit are always available on my website, at www.cs.uleth.ca/~fitzpat/oer.html.

Class schedule Classes meet Tuesday and Thursday, from 12:15–1:30 pm in SA6010.

Tutorials run on Thursday morning, at 8:00 or 9:25 am in C630, depending on your section.

Office hours Monday and Wednesday, 10:00 – 11:15 am and 1:15 – 2:45 pm.

If none of those times work you can email me for an appointment. Note however that Tuesday and Thursday I'm in class most of the day, and Friday is often filled with meetings and prep work.

Grading Weighting of individual course components is given in Table 2.1. Conversion to letter grades is given in Table 2.2.

2 Frequently asked questions

2.1 Organizational questions

1. *How do I make sure I succeed in this course?*

   Some of this will seem like fairly obvious advice, but...

   - Do the homework as soon as you can. You'll be provided with weekly online homework sets. The online homework system automatically saves your progress. You can do one or two questions each night, rather than trying to get through them all the day of the deadline. Also, making at least one attempt early on lets you know which problems you don't understand, which lets you know what you should ask for help with during office hours and tutorial.

   - Learn the art of reading a mathematics textbook effectively. It's trickier than you might think, and it's not unreasonable to ask for help on this.

   - Follow along regularly on Moodle, so you know what will be covered in class, and prepare accordingly. It can be very useful to attempt a few problems *before* you've seen a demonstration in class.

- Learn the art of *productive failure.* It's fine/normal/expected that you won't get something on the first attempt, or maybe even the second or third. But as long as learn a little from each failed attempt, you're making progress.
- Never, ever, say "I don't know where to begin!" on a problem. Make note of the terms used in the statement of the problem. Look up the definitions. Find similar examples. Get yourself stuck. Ask for help once you've figured out what it is that you don't yet understand.

2. *What does a typical lecture look like?*

   I will try to provide a mixture of examples and hands-on activities in each class. There will be some time spent on conceptual explanations, but don't expect too much word-for-word transcription of the textbook onto the board. I'll assume that you're just as capable of reading definitions and theorems from the textbook as you are from a whiteboard.

3. *How do I find you if I need help with something?*

   My office is C540, in University Hall.

4. *Do I need to make an appointment for office hours? What if I have class at that time?*

   You don't need an appointment -- just drop in. **Office hours** are the times that I promise to be available for consultation. If the times I choose don't work, you can email me for an appointment.

5. *What if my question is not related to the course?*

   Come see me anyway, or send an email. If I can't help you myself, I'll try to direct you to someone who can. There's also some great general advice for first year students on the U of L website. You might be able to find an answer there.

6. *OK, but what if it's kind of personal?*

   If it affects your ability to participate in the course (or even if it doesn't), you can come talk to me. In many cases, you might be best off seeing Academic Advising or Counselling Services. Links to these services, and general advice, can be found on the U of L website.

   You may also want to visit the University's Health and Safety website for information on other resources on campus.

2.2 Coursework and evaluation

1. *What are your expectations of students?*

   - I expect you to make your best effort to arrive prepared for each class. I'm also aware that this is not always possible.
   - I expect quality writing: complete sentences, proper use of notation, and clear exposition. I don't expect this right away, but I do expect you to work at improving.
   - I expect you to treat your classmates with respect, and to contribute to group activities to the best of your ability.
   - I expect you to ask for help when you need it. (Everyone does at some point.)

2. *Thanks, but what I really meant is, how do I earn my grade?*

   Oh, right. The most frequently asked question of all. There are several different evaluation components that contribute to your grade:

   Table 2.1 Relative weights of graded activities for Math 2565

Component	Number	Total Weight
Online homework	11	15
Tutorials	12	15
Quizzes	20	5
Term tests	2	30
Final exam	1	35

3. *What is involved with each of the graded components?*

   Here are brief descriptions of each one:

   - *Online homework.*

     Online homework is delivered via our **WeBWorK** online homework system. Access to WeBWorK is via Moodle. You can expect weekly homework assignments. Problems will be mostly routine practice, intended to prepare you for the tests. But there will also be the occasional challenging problem. It's all right if you miss one or two of these — the individual weight of any problem is quite small. The best way to ensure you can solve even the hardest problems is to start soon enough that you have time to ask for help.

     If you have limited access to internet at home, I can usually generate a hard copy of the assignment for you. Get in touch if this is a concern for you.

   - *Tutorials.*

     In each tutorial you will receive an assignment to be completed by the end of class. You can expect each assignment to contain several routine problems, intended to serve as progress checks, as well as one or two more challenging problems. It's expected that you will work with your classmates to solve the problems, especially those that are more challenging. You'll have Arie there to help you out if you get stuck on anything.

     Tutorial assignments are graded initially for feedback. Each problem will receive a score of 1 or 2. You will have an opportunity to make revisions on any problem with a score of 1. Problems you do not attempt receive a score of 0, and may not be revised.

   - *Quizzes.*

     Quizzes will take place at the start of most classes. These will be *reading quizzes*, to give you some incentive to keep up with your readings. Expect one or two short questions on concepts, vocabulary, etc., and possible a simple computational problem.

   - *Tests.*

     There will be two term tests, on the following dates:

     Test 1 February 6,[1] on Chapters 6 and 7.
     Test 2 March 19, on Chapters 8 and 9.

     Each test will be a **two-stage** test. You will have 45 minutes to write an individual test. Once time has expired on the individual test, you'll have 5-10 minutes to get organized into groups of 3 or 4. Each group will be given a new test (which will be based on some portion of the individual test) to complete in the remaining 20 minutes. Your overall test grade will be 80% individual plus 20% group, or 100% individual, whichever is higher.

