Math 111
Oxford College of Emory University
Spring 2015

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Course Content: Mathematics 111 is the first semester of single-variable calculus. The main topics are limits, differentiation, and integration of functions and applications of these topics; they include the analysis of algebraic and elementary transcendental functions. A calendar of topics is attached to this syllabus.

Textbook: James Stewart, *Single Variable Calculus: Early transcendentals, 7th Edition.*

Course Goals: By the completion of this course, the student should 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. Give proofs of some basic theorems, those that require only 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 rates 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.

Classes: The student is expected to attend all classes. An inordinate amount of absences will be handled in accordance with school policies. In addition to the regular class meetings, there will be several tests scheduled on Tuesday or Thursday mornings.

Homework: Homework is assigned almost every day of class. These exercises usually will not be collected but are for the benefit of the student. Students may ask questions, and quizzes based on the homework may be given. The instructor may ask to see a student's homework.

Students will need to spend **at least 3 productive hours of study for each class session, or about 9 to 10 hours per week**. Students should not get behind or wait until the night before a test to study. Sleep is important prior to tests.

Quizzes: There will be 11 quizzes and the grades of the best 10 will be counted. Most of the quizzes will be in-class and a student must be present to take the quiz.

Gateway Exams: In order to pass this course the student must pass an examination on derivatives. Each re-test will be different but very similar to the original test. The student will be allowed three opportunities to pass it.

Pre-calculus skill test: A diagnostic test on pre-calculus skills will be given in class on Friday, January 16th. It will cover basic algebraic skills (factoring, simplifying expressions, solving equations); transformations of functions (shifts, stretching and reflecting); functions: linear, quadratic, polynomial, rational, square root, algebraic, absolute value, transcendental (trigonometric, inverse trigonometric, exponential, logarithmic), piecewise-defined functions; and graphs of functions.

Tests: Two major tests (each with two parts) will be given. The tests will be comprehensive.

Documented special accommodations for test-taking must be cleared several days prior to the test date so that appropriate arrangements can be made.

Final Exam: A cumulative final exam will be given at the time scheduled by the Registrar.

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

Quizzes (10 @ 15 pts)	150 points
Gateway Exams	100 points
Pre-calculus Skill Test	50 points
Tests (2 @ 150 pts)	300 points
Final	200 points
Total	800 points

In general, letter grades will be determined as follows:

A: 91% and above;   B: $81 - 90\%$;   C: $71 - 80\%$;   D: $61 - 70\%$;   F: less than 60%

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

Calculators will NOT be allowed on quizzes or tests.

Blackboard Website: There is a course website **Math_OX111 Calculus I - Spring 2015** on the Blackboard: http://classes.emory.edu Homework assignment, 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 schedule study sessions to review calculus concepts, to help students discover how best to study calculus. The SI is a student who has taken the course (or a similar course) before, has a good understanding of the material, and knows how to be a successful student. Check the Blackboard for scheduled sessions.

Email is an official means of communication at Emory. Students are expected to read class-related emails every day. Frequently the instructor needs to communicate with the class or an individual via e-mail.

Contact Mr. Paul Oser, 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: Thoughts are expressed by sentences: just so in mathematics. Pay attention to your textbook: it is written in sentences. Your written work must be in complete sentences. Note "1+1 = 2" is a complete sentence (it has a subject "1+1", verb "=" and predicate "2"). Use mathematical symbols wherever appropriate. Your work also needs to be neat and orderly to be intelligible. See the "Calculus Style Guide" on Blackboard.

Tips for Success: Calculus is hard, but it can be made easier by intelligent and efficient study habits. Gauss 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. Know **why** each step is correct and **why** each step was the right step to take. 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 will need to study **at least 9 good hours per week** exclusive of the time spent on review for tests.

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

The topics we will cover are very useful and fundamental in the sciences, business and engineering, among other fields, and I 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 me 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.

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

Tentative Calendar:

Monday	Tuesday	Wednesday	Thursday	Friday
Jan 12th	**Jan 13th**	**Jan 14th** **1** §Handouts Mathematical Induction	**Jan 15th**	**Jan 16th** **2** Precalculus Skill Test
Jan 19th *No class* *MLK holiday*	**Jan 20th** Last day for changing courses.	**Jan 21st** **3** §Handouts Mathematical Induction	**Jan 22nd**	**Jan 23rd** **4** §2.2 The limit of a function
Jan 26th **5** §2.3 Calculating limits	**Jan 27th**	**Jan 28th** **6** §2.6 Limits at infinity	**Jan 29th**	**Jan 30th** **7** Review Limits
Feb 2nd **8** §2.5 Continuity	**Feb 3rd**	**Feb 4th** **9** §2.5 Intermediate Value Theorem	**Feb 5th**	**Feb 6th** **10** §2.7, 2.8 Definition of Derivative
Feb 9th **11** §3.1, 3.2 Differentiation Rules	**Feb 10th**	**Feb 11th** **12** §3.3 Differentiation Rules	**Feb 12th**	**Feb 13th** **13** §3.4 Differentiation Rules
Feb 16th **14** §3.5 Implicit Differentiation	**Feb 17th**	**Feb 18th** **15** §3.6 Derivative of logarithmic functions	**Feb 19th**	**Feb 20th** **16** Continuity and Differentiability
Feb 23rd **17** §4.1 Maximum and minimum values	**Feb 24th**	**Feb 25th** **18** Test 1 – Part 1	**Feb 26th**	**Feb 27th** **19** Test 1 – Part 2
Mar 2nd **20** §3.9 Related Rates	**Mar 3rd**	**Mar 4th** **21** §3.9 Related Rates	**Mar 5th**	**Mar 6th** **22** Last day to drop. §3.10 Differentials and Approximations
Mar 9th *Spring Break*	**Mar 10th**	**Mar 11th** *Spring Break*	**Mar 12th**	**Mar 13th** *Spring Break*

Monday	Tuesday	Wednesday	Thursday	Friday
Mar 16th **23** §4.2 Mean Value Theorem	**Mar 17th**	**Mar 18th** **24** §4.3 Monotonicity and Concavity	**Mar 19th** 8:30 a.m. Gateway Exam First opportunity	**Mar 20th** **25** §4.5 Graphing I
Mar 23rd **26** §4.5 Graphing II	**Mar 24th**	**Mar 25th** **27** §4.7 Optimization problems	**Mar 26th** 8:30 a.m. Gateway Exam Second opportunity	**Mar 27th** **28** §4.9, 5.4 Antiderivatives and Indefinite Integral
Mar 30th **29** §5.1 Summation and Area	**Mar 31st**	**Apr 1st** **30** §5.2 Definite Integral	**Apr 2nd**	**Apr 3rd** **31** Last day for freshman drop. §5.3 Fundamental Theorem of Calculus
Apr 6th **32** §5.5 Substitution	**Apr 7th**	**Apr 8th** **33** §5.5 Substitution	**Apr 9th**	**Apr 10th** **34** REVIEW
Apr 13th **35** Test 2 – Part 1	**Apr 14th**	**Apr 15th** **36** Test 2 – Part 2	**Apr 16th**	**Apr 17th** **37** §6.1 Area Between Curves
Apr 20th **38** §6.2 Volume - Disc/washer method	**Apr 21st** 8:30 a.m. Gateway Exam Last opportunity	**Apr 22nd** **39** §6.3 Volume - Shell method	**Apr 23rd**	**Apr 24th** **40** §6.5 Average Value of a Function
Apr 27th *Last day of classes*	**Apr 28th** *Reading Day*	**Apr 29th** **41**	**Apr 30th**	**May 1st** **42**