Math 111 Fall 2020 Syllabus

Section 1 (Oser) - Tu/Th 1:00pm - 2:15pm  
Section 3 (Oser) - Tu/Th 2:40pm - 3:55pm

Instructor:  Paul Oser  Email:  poser3@emory.edu  
Zoom Classroom:  973-7774-8879  
Zoom Office:  652-382-252 (hours posted in Canvas)

Textbook
Calculus: Early Transcendentals, 8th Edition by Stewart. WebAssign will also be used and generally includes access to a digital version of the textbook.

Course Content
Mathematics 111 is the first semester of introductory calculus. Course content includes: limits; continuity; the derivative; differentiation of algebraic, trigonometric, and the natural logarithmic and exponential functions; applications of derivatives; anti-derivatives; the definite integral; integration by substitution; and applications of the definite integral. A calendar of topics is provided at the end of this syllabus.

Course Goals: Upon successful completion of Math 111 students will be able to

1. Evaluate limits and interpret the results in relation to the graph of a function.
2. Define the derivative and relate this definition to the graph of a function and to the concept of “rate of change.”
3. Explain proofs of some of the basic theorems, those that require only elementary algebra, geometry, and induction.
4. Differentiate algebraic, trigonometric, logarithmic and exponential functions.
5. Apply the derivative to the graphs of functions, to optimization situations and to related rate problems.
6. Define the definite integral and its relationship to area and volume.
7. Evaluate definite and indefinite integrals using algebraic techniques and the method of substitution.
8. Write mathematics clearly and cogently.

In general, each student should be able to calculate derivatives, to evaluate limits, and to evaluate integrals (both definite and indefinite). Students should be able to apply appropriately their calculations and evaluations. In addition, students should understand the concepts of limit, continuity, derivative, anti-derivative, and have a beginning understanding of proof. The primary purpose of this course is to provide a solid foundation for success in Mathematics 112.

Prerequisites
Mathematics 111 is a beginning course: no prior exposure to calculus is needed! However, an advanced understanding of pre-calculus concepts (including algebra, logarithms and exponents, and trigonometry) and skill in applying them is necessary to perform well in the course.
Course Success
Mathematical ability is a skill—just like riding a bicycle or playing an instrument. As with any other skill, one’s mathematical ability can be developed and improved through mindful and intentional practice. Students who thoughtfully engage with course material on a regular basis are more likely to demonstrate a high level of performance on tests. In addition to the graded assignments in this course, a collection of suggested problems will be provided for each topic covered. Spending time thoughtfully completing these problems is the only way to become adept at these concepts and thus be well-prepared for tests. Students should realize that they are not really ”done” with a problem until they can produce a full solution for it without any sort of assistance. The amount of time required to practice a topic can vary from student to student and topic to topic, but this individual practice is the most important aspect of preparation for this course; it is worth investing the time necessary to build proficiency with each topic!

Expected Workload
Students’ weekly commitment will be split across three components: asynchronous material online, synchronous class meetings, and individual homework and practice. All three components are vital to success in the course.

- **Asynchronous Material Online**: The bulk of the content for this course will be delivered via recorded lectures and written materials provided on Canvas. These will be organized by day in the Canvas learning management system and have corresponding assignments on WebAssign to introduce the concepts and procedures presented; additionally, students are encouraged to ask questions about the day’s material on Piazza and respond to questions posed by classmates.

- **Synchronous Class Meetings**: Synchronous meetings will be held via Zoom for 75 minutes during regularly scheduled class time. Part of this time will be spent addressing questions or other important details about the course material that need further explanation. A significant portion of this time will be spent in groups discussing and presenting solutions from a recent problem set or working together on a quiz. Students are expected to attend all synchronous sessions; if students plan on missing more than a couple classes, they are strongly encouraged to reconsider their plans one way or the other.

- **Individual Homework and Practice**: Mathematical ability is a skill, thus its improvement requires regular meaningful practice. In this course, some of this practice is structured, in the form of graded assignments; however, most of practice and study for the course will be left to the discretion of the student. Students should plan to spend 45 to 75 minutes each day (between four and six hours every week) working and practicing problems on their own.

Online Tools
Below are some of the online tools that will be used over the course of the semester.

