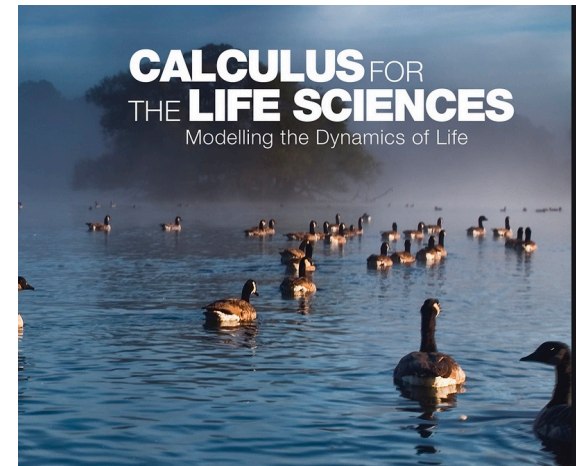


Math 1LS3

Calculus for the Life Sciences I



Instructor Information

Instructor: Erin Clements

Email: clemene@math.mcmaster.ca

Office: Hamilton Hall, room 425

Office Hours: TBA



Course Content

- ❖ **standard calculus material:** limit, continuity, derivative, integral
- ❖ **calculus objects in context:** for instance a function (abstract math object) could represent a population of bacteria (application)
- ❖ **modeling:** using math to study problems arising in life sciences
- ❖ **approaches to math:** algebraic, numeric, geometric, verbal (descriptive)

Abstract math vs math in applications

it is the same math, but ...

Example: heartbeat frequency h (in beats per minute)
of a mammal of body mass B (in kg)

