

# MATH0100: Introductory Calculus, Part II

Syllabus, Fall 2023

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Canvas site: <https://canvas.brown.edu/courses/1092683>

*The Canvas site is shared between all sections in MATH 100*

## Course Description

Math 100 is a second-semester Calculus course. In the course of the semester we will study three (related) topics that form a central part of the language of modern science:

- applications and methods of integration
- infinite series and the representation of functions by power series
- differential equations

The material we take up in this course has applications in physics, chemistry, biology, environmental science, astronomy, economics, and statistics. We want you to leave the course not only with computational ability, but with the ability to use these notions in their natural scientific contexts, and with an appreciation of their mathematical beauty and power. Our goal is to help you gain a solid, deep, and portable understanding of single variable calculus as well as its applications and uses in other fields. You should leave this course with a firm set of mathematical concepts, skills, and strategies and a high degree of confidence in your ability to apply what you have learned to your future areas of study, whether that be mathematics, biology, economics, physics, or another discipline. In order to achieve these goals, we ask you to be actively involved in your own learning. We will assist you by looking at multiple approaches to problem solving and by emphasizing understanding the underlying ideas behind the mathematics we study. A more detailed list of topics, and a tentative schedule, can be found on the last page of the syllabus and the course website.

*Total time spent in and out of class for this course is estimated at 180 hours over the 14 weeks of this course, so students should expect to spend an average of 9 hours per week working outside of class (completing homework assignments, reviewing notes and the textbook, seeking help, and preparing for exams). Students may require more or less time based on their mathematical background, personal goals, and other factors.*

## Textbook

Thomas' Calculus: Early Transcendentals, Single Variable, 14th Edition by Thomas, Weir, Hass (ISBN: 978-0-13-443941-9). This ISBN is for the paperback edition; if you obtain another version (hardback, looseleaf, etc.), make sure it says "14th Edition" and "Early Transcendentals."

## Course Format

This course will be offered as a hybrid course in the fall semester of 2023. The main lectures will be held in the form of pre-recorded (asynchronous) videos. Weekly conference/recitation sections will be held **in person**.

The primary components of Math 100:

- **Video lessons and worksheets.** The asynchronous format allows students to learn at their own pace. Lessons will be delivered using pre-recorded videos on the course website at 9 am every Monday, Wednesday, and Friday.

To better organize the material, and to make teaching and learning more efficient, each lesson will be structured around a worksheet. We believe that **doing math is the best way to learn math!** Therefore, we aim to have a 40-45 mins long video for each class so that you can spend some time trying out some of the problems while watching the video. We recommend that you take notes, write down your questions (to ask later!), and **try the problems on the worksheet when you are asked to do so**. Note that we will almost never finish all the problems on the worksheet—this is intentional. You should definitely spend some time working through the course worksheets. The worksheet will be posted before each class, and the solutions to the problems appearing on it will be posted afterwards. *See the “Video Lessons and Worksheets” page on canvas for more details.*

- **Problem sets.** The way to develop a deep and flexible understanding of the material is to constantly practice applying it in different contexts. The asynchronous format ensures that every student in the course is on the same schedule and therefore is able to work on the same problem set after each lesson. (On a typical week, students will have 3 PSets and each PSet will have no more than 5 questions.) In addition, with this more frequent problem-set schedule, students will have more opportunities to seek help (such as coming to office hours) before it’s too late.

Problems are an essential part of the course; it is virtually impossible to learn the material and to do well in the course without working through the homework problems in a thorough manner. The only way to learn math is by doing math. In general, homework problems **will look different** from problems discussed in class. This is intentional; the only way to develop a deep and flexible understanding of the material is to constantly practice applying it in different contexts. As you go through the homework, think carefully about the problems posed, the strategies you’ve used, and the meaning of the computations you’ve performed. Most homework problems are intended to deepen your understanding of the material already covered in class, but some problems will ask you to acquire additional skills from the assigned reading so that we can spend class time on applications of these skills.

- **Math 100 MRC and Office Hours.** The Math 100 MRC (Math Resource Center) will be held in MacMillan 115, in person, from 8pm-10pm, Sunday-Thursday. This is for Math 100 students only and it’s not mandatory. You are encouraged to use the MRC as a study space, and to meet other students and the UTAs in Math 100! There will be UTAs answering your questions about the course material but you don’t have to have questions in order to attend. The Math 100 MRC will start on September 11, Sunday.

Note: the MRC for other courses will be held in Foxboro Auditorium - the math department operates the Math Resource Center, Monday-Thursday for two hours each night.

