Math 112L: Laboratory Calculus 2
(Fall 2024)

Day	Time	Location	Style
Mon, Wed	8:45 to 9:35	Physics 150	Lecture
Tues	10:05 to 11:20	Gross Hall 105	Lecture
Thurs	10:05 to 11:20	Gross Hall 304B	Lab

Your instructor

Name: Kairi Black
Pronouns: she/her, they/them
Email: kairi.black@duke.edu
Drop-in hours: MW, 9:45 to 10:45, Physics 274J
About me: My name is Kairi (she/they) and I am a graduate student in mathematics. I prefer to be addressed by 'Kairi, but 'Instructor', 'Instructor Black', or 'Ms. Black' are also fine. Taking calculus 2 convinced me to study math, so I'm excited to share 112L with y'all! Outside of math, I enjoy rock climbing, reading, sewing, video/board games, and cooking.

*The other 112 sections are taught by graduate students Hannah Scanlon and Allie Cruikshank.

What background knowledge do I need before taking this course?

This course is designed for students who have completed either 105/106L or 111L.

What will I learn in this course?

See the course webpage on Canvas for a course schedule by topic.

Here are some big-idea questions which we'll answer in 112L:
- How can we integrate unfamiliar functions?
- Can a region have infinite perimeter but finite area?
- How can we make sense of an infinite sum?
- Can we approximate non-polynomial functions with polynomials?
- How can we extract knowledge of a function from an equation involving derivatives?

In precise terms, after taking this course you will be able to:
- Integrate by u-substitution, by parts, and by partial fraction decomposition;
- Compute the volume of a revolution of a solid and the arc length of a curve;

- Determine the convergence of improper integrals;
- Define 'random variable' and analyze a random variable's meaning;
- Determine the convergence or divergence of an infinite sum;
- Approximate certain functions by polynomials;
- Approximate periodic functions by sums of sines/cosines; and
- Define 'differential equation', interpret its meaning, and solve certain ones.

Calculus is a powerful tool across the physical and social sciences, and this course will prepare you to use it in whatever discipline(s) you pursue.

What will we do in class sessions?

MTW Classes: I will have a lecture prepared for each class, which will take some portion of class time. Each class has accompanying fill-in-able lecture notes, available on the course webpage. Lectures will include a mixture of my writing on the board, my writing on a projected tablet, and guided solo/group work.

Th Lab: In lab, y'all will work in randomly assigned groups of 3-4, with groups changing weekly. Group work is a key component of lab, and learning objectives in lab include mathematical collaboration, communication, and creativity. In this spirit, you will do your lab work together as a group at the board and then submit pictures of your completed boardwork on Gradescope. Moreover, **lab attendance is mandatory.**

Exams: There are three in-class midterm exams and one additional final exam:
- Test 1: Thursday, September 26
- Test 2: Thursday, October 24
- Test 3: Thursday, November 21
- Final Exam: Saturday, December 14, from 2pm to 5pm.

Midterm exams are no calculator and no notes. On the final exam, you may bring a single 8.5'' by 11'' sheet of notes (front and back).

How can I prepare for the class sessions to be successful?

Make preparations to always arrive early! This ensures that you have time to setup your lecture/lab workspace and to review the previous day's material. Because each MTW class has accompanying lecture notes, you may also choose to bring a copy to write-on. I encourage y'all to explore systems of organization and learning that work for you!

What are the required texts and materials?

We are using an open-source textbook which is freely available online: *OpenStax Calculus* [Volume 1](#) & [Volume 2](#) by Gilbert Strang and Edwin Herman.

We will not use the textbook directly as your weekly homework assignments will be problem sets written by your instructional team. However, the textbook for the class provides background and supplemental material. In addition, we will post additional practice on Canvas, called "Daily Homework" including solutions.

What technologies will we use?

The main source for all course materials is the Canvas course webpage. All assignments will be submitted online on Gradescope.

For exams, you will **not** have access to a calculator. Calculators (for example, Desmos online graphing calculator) can be incredibly useful tools for visualization and checking work. However, be wary and make sure that you can perform computations yourself.

Course Communication

Course communication will take place on Canvas and occasionally by email to your Duke email address, so it is imperative that you have notifications set up for both of these! Monday through Friday, I am accessible by email. On weekends, I will respond to emails less quickly and with less detail.

Academic Accommodations

To request accommodation for a disability, start at https://access.duke.edu/requests/. Note that accommodations cannot be provided retroactively, so request sooner rather than later.

[Duke Access and Accommodation Services](#) (DAAS) supports students with accommodations and provides students with necessary referrals. I will work with DAAS to provide you with equal access to course materials and make accommodations for course assignments.

Testing Accommodations: We will use the Testing Center for testing accommodations (both for DAAS accommodations or for approved make-up exams). The Testing Center operates by appointment only and appointments must be made at least 7 calendar days in advance. For instructions on how to make an appointment at the Testing Center, visit their website at https://testingcenter.duke.edu.

How will my grade be determined?

All graded work in this course will be submitted to Gradescope. When you upload your submission to Gradescope, you are required to match questions and pages when prompted; graders have discretion to deduct points if you do not. When relevant, please box final answers.

Each week, you will submit
- **by Wednesday at 11:59pm,** your weekly problem set as an individual, and
- **by Thursday at 11:59pm**, your lab work as a group (one submission for the group).

Late submissions: Problem sets submitted within 24 hours after the deadline will be counted as late and will receive a penalty of 10% of the total points. Problem sets submitted more than 24 hours late will not be accepted, except in extreme circumstances.