$$h = 241B^{-1/4}$$

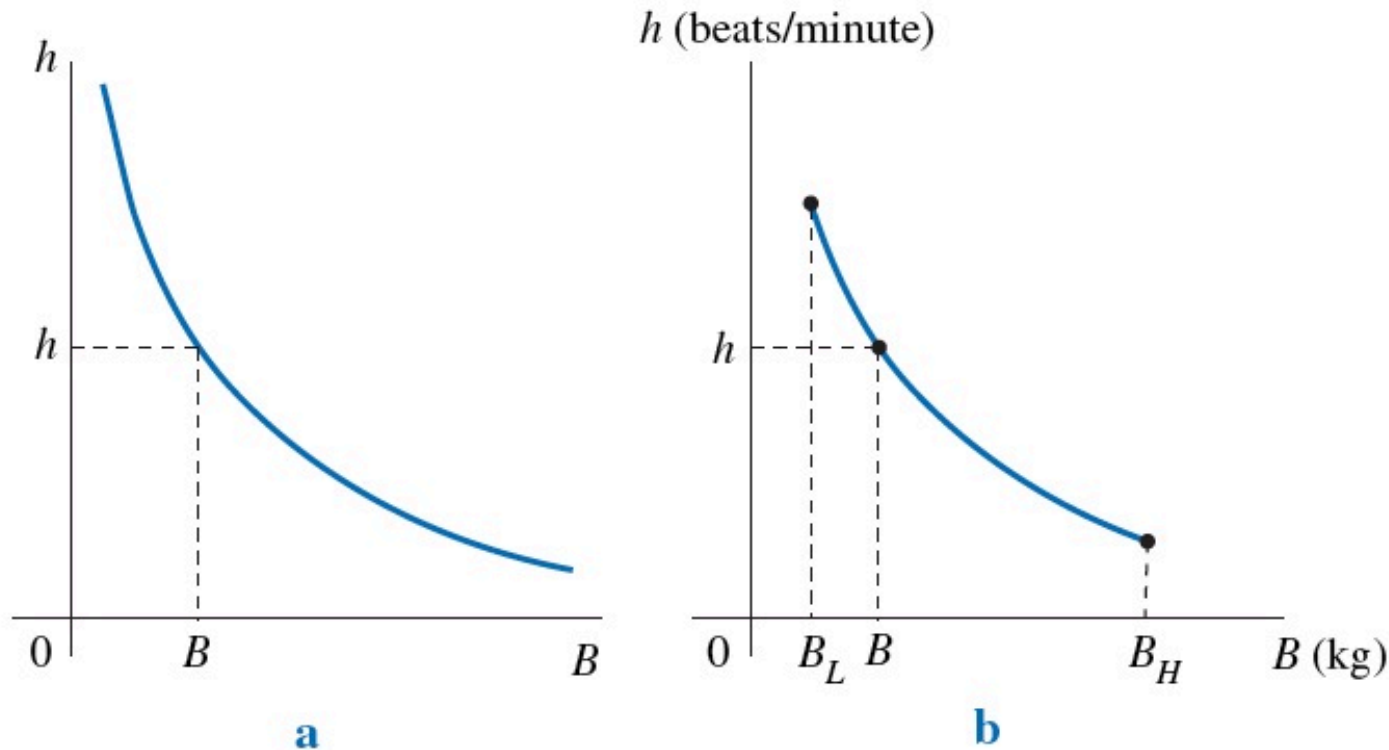
so, no longer

$$f(x) = 241x^{-1/4}$$

math symbols have a meaning

Abstract math vs math in applications

it is the same math, but ...



Math: domain consists of all positive numbers

Biology: domain is an interval from the lightest to the heaviest mammal

What questions can the math taught in 1LS3 help us answer?

- How does our body process and eliminate drugs (Tylenol, alcohol, recreational drugs)?
- How does math help forensic pathologists find a location of impact (say from a bullet) from blood splatters?
- An x-ray shows that a blood vessel branches off the right coronary artery at an angle of 78° . Is there a reason for concern?

What questions can the math taught in 1LS3 help us answer?

- How do we estimate the surface area of a lake (we need this need when we study pollutants and their effect on underwater fauna and flora)?
- How do we compute the volume of a heart chamber from a sonogram (ultrasound image)?
- How is UV index calculated?

Course Information – its all on AVENUE

Start by downloading
and reading our
**course outline and
course schedule!**

The screenshot shows the Avenue to Learn interface for the course MATH 1LS3: Calculus for the Life Sciences I. The top navigation bar includes the Avenue to Learn logo, the course title, and icons for a grid, email, chat, notifications, and a user profile for Erin Clements. Below the navigation bar is a menu with 'Content', 'Resources', 'Communication', and 'Assessments'. The main content area is titled 'MATH 1LS3: Calculus for the Life Sciences I'. On the left, under 'Announcements', there is a post titled 'Welcome to Math 1LS3!' by Caroline Junkins, dated August 31, 2022. The post provides information about the course, including the first meeting on Tuesday, September 6th, and mentions that lectures will be in-person with Echo360 recordings available. On the right, there is a 'Calendar' section showing 'Monday, September 5, 2022' and 'Upcoming events', which currently displays 'There are no events to display.' Below the calendar is an 'Updates' section showing '13 New Emails'.

avenue to learn MATH 1LS3: Calculus for the Life Scienc...

Content Resources Communication Assessments

MATH 1LS3: Calculus for the Life Sciences I

Announcements

Welcome to Math 1LS3!

Caroline Junkins posted on Aug 31, 2022 2:00 PM • Edited

Information about our course can be found in the **Content** page (top left of your screen) under the **COURSE INFO** tab. Please start by downloading and reading our **Course Outline** and **Course Schedule**.

Our first meeting will be Tuesday, September 6th at your scheduled class time (check Mosaic for your classroom location). During this first class, your instructor will welcome you to the course, introduce you to some authentic applications of Calculus to the Life Sciences, and walk through some important information about course structure and resources.

Math 1LS3 will have both in-person and virtual/online components:

- Lectures** will take place in-person in our designated classrooms, with **Echo360 Recordings** posted on Avenue. We encourage you to come to class, but please stay home if you are sick or isolating. *Masks are strongly encouraged*

Calendar

Monday, September 5, 2022

Upcoming events

There are no events to display.

