# Math 110
## Oxford College of Emory University
## Fall 2017

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| **Instructors:** | Dr. Benjamin Purkis | Dr. Michael Rogers |
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**Course Content:** Mathematics 110 provides students with an integrative approach to Calculus I that includes the necessary precalculus topics:

Review of algebra; functions; trigonometric, inverse trigonometric, logarithmic and exponential functions. Calculus topics include limits, continuity, the definition of the derivative, differentiation, extrema, antiderivatives and optimization problems.

**Textbook:** James Stewart, *Single Variable Calculus: Early transcendentals, 7th or 8th Edition.* Try to read the book before coming to class: believe us, this is a very useful habit.

**Course Goals:** Upon successful completion of Math 110 students will:

1. Be able to perform complex algebraic manipulations.
2. Be able to graph and compute with algebraic and transcendental functions.
3. Understand conceptually limits and their relationship to the graph of a function.
4. Understand conceptually the derivative and its relationship to the concept of "rate of change".
5. Be able to calculate derivatives and evaluate limits.
6. Be well-prepared for Math 111.

**Classes:** The student is expected to attend all classes since the student is responsible for work covered and/or announcements made in class. An inordinate amount of absences will be handled in accordance with school policies. In addition to the regular class meetings, there will also be some tests scheduled on Tuesday or Thursday mornings.

**Homework:** Homework is assigned almost every day of class. Students should expect to spend at least 2 productive hours of study for each class session, or about 6 to 8 hours per week.

Students are encouraged to ask questions of the instructor about any problems with which they struggled in these assignments, usually during the instructor's office hours and/or at the Math Center. These exercises usually will not be collected, but instead are for the benefit of the student. However, the quizzes that are given may be based on the homework problems.

**Quizzes:** Some number of in-class quizzes will be given and most of them will be unannounced. The student must be present in class to take each quiz. No make-up quizzes will be given, regardless of the circumstances; however, the lowest two quiz grades will be dropped.

**Gateway Exams:** In order to pass this course the student must pass an examination in algebra, graphs and transcendental (trigonometric, inverse trig, logarithmic and exponential) functions. The student will be allowed three chances to pass it (see below). Each test will be different but very similar to the first test.

- **First Gateway: 8:00 am, Thursday, October 19**
- **Second Gateway: 8:00 am, Tuesday, October 31**
- **Last Gateway: 8:00 am, Tuesday, November 21**

**Tests:** Four major tests will be given. All of the tests will be comprehensive. Calculators will **<u>not</u>** be allowed on tests. Each student is expected to take tests at the scheduled times. Any conflicts should be brought to the instructor's attention as soon as possible. If a legitimate reason exists for missing a test - as determined by the instructor - then the test must be taken prior to the regularly scheduled date. In the unusual circumstance where taking the test early is not possible, **students should be aware that any make-up test given will be designed to be more difficult to offset the additional time given for study**. Students must provide written documentation in advance of any special accommodations required for testing. This includes additional time or other needs. The final exam cannot be rescheduled.

The tests will be given on the following days:

- **8:00 am, Thursday, September 21 - Test 1**
- **8:00 am, Thursday, October 12 - Test 2**
- **8:00 am, Tuesday, November 7 - Test 3**
- **In Class, Friday, December 1 - Test 4**

**Skills Test:** An optional skills test will be given on **Thursday, September 28** at **8:00 am**. This test will cover the algebraic and trigonometric skills studied during the first unit of the course. The skills test will be in explained in more detail following the first test.

**Projects:** Two projects will be assigned during the semester requiring a more in-depth mathematical investigation. These projects will be group projects, and more information will be available when they are assigned.

**Final Exam:** A cumulative final exam will be given in accordance with the schedule below:

- **Tuesday, December 12th, 2:00pm-5:00pm**          Section 9A (9:30-10:35, Rogers)
- **Wednesday, December 13th, 9:00am-12:00pm**      Section 10A (10:45-11:50, Purkis)
- **Wednesday, December 13th, 9:00am-12:00pm**      Section 10B (10:45-11:50, Rogers)
- **Thursday, December 7th, 7:00pm-10:00pm**        Section 12A (12:00-1:05, Purkis)

**Grading:** Evaluation will be based on the following written work:

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| Quizzes | 100 points |
| Gateway Exams | 100 points |
| Projects (2 @ 50 pts) | 100 points |
| Tests (4 @ 100 pts) | 400 points |
| Final | 200 points |
| Total | 900 points |

In general, letter grades will be determined as follows:

A:  810 points and above;    B:  $720 - 809$;    C:  $630 - 719$;    D:  $540 - 629$;    F:  less than 540 points

Grades of $A-, B+, B-, C+, C-, D+$ may be assigned for percentages near the above cut-offs.

**Canvas Website:** There is a course website on Canvas: `http://classes.emory.edu`. Homework assignments, extra handouts, announcements, scheduled SI sessions, questions related to problems, and other material can be posted at any time. Students are responsible for checking the site every day and obtaining related information.