- **Canvas**: This learning management system will be used to organize most aspects of this course and to communicate any announcements and updates. Canvas will provide links to daily asynchronous learning material (video lectures, notes, etc) and is also where any written assignments will be submitted (students should ensure they have a way to scan these as pdfs). Canvas has an integrated automated proctoring system using Respondus Monitor and LockDown Browser, which records students during online assessments; these technologies may be used for tests and exams. Students should ensure they have access to a compatible computer and browser; and note that Chromebooks are not compatible with these tools.

- **Zoom**: Synchronous class meetings will be held via Zoom; students should plan to be present with their cameras on for the length of each meeting. Breakout rooms will be used during class meetings and students will frequently need to share written work using the “Share Screen” feature. Students may be asked to record themselves working through a problem during the semester; Zoom is a good tool for this. One should note that only Windows and OS X versions of Zoom have these capabilities fully implemented; in particular, Zoom for Chromebooks cannot use breakout rooms while the iOS and Android versions of Zoom have limited recording functions.
- **WebAssign**: Problem sets, daily “pulse-check” assignments, and some assessments will be conducted via the online homework platform WebAssign. This is a service owned by the publisher of the course textbook, so the system is closely integrated with the materials, examples, and exercises presented in the book. In addition to its online homework capabilities, WebAssign also offers written solutions, recorded explanations, and other resources to aid students in their practice. Students must purchase an access code to use this platform; codes are often available to purchase as part of a bundle with the textbook, but can also be purchased on their own. Codes are admittedly not cheap, but conveniently allow access to an electronic version of the textbook.

- **Piazza**: Content-related questions can be posted on Piazza, a discussion platform that is well-designed for posing and answering mathematical questions. It is incredibly helpful in one’s learning to both ask questions and explain answers to classmates. The instructor will check questions almost every day, though will generally wait to give students an opportunity to answer or discuss a problem before chiming in. One should note that Piazza’s business model is based upon sharing personal information with interested employers; students do not have to agree to share their information in order to use this platform.

**Grading**

Final course grades will be determined as follows:

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<tr>
<th>Component</th>
<th>Percentage</th>
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<tr>
<td>Participation</td>
<td>10%</td>
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<tr>
<td>Problem Sets</td>
<td>15%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Gateway Exam</td>
<td>5%</td>
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<tr>
<td>Tests</td>
<td>40%</td>
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<tr>
<td>Final Exam</td>
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<td><strong>TOTAL</strong></td>
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In general, letter grades will be determined as follows, based on points each student earns:

A: at least 90%; B: 80-89%; C: 70-79%; D: 60-69% points; F: less than 60%.

Grades of A-, B+, B-, C+, C-, D+ may be assigned for sums of points near these cut-off totals.

**Participation**

Frequent thoughtful engagement with course content is critical to success this semester—this applies to both engagement with the asynchronous course materials provided as well as engagement during synchronous class meetings. Students’ levels of participation in the course will be tracked and affect their overall course grades this semester.

- **Asynchronous Material**: The Hungarian mathematician Paul Erdős would refer to someone having “died” to mean that they no longer worked in mathematics. To ensure that students are frequently working through the course materials provided online, there will be “pulse-check” assignments on WebAssign that are to be completed on a near-daily basis. These will contain a small handful of basic exercises from topics covered recently in the course. One should note that these assignments represent a **bare minimum** level of engagement with the course material and will **not** be adequate preparation for the tests in this course.

- **Synchronous Meetings**: To get the most out of class meetings, it is important that students come prepared to participate in the day’s group discussions and activities. It is consequently important to allot enough time for preparation and careful study of the provided materials on Canvas, to thoughtfully work through the related “pulse-check” assignment on WebAssign, and to ask questions on Piazza. This last step is particularly important: these questions will help determine any additional explanations or examples to be presented during synchronous meetings. If regular attendance of the synchronous meetings is prohibitive for some reason, affected students should contact the instructor about this as soon as possible.

Participation grades will be based on how often students complete the “pulse-check” assignments on time and how often students attend and actively engage in each synchronous meeting. As these are minimal expectations for
the course, the instructor will track when these expectations are not met and use this to determine grades for this component of the course.

**Problem Sets**
In addition to the “pulse-check” assignments, longer problem sets pertaining to recent material will be provided via WebAssign and Canvas regularly. Students must complete these problem sets by their due date, which typically will be each Friday.

To receive full credit for these problem sets, students must do TWO things by the assignment’s due date:

1. Correctly answer all questions in WebAssign (if applicable).
2. Submit scanned work to Canvas showing clearly-written and well-organized solutions for each problem.