Updates

13 New Emails

Course Delivery

- **lectures**... scheduled to be in person
(recordings are uploaded to Avenue after each lecture)
- **tutorials**... virtual (Teams and/or Zoom)... will start next week

Course Evaluation

Topics	Weight
Participation (completion of quizzes/activities)	10%
Computer Labs (collectively worth 15%)	15%
3 Term Tests (each worth 15%)	45%
Final Examination	30%


Participation (10%)

- Baseline assessment (2%)
 - One at the beginning of the semester, submitted on Crowdmark
- Checkpoints (8%)
 - Series of 10 quizzes assigned regularly throughout the semester, accessed and submitted through Childsmath

childsmath
Student Admin Page

$\int_M d\omega = \int_{\partial M} \omega$

McMaster
University



user: clemene

Open Resources:
[Pre-Calc Review](#)
[Calculus Warm-Up](#)

Your Courses:
Math 1LS3
[Math 1LT3 Summer](#)
[More Courses...](#)

Math 1LS3

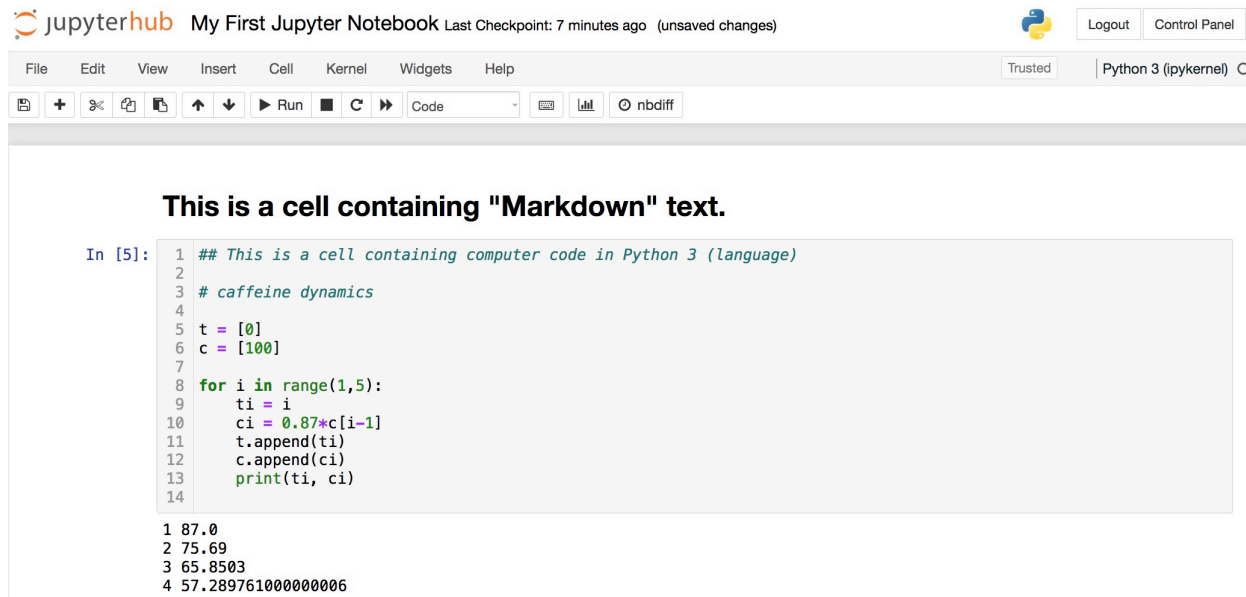
Lab 0
Lab 1
Lab 2
Lab 3
Checkpoint 1

[Math 1LS3 Marks](#)

[Back to Intro Page](#)
[Log Out of the System](#)

Computer Labs

- There will be 4 computer labs assigned throughout the course.
- We will use **Jupyter Hub** as our Python 3 coding environment. You can access McMaster's server here: <https://mcmaster.syzygy.ca/>