**Supplemental Instruction/Help Sessions/Tutoring/Study groups:** The supplemental instruction (SI) leaders will be announced. They schedule study sessions to review concepts, to help students discover how

best to study. The SI is a student who has taken the course (or a similar course) before, has a good understanding of the material (but probably not as complete as the instructor), and knows how to be a successful student. Check the Canvas site for scheduled sessions.

Help sessions will be scheduled as there is demand for them. Attendance is optional.

Contact Christina Lee, Director of the Mathematics Center, for tutoring hours, most likely Mondays through Thursdays, 3–6 pm. Study groups, organized by students are highly recommended.

**Written Style:** Expressing complete thoughts and arguments require complete sentences. In mathematics, where clarity of thought is paramount, this is no less true. Granted, with mathematical symbols one can write these sentences very efficiently – but they are sentences nonetheless. Consider "$1+1 = 2$". This is a complete sentence (it has a subject "$1+1$", verb "$=$" and predicate "$2$").

To this end, your written work in this class should be in complete sentences. Use mathematical symbols wherever appropriate. Your work also needs to be neat and orderly to be intelligible. See the "Calculus Style Guide" on Canvas.

**Tips for Success:** Calculus is hard, but it can be made easier by intelligent and efficient study habits. The mathematician Richard Hamming said the purpose of calculation is insight. Insight is an understanding into why things work the way they do. This should be the goal of working out problems. Students should know **why** each step is correct and **why** each step was the right step to take. Note, this is more than knowing **that** each step is correct.

Although the homework exercises are not graded, it is important for the success of the student that they be completed as soon after covering the material as possible. Calculators may be used when appropriate, but the student should keep in mind that they are not permitted on the tests. While collaboration is encouraged, each student should be sure that he or she ultimately can ***solve problems unaided by notes, the textbook, a calculator, or other people***.

Practice good style on homework. A clean style helps to clean up messy thinking.

In general the student should expect to study at least six good hours per week in addition to time spent reviewing for tests.

Tests are performances, similar to those by athletes, musicians, and dancers. Prepare for them in similar ways. Begin practicing for them weeks in advance.

The topics we will cover are very useful and fundamental in the sciences, business and engineering, among other fields, and we want you all to succeed. However, success in the course will require your diligence and hard work. Be sure to keep up with the assignments and to attend class. Talk to your instructors as soon as you are having problems - don't wait until the week of a test. In addition to learning quantitative skills, it is important that you develop learning skills and study habits that will help you in calculus, in other courses, and in life beyond Oxford College.

You may always ask the instructors any question about an assignment. They will answer at their discretion.

Good luck and we hope this will be an enjoyable experience for all of you!


*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.*


*This syllabus is a guide for effective learning in this class; it is not a legal contract. The instructor reserves the right to modify the syllabus as needed.*

**A Word on Technology:** Please leave all iPods, MP3 players, netbooks, etc. stowed and off for the duration of the class. Cell phones should be silenced or off.

**Academic Accommodations:** Access, Disability Services and Resources (ADSR) works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, students must contact ADSR and complete the registration process. Faculty may not provide disability accommodations until an accommodation letter has been processed; accommodations are not retroactive. Students registered with ADSR who receive a letter outlining specific academic accommodations are strongly encouraged to coordinate a meeting time with their professor to discuss a protocol to implement the accommodation as needed throughout the semester. This meeting should occur as early in the semester as possible. Contact Access, Disability Services and Resources for more information at (770) 784-4690 or `adsroxford@emory.edu`. Additional information is available at the ADSR website at `http://equityandinclusion.emory.edu/access/students/index.html`.

**Religious Holidays:** Instructors are encouraged, not required, to accommodate students' academic needs related to religious holidays. Please make every effort to negotiate your religious holiday needs within the first two weeks of the semester; waiting longer may compromise your instructor's ability to extend satisfactory arrangements. If you need guidance negotiating your needs related to a religious holiday, the College Chaplain, Rev. Lyn Pace, `ppace@emory.edu`, Candler Hall 202, is willing and available to help.

**Please be aware that Rev. Pace is not tasked with excusing students from classes or writing excuses for students to take to their professors.*

Emory's official list of religious holidays may be found at:
`http://www.religiouslife.emory.edu/faith_traditions/holidays.html`.

**THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. TO RECEIVE CREDIT FOR WORK SUBMITTED YOU MUST PLACE YOUR NAME ON IT. BY PLACING YOUR NAME ON SUCH WORK, YOU PLEDGE THAT THE WORK HAS BEEN DONE IN ACCORDANCE WITH THE GIVEN INSTRUCTIONS AND THAT YOU HAVE WITNESSED NO HONOR CODE VIOLATIONS IN THE CONDUCT OF THE ASSIGNMENT.**

# Tentative Calendar:

| Monday | Tuesday | Wednesday | Thursday | Friday |
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| Aug 21st | Aug 22nd | Aug 23rd **1**<br><br>§APC[1]<br>Introduction: Optimization and calculus | Aug 24th | Aug 25th **2**<br><br>§"Handout A"[2]<br>Algebra Review |
| Aug 28th **3**<br><br>§"Handout A"<br>Algebra Review | Aug 29th | Aug 30th **4**<br><br>§1.2<br>Polynomial and Rational Functions | Aug 31st | Sep 1st **5**<br><br>§1.1<br>Piecewise-defined Functions |
| Sep 4th<br><br>*No class*<br>*Labor day holiday* | Sep 5th | Sep 6th **6**<br><br>§1.3<br>Combining Functions | Sep 7th | Sep 8th **7**<br><br>§ NTF[3] A<br>Trigonometric Functions |
| Sep 11th **8**<br><br>Class Canceled - Hurricane Irma | Sep 12th | Sep 13th **9**<br><br>§NTF B<br>Trigonometric Identities | Sep 14th | Sep 15th **10**<br><br>§NTF C<br>Graphing Trigonometric Functions |
| Sep 18th **11**<br><br>§NTF D<br>Solving Trigonometric Equations | Sep 19th | Sep 20th **12**<br><br>§NTF E<br>Inverse Trigonometric Functions | Sep 21st<br><br>**Test 1**<br>**8am** | Sep 22nd **13**<br><br>§NTF F<br>Exponential & Logarithmic Functions |
| Sep 25th **14**<br><br>§NTF G<br>Exponential & Logarithmic Equations | Sep 26th | Sep 27th **15**<br><br>§2.2<br>The Limit of a Function | Sep 28th<br><br>**Skills Test**<br>**8am** | Sep 29th **16**<br><br>§2.3<br>Calculating Limits |
| Oct 2nd **17**<br><br>§2.6<br>Limits at Infinity | Oct 3rd | Oct 4th **18**<br><br>§2.5<br>Continuity | Oct 5th | Oct 6th **19**<br><br>§2.5<br>Continuity |

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[1] See section "A preview of Calculus" in the textbook.

[2] See Handout on Algebra on Canvas

[3] See "Notes on Transcendental functions" on Canvas.

| MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY |
|---|---|---|---|---|
| Oct 9th<br><br>*Midsemester Break* | Oct 10th<br><br>*Midsemester Break* | Oct 11th **20**<br><br>REVIEW | Oct 12th<br><br>**Test 2 8am** | Oct 13th **21**<br><br>**Last day to withdraw.**<br>§Notes<br>Trig Review; Sigma Notation |
| Oct 16th **22**<br><br>§Notes<br>Binomial Theorem | Oct 17th | Oct 18th **23**<br><br>§2.7<br>Introduction to Derivatives | Oct 19th<br><br>**Gateway Exam 1st try, 8am** | Oct 20th **24**<br><br>§2.7<br>Using the Definition of Derivatives |
| Oct 23rd **25**<br><br>§3.1<br>Derivative of Polynomials | Oct 24th | Oct 25th **26**<br><br>§3.2<br>The Product and Quotient Rules | Oct 26th | Oct 27th **27**<br><br>§3.3<br>Derivatives of Trigonometric Functions |
| Oct 30th **28**<br><br>§3.4<br>The Chain Rule | Oct 31st<br><br>**Gateway Exam 2nd try, 8am** | Nov 1st **29**<br><br>§3.6<br>Derivatives of Logarithmic Functions | Nov 2nd | Nov 3rd **30**<br><br>§Notes<br>Combining Derivative Rules |
| Nov 6th **31**<br><br>REVIEW | Nov 7th<br><br>**Test 3 8am** | Nov 8th **32**<br><br>§4.1<br>Maximum and Minimum Values | Nov 9th | Nov 10th **33**<br><br>**Freshman withdrawal.**<br>§4.3<br>Increasing, Decreasing, and Concavity |
| Nov 13th **34**<br><br>§4.9<br>Antiderivatives | Nov 14th | Nov 15th **35**<br><br>§5.5<br>$u$-substitution | Nov 16th | Nov 17th **36**<br><br>§5.5<br>$u$-substitution |
| Nov 20th **37**<br><br>§Notes<br>Mixed Antiderivatives | Nov 21st<br><br>**Gateway Exam Last try, 8am** | Nov 22nd<br><br>*Thanksgiving recess* | Nov 23rd<br><br>*Thanksgiving recess* | Nov 24th<br><br>*Thanksgiving recess* |
| Nov 27th **38**<br><br>§4.7<br>Optimization | Nov 28th | Nov 29th **39**<br><br>§4.7<br>Optimization | Nov 30th<br><br>*EVENING REVIEW* | Dec 1st<br><br>**Test 4 In Class** |
| Dec 4th **40**<br><br>FINAL REVIEW | Dec 5th | Dec 6th<br><br>*Reading Day* | Dec 7th | Dec 8th **41** |