Math 112L: Laboratory Calculus 2 (Fall 2023)

MW 8:45 to 9:35 AM (Physics Building 119)
TuTh 10:05 to 11:20 AM (Classroom Building 114)

Your instructor

Name: Kyrie Johnson
Pronouns: she/her, they/them
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Drop-in hours:

- Tuesday, 11:30 to 12:30 am, Classroom Building 132
- Monday, 6:30 to 7:30, Zoom link here

About me: My name is Kyrie (she/they) and I am a graduate student in the Duke math department. I prefer to be addressed by 'Kyrie', but 'Instructor', 'Instructor Johnson', or 'Ms. Johnson' 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, playing video/board games, and cooking.

What is this course about?

We will begin 112L by concluding 111L's study of integration, including advanced integration techniques and applications of integration. Along the way, we will learn some probability theory to partially motivate the second core subject of our course: sequences and series. Finally, we will return to 111L's discussion of differential equations to apply our new knowledge there. 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 background knowledge do I need before taking this course?

This course is designed for students who have taken calculus at Duke, either through 105/106L sequence or through 111L.

What is the course schedule?

See the course webpage on Sakai for a full schedule (linked here).

What will I learn in this course?

Here are some big-idea questions which the content of 112L will answer:

- How can we integrate functions which aren't separable?
- Can a region have infinite perimeter but finite area?
- How can we make sense of an infinite sum?
- Can we approximate complex 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
- State the definition of a differential equation, interpret its meaning, and solve certain differential equations.

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: Each lab will begin with a short introduction by the lab TAs. Then y'all will work in groups of 3-4 on the lab assignment, with groups changing from week to week. Group work is a key component of lab, and one of your goals in lab should be to exercise your 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** (see 'How will my grade be determined?' below).

Exams: There are three in-class midterm exams and one additional final exam:

- Test 1: Thursday, September 28
- Test 2: Thursday, October 26
- Test 3: Thursday, November 30
- Final Exam: Thursday, December 14, from 9 am to Noon.

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 each day's lecture notes in a format you can write on (for example, by printing it out or accessing it on a tablet).

What are the required texts and materials?

The course textbook is *Calculus* by Hughes-Hallett et. al., 7th edition. 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 and you are encouraged to read the relevant section(s) of the textbook and look at recommended daily textbook problems. Solutions to textbook problems will be available on Sakai.

If you are struggling to access the textbook due to cost, you may contact the financial aid office (whether or not you are on aid) to receive aid or a loan.

What technologies will we use?

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

We will also use Ed Discussion – accessible via Sakai – as a discussion forum. I encourage you to post questions on course material on Ed Discussion so that all students can benefit from questions and answers. Additionally, I encourage y'all to respond to one another's questions as doing so facilitates everyone's learning. Instructors may then expand upon student responses.

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.

For immediate assistance with learning technologies, system errors/outages, or your NetID account and password, contact the OIT Service Desk.

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 midnight:** your weekly problem set as an individual, and
- **by Monday at midnight:** your lab work as a group.

Late submissions: Submissions received within 24 hours after the deadline will be counted as late and will receive a penalty of 10% of the total points. Submissions 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. These requests should *only* be submitted in the event of an administrative error or clear grader error (e.g. wrong rubric item selected), and should 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 (*before* the class in question), which can be found at http://trinity.duke.edu/undergraduate/academic-policies/illness. If you are more than 10 minutes late to lab, you will receive an individual penalty of 15% on the lab assignment.

Computation of final grade: Your final numerical percentage grade will comprise of

Homework and Participation	12.5%
Labs	12.5%
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 each midterm, I will provide a table to convert your numerical score into a letter grade, and 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, I require a doctor's note in addition to 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 or use the final exam score to replace the missed exam.

Course Communication

Course communication will take place on Sakai and occasionally by email to your Duke email address, so it is imperative that you have notifications set up for both of these! Likewise, during the week (Monday through Friday), I am accessible by email. On the weekends, I will respond to emails but responses will be less detailed and much less prompt.

If you miss lab for an excused reason, you must submit an Incapacitation Form (see 'How will my grade be determined?' above). Absences will only be excused by your dean for reasons such as serious illness, family emergency, or official university activities. In either case, refer to the course schedule to see what you missed, and submit the lab alone following an excused absence.

Group work guidelines

The mathematician Federico Ardila writes that 'everyone can have joyful, meaningful, and empowering mathematical experiences' and that 'every student deserves to be treated with dignity and respect' (see here). 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 guidelines:

- Respect that others' opinions, beliefs, perspectives, and experiences may 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 ways/opportunities to share your perspective.

Please bring any communications you believe to be in violation of this class policy to my attention.

Diversity and Inclusion

Federico Ardila also affirms that 'mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs' and that 'mathematical talent is distributed equally among different groups, irrespective of geographic, demographic, and economic boundaries' (see here). I agree, and I expect that our work in 112L – in and out of the classroom – creates space for everyone to access the incredible tool which we call calculus.

Because group work is a key component of the course, part of how we will cultivate an inclusive culture in our class is by adhering to the above group work guidelines. In addition, I will post announcements on Sakai with weekly blurbs about various mathematicians, to connect a bit of our course material to some of the diversity in the math (and math-adjacent) community.

Getting Help

You will need help with this class! Everyone will. Math is a challenging subject, and this class will ask a lot of you. While I expect you to work hard, I also want you to feel supported.

Help Room: The help room is in room 132 of the Classroom Building on East Campus. Beginning the second week of class, the help room is open

- Sunday through Thursday, 4 to 10 pm; and
- Saturday, 4 to 6 pm.

The help room is staffed by undergraduate teaching assistants ready to answer your questions. This is also a good place to work on problems with other students. To find a detailed schedule of time and helpers, see https://math.duke.edu/undergraduate/help-tutoring/help-rooms.

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Academic Resource Center (ARC): Duke's ARC provides multiple layers of support for classes, including Learning Consultations, Peer Tutoring, Learning Communities, ADHD/LD Coaching, Workshops and Outreach, GRE/MCAT Prep, Study Connect, and more. Because learning is a process unique to every individual, we work with each student to discover and develop their own academic strategy. Contact the ARC to schedule an appointment.

DukeReach: DukeReach can connect you with departments across campus to get you help with physical and mental health concerns. You can also contact Counseling & Psychological Services (CAPS) directly for counseling services, and reach 24/7 mental health support through Blue Devils Care.

Academic Accommodations

If you need to request accommodation for a disability, you can contact the Disability Management System (DMS) office. I will work with that office to provide you with equal access to course materials and make accommodations for course assignments. Note that accommodations cannot be provided retroactively, so it is best to contact the DMS office sooner rather than later.

Testing Accommodations: This class will use the Testing Center to provide testing accommodations to undergraduates registered with and approved by the Student Disability Access Office (SDAO). The Testing Center operates by appointment only and appointments must be made at least 7 calendar days in advance, but please schedule your appointments as far in advance as possible. You will not be able to make an appointment until you have submitted a Semester Request with the SDAO and your accommodations or supports have been approved. If you have not already done so, promptly submit a Semester Request to the SDAO in order to make your appointment in time. For instructions on how to register with SDAO, visit their website at https://access.duke.edu/requests. For instructions on how to make an appointment at the Testing Center, visit their website at https://testingcenter.duke.edu.

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.