

Math 111
Oxford College of Emory University
Spring 2016

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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 or 8th 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 at least 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 15th. 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 2016** 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 instructors need to communicate with the classes or individuals via e-mail.

Contact Ms. Christina Lee for tutoring hours of the **Math Center**, most likely Mondays–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 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.

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

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

Monday	Tuesday	Wednesday	Thursday	Friday
Mar 14th <u>23</u> <u>§4.2</u> Mean Value Theorem	Mar 15th	Mar 16th <u>24</u> <u>§4.3</u> Monotonicity and Concavity	Mar 17th 8:30 A.M. Gateway Exam First opportunity	Mar 18th <u>25</u> <u>§4.5</u> Graphing I
Mar 21st <u>26</u> <u>§4.5</u> Graphing II	Mar 22nd	Mar 23rd <u>27</u> <u>§4.7</u> Optimization problems	Mar 24th 8:30 A.M. Gateway Exam Second opportunity	Mar 25th <u>28</u> <u>§4.9, 5.4</u> Antiderivatives and Indefinite Integral
Mar 28th <u>29</u> <u>§5.1</u> Summation and Area	Mar 29th	Mar 30th <u>30</u> <u>§5.2</u> Definite Integral	Mar 31st	Apr 1st <u>31</u> Last day for freshman drop. <u>§5.3</u> Fundamental Theorem of Calculus
Apr 4th <u>32</u> <u>§5.5</u> Substitution	Apr 5th	Apr 6th <u>33</u> <u>§5.5</u> Substitution	Apr 7th	Apr 8th <u>34</u> REVIEW
Apr 11th <u>35</u> Test 2 – Part 1	Apr 12th	Apr 13th <u>36</u> Test 2 – Part 2	Apr 14th	Apr 15th <u>37</u> <u>§6.1</u> Area Between Curves
Apr 18th <u>38</u> <u>§6.2</u> Volume - Disc/washer method	Apr 19th 8:30 A.M. Gateway Exam Last opportunity	Apr 20th <u>39</u> <u>§6.3</u> Volume - Shell method	Apr 21st	Apr 22nd <u>40</u> <u>§6.5</u> Average Value of a Function
Apr 25th <i>Last day of classes</i>	Apr 26th <i>Reading Day</i>	Apr 27th	Apr 28th	Apr 29th <i>Final Exam 9A, 9B 9 AM - Noon</i>
May 2nd <i>Final Exam 10A, 10B 9 AM - Noon</i>	May 3rd	May 4th	May 5th	May 6th