The screenshot shows a Jupyter Notebook interface. At the top, the header includes the Jupyter logo, the text "jupyterhub My First Jupyter Notebook", and a status message "Last Checkpoint: 7 minutes ago (unsaved changes)". On the right, there are "Logout" and "Control Panel" buttons. Below the header is a menu bar with "File", "Edit", "View", "Insert", "Cell", "Kernel", "Widgets", and "Help". A toolbar contains icons for saving, adding, and running cells, along with a dropdown menu set to "Code". The main area displays a code cell with the text "This is a cell containing 'Markdown' text." followed by a Python code block. The code block is labeled "In [5]:" and contains a loop that calculates and prints values for 'ti' and 'ci'. The output of the code is shown below the cell, displaying four lines of numerical results.

```
1 ## This is a cell containing computer code in Python 3 (language)
2
3 # caffeine dynamics
4
5 t = [0]
6 c = [100]
7
8 for i in range(1,5):
9     ti = i
10    ci = 0.87*c[i-1]
11    t.append(ti)
12    c.append(ci)
13    print(ti, ci)
14
```

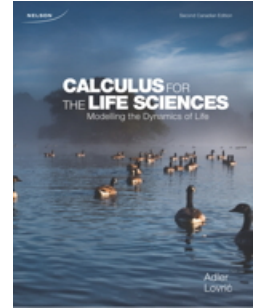
```
1 87.0
2 75.69
3 65.8503
4 57.289761000000006
```

Term Tests and Final Exam

- **3 Term Tests** (15% each)... tentative dates are in course outline, detailed information (i.e., what topics are covered, where you will write the test, etc.) will be posted in Avenue closer to each test date
- **Final Exam** (30%)... in December; scheduled by the Office of the Registrar (date/time are usually posted late November)

Course Materials

- **math 1LS3 textbook (required)**
"Calculus for the Life Sciences: Modelling the Dynamics of Life", Fredrick A. Adler, M. Lovric
(Note: The student's solution manual is optional)
- **math 1LS3 courseware (required)**
- **McMaster standard calculator – Casio fx991 (required)**



To Do

- ✓ Familiarize yourself with our Avenue page
- ✓ Read the Course Outline posted in Avenue thoroughly
- ✓ Print the Week by Week Schedule to keep with your Math 1LS3 notes

To Do

- ✓ Purchase your course materials; work on Assignment 0 in your courseware (review)
- ✓ Bookmark Childsmath; try the System Tutorial
- ✓ Bookmark Jupyter hub; if you're brand new to coding, watch this and follow along:
https://www.youtube.com/watch?v=dEWsl4OUJ_c&t=1199s

To Do

✓ Download lecture outlines for this week

Math 1LS3 Lecture Outlines for Sections 02 and 03 (Clements)

* Note 1: Please note that the lecture notes posted are just an outline of the material covered in class. Details, solutions, and additional examples will be added during lectures.

* Note 2: Topics won't necessarily be covered in the order below. Please see Avenue for our Fall 2022 Calendar to see which sections will be studied each week.

intro	1.2	1.3	1.4	2.1
2.2	2.3	3.1	3.2	3.3
4.1	4.2	4.3	4.4	4.5
5.1	5.2	5.3	5.4	5.5
5.6	5.7	6.1	6.4	6.7
6.8	7.1	7.2	7.3	7.4
7.5	7.6	7.7		

<https://ms.mcmaster.ca/~clemene/1LS3lectureoutlines.html>

Expectations

- **come to all classes...** make sure your lecture notes are organized and complete
- **work on practice problems regularly** ... an hour or so every day is more manageable than 8-10 hours straight before a test
- **learn actively**... study, ask questions, use math help centre
- **take responsibility for your education** ... reflect on things, identify problems and deal with them immediately, ask for help when you need it, don't get behind (or recover quickly if you do)