   - *Final Exam.*

     A traditional, cumulative, three-hour exam. Note that final exams are no longer scheduled according to the timetable, so the date of the final exam will not be known until sometime in February. You should plan to remain on campus for the entire exam period. The Registrar's Office *will not* allow you to reschedule due to travel conflicts.

4. *How are letter grades calculated?*

   Each of the grade components above will be assigned a numerical score. These will be added to get a score out of 100 using Table 2.1. 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 2565

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	F
95-100	90-94	86-89	82-85	77-81	73-76	69-72	64-68	60-63	56-59	50-55	0-49

---

[1]This test can be moved one week later, to give you more time to digest Chapter 7 material. But then we'll be on the last class before Reading Week, which is a popular day for midterms.

2.3 Course policies

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

1. *One of the tests conflicts with something else in my schedule. What are my options?*

   If you know in advance that you will not be able to attend a test due to an "approved absence", like varsity athletics, a conference, tea with the Queen, etc., send me an email. We will try to arrange an alternate sitting of the test. (Individual stage only.)

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

   Contact me ASAP to make alternate arrangements. Make-up tests are possible, but only if you contact me in time. (Advance notice is preferred when possible.) If no arrangements can be made, we will meet to discuss adjustments to your grading scheme.

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

   No. This wastes health care resources and your time. 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.

4. *What if my car breaks down?*

   Same thing, for this, or other circumstances beyond your control. Send me an email, and we'll sort something out. But if there's a snowstorm forecast for the night before, maybe don't plan a trip to Calgary.

5. *I'm on one of the Pronghorns teams.*

   Good for you!

   Oh, you probably have some scheduling issues. Your coach should be providing you with a letter. Plan to meet with me during office hours one day and we'll sort something out.

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

   First, make sure that you have registered with the University's Accommodated Learning Centre. If you have exam accommodations, you'll need to schedule your exams with them. No need to let me know: they'll contact me to request a copy of your exam.

   If you require any in-class accommodations, or 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.

7. *Do we get to have calculators for the tests?*

   Yes. Basic and scientific calculators are fine. Graphing calculators and computers are not, unless you are explicitly told otherwise.

8. *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 requested ahead of time. Online homework extensions need to be in place before solutions become available. See me if you're having trouble, or take a look at the other resources mentioned in Question 6 of the Organizational questions.

9. *I missed class. What do I do?*

   If it's a one-time thing, don't worry about it. Drop by during office hours if you need to catch up. If circumstances are conspiring to keep you from class on a regular basis, please meet with me to come up with a plan to get you through the course.

10. *Is there anything else I need to know?*

    Students are expected to abide by the policies and regulations as laid out in the Academic Calendar. This includes the University's policies on plagiarism and academic misconduct. In Math 2565, this more or less amounts to not copying on the tests, and not getting someone else (including a website) to do your homework for you.

11. *I have a question that isn't answered here. How do I contact you?*

    Short answer: you can send me an email. There are a few caveats, however:

    - First, check the course page (and the announcements forum) on Moodle. Any information I need to communicate to the class will be posted on Moodle, or emailed to the class as an announcement via Moodle.
    - Is the question about homework? Email is not a good medium for discussing math. Your best option is to ask me in person. If that doesn't work, we have a class discussion forum, on Piazza.com. You'll be able to access the forum via Moodle.

12. *I sent you an email. Why haven't you answered it yet?*

    Here's a short troubleshooting guide:

    - Your email was not sent from a ULeth account and had no subject line: It went to my spam folder.
    - Your email sent between 10 pm and 6 am: I'm asleep. I'll answer when I get to work in the morning.
    - Your email sent during office hours: I'm busy helping the students who are here in person. Consider dropping by yourself.
    - Your email asked for help on a specific homework problem: Direct your question to the online forum.
    - Your email was about something already addressed in this FAQ, and I need time to come up with a polite reply.

3 Course topics

The following table provides a list of the topics we'll attempt to cover in Math 2565, along with the dates I think we'll get to them, where they can be found in the textbook. You can generally expect that the minimum recommended homework for each section consists of the odd-numbered problems. Note that some questions will differ slightly between the HTML and PDF editions of the textbook. There are also significant differences in Chapter 8 (differential equations). Sections given below are for the HTML version.

Table 3.1 Math 2565 topics schedule for Spring 2020

January 7	Introduction; substitution	6.1
January 9	Integration by parts	6.2
January 14	Trigonometric integrals	6.3
January 16	Trig and hyperbolic substitution	6.4
January 21	Partial fractions	6.5
January 23	Improper integrals	6.6
January 28	Area between curves	7.1
January 30	Volumes of solids of revolution	7.2, 7.3
February 4	Arc length	7.4
February 6	Test #1	Chapters 6 and 7
February 11	Introduction to differential equations	8.1, 8.2
February 13	Linear differential equations	8.3
February 25	Modelling with differential equations	8.4
February 27	Intro to sequences and series	9.1, 9.2
March 3	Integral and comparison tests	9.3
March 5	Ratio, root, and alternating series tests	9.4, 9.5
March 10	Power series	9.6
March 12	Taylor series	4.5, 9.7
March 17	Conic sections	10.1
March 19	Test 2	Chapters 8 and 9
March 24	Parametric curves	10.2, 10.3
March 26	Polar curves	10.4, 10.5
March 31	Functions of several variables	12.1, 12.2
April 2	Partial derivatives	12.4, 12.5