Generally grades for each problem set will be determined by the score earned on the corresponding WebAssign assignment. A significant penalty will be applied if written solutions are not submitted via Canvas. Submissions should be an accurate reflection of each student’s personal work; students are welcome to use the available resource provided within WebAssign and to discuss pertinent concepts in general with classmates, but should not share work for these particular problems before they are due. Students’ written solutions will frequently serve as the basis of group discussions and presentations in synchronous class meetings.

**Quizzes**
Synchronous class meetings will often include a quiz with one or two problems related to recently-covered material. Sometimes these problems will mirror the types of problems one might see on tests or in the problem sets, while other times students will be tasked with something more “creative.”

Usually a small amount of time will be spent in class to begin these quizzes within small discussion groups. However, additional time outside of the synchronous session will often also be needed to complete the task at hand. Completed quizzes should be submitted to Canvas by the appropriate deadline. For these and all assessments in the course, in addition to performing correct computations, students should ensure their work is organized well and presented as a logically cohesive and easy-to-follow solution.

**Gateway Exam**
In order to pass this course, one must pass an examination on applying derivative rules without the use of notes, calculator, or any other resource; correctly and efficiently using these rules is critical to understanding advanced concepts that will be encountered this semester and in subsequent courses. Full credit will be given for a perfect test while having only one mistake will earn 70% credit; submissions with more than one mistake will receive no credit.

Passing the Gateway Exam will require plenty of practice, but this is a goal that every student in this course can and must achieve. Students will have three opportunities to pass the gateway exam and must take each scheduled exam until one is passed. Any student may re-test for a better score with no penalty.

**Tests**
Four tests will be given during the scheduled synchronous sessions on the following dates: Sept 15, Oct 13, Nov 3, and Nov 24. Students are expected to take each test at its scheduled time.

Students may use no additional resources in the completion of each test: the use of calculators, the textbook, or notes during the exam is forbidden. To help ensure these expectations are followed, one should note that a remote proctoring system may be utilized for these assessments.

Conflicts, problems, and emergencies will be handled on an individual basis and should be brought to the instructor’s attention as soon as possible. In very extraordinary cases, arrangements may be made to take a test prior to the testing time; such arrangements must be made at least one week in advance. In the unusual case where a test
must be taken late, students should be aware the test given may be made more difficult to offset the additional time available for study.

**Final Exam**
A cumulative, synchronous final exam will be given after Thanksgiving, no earlier than Dec 3rd. The precise date and time will be announced soon. The exam will be in a format similar to that of the other tests in the course.

**Attendance**
This semester due to the pandemic, some students might be sick or will need to go into isolation or quarantine. If a student becomes sick and must consequently be absent, he or she should understand the instructor will be flexible with regard to attendance. Students in this situation should email the instructor so that they can discuss their individual circumstances and how to best proceed. For students in quarantine who are well, the course has been structured so that they can keep up with the work. Students in quarantine should also contact the instructor via email to communicate their situation.

**Class Session Recording**
Class sessions on Zoom may be recorded (both audio and video) for students in the class to use as reference as needed, and for enrolled students who are unable to attend live.

Lectures and other classroom presentations presented through video conferencing and other materials posted on Canvas are for the sole purpose of educating the students enrolled in the course. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructor states otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation and may also be a violation of other state and federal laws, such as the Copyright Act.

Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. In the rare case that students are unwilling to consent to have their profile or video image recorded, or have their voice recorded during class, they must meet individually with the instructor via Zoom to discuss how to proceed.

**Questions**
Mathematics is all about posing and answering questions. Questions that ask “why?” are among the most important; related to these are “what happens if...?” questions. Asking questions is also a necessary part of learning mathematics; as such, students should frequently ask questions throughout their studies and zealously seek their answers. Silly as it may sound, students should always try to answer their own questions before asking someone else: mathematics is full of results that are not immediately obvious but are obtainable through some logical combination of obvious facts. When students do come across a question they are unable to answer on their own (even with the help of the textbook), they should seek out advice on the matter from the instructor or classmates. While this can be challenging to do remotely, one can try to make good use of the tools used in the course: setting up study groups via Zoom is a terrific idea, while Piazza can be a good way to ask burning questions while they’re fresh in one’s mind. The instructor will of course be available for questions during class meetings and office hours. Piazza offers another avenue to get help from the instructor.