Regrade requests: Once grades are posted, you will have one week to submit a regrade request in Gradescope. You may *only* submit a regrade request to correct an administrative or grader error (e.g. wrong rubric item selected), and must be polite. Results of the regrade request are final and may result in a higher or lower score.

Lab Attendance: An unexcused absence from lab will result in a grade of zero for the associated assignments. If you are absent for physical/mental health reasons or for official university activities, you must submit the online Incapacitation Form. If you are more than 15 minutes late to lab, you will receive an individual penalty of 15% on the lab assignment.

Computation of final grade: This course is offered graded-only, **so S/U is not an option**. Your final numerical percentage grade will comprise of

Homework and Participation	15%
Labs	10%
Midterm Exams	45%
Final Exam	30%

and will be converted to a letter grade as follows:
- a final percentage of at least 90 guarantees at least an A-
- a final percentage of at least 80 guarantees at least an B-
- a final percentage of at least 70 guarantees at least an C-.

After the first exam you will be given a mid-semester grade that incorporates homework/labs.

Missing an exam: For an exam absence due to illness to be excused, you must fill out the above Incapacitation Form. For a second exam missed due to illness, you must provide a dean's excuse as well. An unexcused absence from an exam will result in a zero. For an excused absence during an exam, I reserve the right to offer a make-up exam – scheduled through the Testing Center – or use the final exam score to replace the missed exam.

Getting Help

You will need help with this class! Math is a challenging subject, and this class will ask a lot of you. It important to seek help when you need it, and I hope you will use these resources.

There are 15 hours of outside-of-class (generally in Physics 274J) help hours available to you!

	Sunday	Monday	Tuesday	Wednesday
09 AM				
10 AM		**Kairi** 09:45 AM - 10:45 AM		**Kairi** 09:45 AM - 10:45 AM
11 AM				
12 PM			**Hannah (Gross 359)** 12:00 PM - 01:00 PM	**Hannah** 12:00 PM - 01:00 PM
01 PM				
02 PM				**Allie** 02:00 PM - 03:00 PM
03 PM	**Help Room**	**Help Room**	**Help Room** 03:00 PM - 04:00 PM	**Help Room**
04 PM			**Help Room & Allie** 04:00 PM - 05:00 PM	
05 PM	03:00 PM - 07:00 PM	03:00 PM - 05:00 PM		03:00 PM - 05:00 PM
06 PM				

You can find additional math resources at https://math.duke.edu/undergraduate/help-tutoring.

Academic Resource Center (ARC): Duke's ARC provides a variety resources:
- SAGE, which connects students enrolled in the same course with a student facilitator for regular meetings throughout the semester;
- Study Connect, which facilitates the formation of student study groups;
- Peer tutoring;
- ADHD/LD coaching; and
- Individual learning consultations to improve studying and time management skills.

Mental and Physical Health Resources:

- Duke Reach (https://students.duke.edu/wellness/dukereach/) can help you identify support services from across campus or in your local community. Duke Reach also manages an online report form for concerns about the health or safety of a student.
- Duke's CAPS (https://students.duke.edu/wellness/caps/) provides counseling services.
- Duke's "Blue Devils Care" (http://bluedevilscare.duke.edu) provides 24/7 mental telehealth support.
- Duke Student Health (https://students.duke.edu/wellness/studenthealth/services/) provides a wide range of physical healthcare services for all Duke students, many of which are covered by the student health fee.
- Duke's "DuWell" (https://students.duke.edu/wellness/duwell/) hosts a variety of wellness experiences across campus to help students manage stress and anxiety.

Group work guidelines & inclusivity

The mathematician Federico Ardila writes, see here,
- everyone can have joyful, meaningful, and empowering mathematical experiences;
- every student deserves to be treated with dignity and respect;
- mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs; and
- mathematical talent is distributed equally among different groups, irrespective of geographic, demographic, and economic boundaries.

I agree, and I expect our work in 112L – in and out of the classroom – to uphold these values.

To succeed in this course, you will have to actively interact with your peers, your instructors, and your TA's, so please adhere to these communication guidelines:
- Respect that others' beliefs, perspectives, and experiences differ from your own.
- If you disagree with an idea (mathematical or non-mathematical) communicated by a fellow student, you may critique the idea, but not the person.
- Listen carefully, be courteous, and don't interrupt.
- Communicate thoughtfully, be patient, and leave space for others.
- Support your statements with evidence and sound reasoning.
- Moderate how you contribute to discussions:
    - if you have a lot to say, work to avoid dominating the conversation; and
    - if you are reluctant to speak up, look for opportunities to share your perspective.

I am available chat with y'all about any communication concerns that come up for you!

In addition, I will post weekly announcements on Canvas with 'blurbs' about modern day mathematicians. I will highlight in these 'blurbs' the variety of styles of communication, perspectives, and identities across mathematics.

Academic Integrity

As a student, you should abide by Duke's Community Standard, which you can read at https://trinity.duke.edu/undergraduate/academic-policies/community-standard-student-conduct.

If you are ever unsure about what constitutes a breach of academic integrity in the context of our course, feel free to talk to me! I will handle academic misconduct on a case-by-case basis, and in general misconduct on an assignment will result in no points received for the assignment. Egregious academic misconduct may necessitate involvement of the Office of Student Conduct.

Policy Change

All policies in this syllabus are subject to reasonable change at my discretion. I will announce any changes in class, and will update this document and the course website (where relevant) to reflect the change.