The Math 100 teaching team will hold office hours on Zoom or in person. You do not need to make an appointment, just show up! The schedule will be posted on the “Office hours” page.

- **Weekly in-person recitation sections.** Discussion helps solidify the ideas as well as increase fluency in the language of mathematics. Although the main lessons will be delivered online, students

will have a lot of opportunities to talk to the instructor and the TAs in person during office hours. In addition, every student will be asked to register for a weekly in-person conference/recitation session (mandatory) where students will be able to review content, ask questions, and most importantly, practice solving problems in small groups and work with their peers.

Studies show that students learn faster and perform better in smaller classes. Therefore, we would like to keep the class size small, about 20 students in each recitation section) so that the TAs can tailor instruction according to the needs of their particular sections, and pay more one-on-one attention to each student.

Depending on the week, there will be different activities in the recitation sections, including but not limited to group work, students' presentations, quizzes or tests. There will be 12 meetings throughout the semester. There will be 4 tests/exams on the following dates (to be confirmed). The integration techniques test, and unit 1 & 2 & 3 completion exams will be given during the recitation sections.

- 9/26 (Tue) Integration techniques test
- 10/10 (Tue) Unit 1: Integration (unit completion exam)
- 11/14 (Tue) Unit 2: Series (unit completion exam)
- 12/5 (Tue) Unit 3: Differential equations and Polar coordinates (unit completion exam)

Note that recitation "hopping" is not allowed. If you have a conflict for a particular week, and it's possible for you to attend a recitation at a different time that week, contact the TA and explain the situation. The first recitations will start on **September 12, Tuesday**.

The grade for each recitation is calculated as 50% for participation and/or presentation and 50% for groupwork and/or quizzes. We will give everyone two drops.

## Homework Policy

Problem sets and their due dates will be posted on the course website. They must be submitted online to **Gradescope**. Click HRER to see how to submit PDF homework. Make sure the file you upload is in .pdf. This does not mean you have to type up your solutions on a computer (though you are certainly free to do so). It just means you have to scan your handwritten work and create a PDF from it. Check Scanning Work on a Mobile Device.

- You will normally have one PSet due before 1pm (EST) on MWF, unless otherwise posted. On a typical week, you will have 3 PSets and each PSet will have no more than 5 questions.
- Because of the shopping period, your first assignment will be due on Wednesday 9/13 and it will be a bit longer (combining 3 PSets; PS1-PS3). After that, we will install the regular schedule as explained above.
- To make sure everyone knows how to use Gradescope to submit the upcoming assignments, all students will be required to submit PS0 to Gradescope by 1pm (EST) on Monday(9/11). You will get full points as long as you submit it on time and upload your pdf file(s) to Gradescope correctly!

**No late homework will be accepted (this includes illness, absence, and adding the course late)!** We realize that occasionally things such as minor illnesses may come up that prevent you from giving full attention to homework; we will accommodate by dropping your lowest four problem set scores when computing your final homework grade.

It is your responsibility to ensure that your problem set has been successfully uploaded in a readable format (pages are not upside-down or sideways, not blurry, etc.). **Make sure you leave yourself enough time before the deadline to address any technical issues that may come up. Illegible or misuploaded homework will not be graded.**

## Collaboration Policy and the Academic Code

Students are encouraged to work together and/or ask each other questions about homework problems, but it is unacceptable to copy or submit another student's work, calculations, or final answers without solving the problem yourself. The best practice to obey this policy is to start each problem on your own, seek help if you run into difficulties, and then use that help to finish the problem on your own. **Violation of this policy, cheating on exams, or any other form of academic dishonesty is prohibited by Brown's Academic Code and may have serious consequences.**

## Other Important Resources

We want you to feel supported in your work in this course. It is entirely natural and to be expected that problem solving is sometimes challenging. You are not expected to be able to whiz through all the problems you are given. Be patient with yourself. Give yourself enough time to play with the problems before you have worked out a solution and enough time to reflect upon them afterwards. Other help is also available without any appointment:

- **ED Discussion:** we will use Ed Discussion for the course. This is a good place to ask questions about problems and concepts. These questions may sometimes be answered by the Math 100 teaching team, though ED Discussion is often most effective when students answer each other's questions, so you are encouraged asking and answering questions.
- **Brown's Academic Tutoring Program** organizes peer group tutoring sessions for various courses (including this one), available on a limited basis to students who sign up.
- **Study groups:** you are encouraged to form study groups with your classmates. This is a wonderful way to learn the material. Discussion helps solidify the ideas as well as increase fluency in the language of mathematics.