**Written Style**
Mathematicians value the efficient communication of logical arguments and statements. Thoughts are expressed by sentences: just so in mathematics. The textbook provides good examples of how to do this. Written work submitted in this course must be in complete sentences. One should note “1+1 = 2” is a complete sentence (it has a subject “1+1”, verb “=", and predicate “2”). One should carefully consider the most efficient way to convey one’s thought process in doing mathematical work; use mathematical symbols wherever appropriate, but also know that even in mathematics, words formed into complete sentences are often the most effective way to communicate.
Electronics
Students should use electronic devices in a way that is conducive to the task at hand: learning. Please keep cell phones silenced and refrain from responding to text or other electronic messages during class meetings. It may be helpful to do this while working independently on class material, too.

Special Accommodations
The Office of Accessibility Services (OAS) works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, please contact the OAS and complete the registration process. Faculty may not legally provide students with accommodations until an accommodation letter has been processed and discussed with them; accommodations do not start until this point and are not retroactive. Students registered with OAS who receive a letter outlined specific academic accommodations are thus strongly encouraged to immediately coordinate a meeting with their professors to discuss a protocol to implement accommodations that will (or may) be needed over the course of the semester. This meeting should occur as early in the term as possible. Contact Megan Bohinc in OAS for more information at (770) 784-4690 or oas.oxford@emory.edu

Honor Code
All students must abide by the Emory Honor Code. Students should submit only their own work on tests and problem set solutions and ensure these accurately reflect their personal understanding of the question and related concepts. Students should also make sure to follow all instructions and adhere to the expectations for each assessment detailed in this syllabus. Honor code violations must be reported. Read the Code: http://oxford.emory.edu/catalog/regulations/honor-code.html

Getting Help
Students should utilize the following resources:

- **Office Hours:** Online availability via Zoom will be posted on Canvas.
- **Canvas:** Announcements and important documents will be posted on the course’s Canvas site. The student is responsible for regularly checking the site for new announcements and resources, including homework assignments and handouts.
- **Piazza:** A good place to get course-specific guidance is Piazza: students can receive some guidance on whatever question they have either from the instructor or from their classmates.
- **Supplemental Instruction:** Supplemental instructors are students who have previously taken the course and know how to be successful in it. This course has two SIs who will support students via online resources and sessions.
- **Math Center:** Student tutors are planned to be available through the Math Center. Additional information about online tutoring and online resources from the Math Center are available at http://math.oxford.emory.edu.
- **Study Groups:** When used appropriately, study groups can be a useful tool in learning mathematics. Study groups should complement and enrich individual study of course material; with particular regard to homework assignments, it is suggested that study groups discuss completed (or attempted) assignments rather than work through homework problems for the first time.

Note: Student work submitted as part of this course may be reviewed by Oxford College and Emory College faculty and staff for the purposes of improving instruction and enhancing Emory education.
Tentative Schedule (Tu/Th Sections):
Any needed adjustments to what is given below will be reflected in Canvas, on the official schedule for the course.

Aug 20 Review (as necessary) §1.1-1.5; Motivating the Study of Calculus §2.1
Aug 25 Intuitive vs. Formal Approaches to Limits §2.2, §2.4
Aug 27 Limit Laws §2.3; Limits at Infinity §2.6
Sep 1 Comparison of Functions; Limits of Compositions
Sep 3 Continuity; Intermediate Value Theorem §2.5
Sep 8 The Derivative §2.7, §2.8
Sep 10 Mathematical Induction
Sep 15 Test 1
Sep 17 More on the Derivative §3.1; Basic Derivative Rules §3.2
Sep 22 Trigonometric Derivatives §3.3
Sep 24 Chain Rule §3.4
Sep 29 Implicit Differentiation §3.5; Logarithmic Differentiation §3.6
Oct 1 Related Rate Problems §3.9
Oct 6 Differentials and Approximation §3.10
Oct 8 Extrema §4.1
Oct 13 Test 2
Oct 15 Mean Value Theorem; Monotonicity and Concavity §4.2
Oct 20 Graphing I §4.3
Oct 22 Graphing II §4.5
Oct 27 Optimization Problems §4.7
Oct 29 Antiderivatives and Substitution §4.9, Differential Equations §9.1, §9.3
Nov 3 Test 3
Nov 5 Summation and Area §5.1; Integration §5.2; Average Value §6.5
Nov 10 Fundamental Theorems of Calculus §5.3
Nov 12 Substitution §5.5
Nov 17 Net Change §5.4
Nov 19 Area Between Curves §6.1
Nov 24 Test 4