## Exams

More information on the tests/exams will be posted on the Exam Information page.

### Tentative Schedule

- 9/26 (Tue) Integration Techniques Test
- 10/10 (Tue) Unit 1: Integration (unit completion exam)
- 11/14 (Tue) Unit 2: Series (unit completion exam)
- 12/5 (Tue) Unit 3: Differential equations and Polar coordinates (unit completion exam)

If you have an accommodation through SAS, you are entitled to extra time as documented in your letter.

## Math 100 Group Project

Math 100 introduces integration, infinite series, and differential equations; three topics that are integral in many other fields and in daily life. A component of our course grade will be a group project. Group projects is a wonderful way to work with others and explore topics or theorems that we have encountered over the semester. As an example, past projects have included songs, apps, games, stories and poetry. Group project presentations are always a fun and exciting occasion; show us what amazes and interests you in Math 100 *and* why it matters.

Guidelines will be made available in mid-semester.

## Grading

Your final grade for the course will be determined based on a weighted average calculated as follows:

- 6 % Integration Techniques Test
- 8 % Unit 1: Integration (unit completion exam)
- 14 % Unit 2: Series (unit completion exam)
- 10 % Unit 3: Differential equations and Polar coordinates (unit completion exam)
- 7% Final course completion assignment (will be assigned towards the end of the semester)
- 6% Final group project\*
- 35% Homework
- 16% Recitation

\*More details on the final group project will be posted on the course website later this semester.

Note that when calculating the homework average, we will drop your four lowest grades. This policy is specifically intended to account for unpreventable absences, so that even if your absence is "excused," you will not receive extra dropped grades. However, if an illness or other documented issue causes you to miss more than four homework assignments, please contact the course head and in that case, we may drop additional grades to account for the absence. All weeks are weighted equally (even if one homework is 24 points and another is 20 points, each is converted to a percentage before averaging).

We will calculate your recitation grade at the end of the semester. Your grade for each recitation is calculated as 50% for participation and/or presentation and 50% for group work and/or quizzes. We will give everyone two drops!

Individual grades are not curved; if your first exam grade is a 78%, it counts as a 78%. The only sense in which the course is "curved" is that cutoffs between letter grades are not determined until the end of the semester. We choose these cutoffs based partially on the distribution of student grades this semester, and partially on typical percentage grades (and grade distributions) from previous semesters of the course. If an exam has an unusually high or low average, we take that into account when choosing the cutoffs.

The purpose of this is not to be unfair or to present a "moving target." It's to give us the flexibility to lower (not raise) our thresholds and give higher letter grades to students who come close to the traditional cutoffs. For example, if we were to set concrete cutoffs at the beginning of the semester, we would only give passing grades to students who finish higher than 65%, but instead we have a floating cutoff so that we can also pass some students who come close to 65%... how close depends on the factors above. Every cutoff has a maximum value; for example, any student finishing above 65% is guaranteed (at least) a C, as we will never raise that cutoff above 65%. So for those students who want a concrete goal, every letter grade has a percentage you can shoot for to guarantee that grade.

- The cutoff between C and NC will be no higher than 65%, and it will most likely fall somewhere between 60% and 65%.
- The cutoff between B and C will be no higher than 80%, and it will most likely fall somewhere between 75% and 80%.
- The cutoff between A and B will be no higher than 90%, and it will most likely fall somewhere between 87% and 90%.

(For students who voluntarily register for the course with S/NC grading, students earning a B or C will receive an S, and students earning an A will receive an S with distinction.)

## **Academic Integrity**

The instructors of this course take Brown's Academic Code, and academic integrity in general, very seriously. Submitting dishonest work, whether on homework or exams, makes it more difficult to effectively help you and your fellow students learn, and it dilutes the meaning of a Brown degree. It is your responsibility to understand what actions are allowed in this course, and what actions are violations of the Academic Code. Further information is available [here](#). Any incidents that appear to violate course rules will be presented to, and adjudicated by, the university's Academic Code committee.

## **Inclusivity and Nondiscrimination**

This course strives to be accessible and inclusive to all students, regardless of age, race, nationality, gender identity, sexual orientation, religion, and economic background. We are committed to conducting all interactions with students with a sense of respect and equity. We ask that students interact with other students and instructors in this same spirit. If something happens to make you feel unwelcome or discriminated against, please bring it to our attention so that we can respond accordingly. In addition, Brown is committed to providing support for students with learning differences, physical impairments, and other disabilities. If you think you may need accommodations due to one of these conditions, please contact Student Accessibility Services for more information.