

# MATH 111 CALCULUS I

## FALL 2017

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**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; simple 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:

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 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.

**Text Material:** James Stewart, *Single Variable Calculus: Early Transcendentals, 7th Edition*; additional resources will be posted on Canvas.

**Class Attendance:** The student is responsible for the course material discussed in class; therefore, the student is expected to attend all classes. Generally, students who attend class on a regular basis perform better on assessments than those who elect to be absent occasionally. Students accumulating an inordinate number of absences will be referred to the associate dean of academic affairs. In addition to the regular class meetings, tests are scheduled for certain Thursday mornings.

**Grading:** Course grades will be determined as follows:

Quizzes	200 points
Gateway Exam	50 points
Problem Reflections	150 points
Tests ( $4 \times 100$ pts)	400 points
Final Exam	200 points
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TOTAL	1000 points

Letter grades will be determined based on the total points each student earns: A: at least 900 points; B: 800-899 points; C: 700-799 points; D: 600-699 points; F: fewer than 600 points. Plus and minus grades may be assigned for sums of points near cut-off values.

**Homework:** Students who thoughtfully engage with course material on a regular basis are more likely to demonstrate a high level of performance on tests and quizzes. A collection of suggested problems will be provided at most class meetings; each assignment should be completed before the next class. A homework assignment is not considered “complete” until the student is able to produce a full solution for each problem without any sort of assistance. The amount of time required to complete a homework assignment can vary from student to student, but completing each assignment is the most important aspect of preparation for this course; it is worth investing the time necessary to do it!

**Quizzes:** A brief quiz will be given at the start of most classes. These quizzes are intended as an incentive to keep up with the course material: students who have completed recent homework assignments will be well-prepared for the problems appearing on each quiz. A student’s four lowest quizzes will be dropped; additional quizzes may be dropped depending on the total number of quizzes given throughout the semester. The average of the remaining quiz scores will be used to determine each student’s overall quiz grade. There is no provision for making up quizzes since many will be dropped.

**Gateway Exam:** In order to pass this course, the student must pass an examination on applying derivative rules. All 50 points will be given for a perfect paper while having only one mistake will earn 35 points; papers with more than one mistake will receive no grade. Students will have three opportunities to pass the gateway exam and must take each scheduled exam until one is passed. Students may re-test for a better score with no penalty.

**Problem Reflections:** Throughout the semester, six challenging problems and activities will be assigned. These problems will vary in style and content, but will require using the skills and knowledge acquired from studying calculus in some different way. Responses will consist of a final product (which varies for each assignment) and a one to two page reflection summarizing the thought process, steps taken, and difficulties encountered while completing the assignment. Successfully completing the assigned task is the ultimate goal of each activity; however, a well-documented and thoughtful attempt that comes up short can still earn full credit. A student’s grade will be determined by the number of accepted responses: five responses will earn 150 points, with a 15 point penalty for each missing response down to 90 points for submitting one successful response.

**Tests:** Four tests will be given throughout the semester on the Tuesday and Thursday mornings indicated on the course calendar at the end of this syllabus. Students are expected to take tests at the scheduled times. Conflicts, problems and emergencies will be handled on an individual basis. For legitimate excuses, arrangements may be made far in advance to take a test prior to the scheduled testing time.

**Final Exam:** The final exam will be given according to the exam schedule and will be comprehensive. Rescheduling a final exam is rarely accommodated and must be approved by the associate dean of academic affairs.

**Inclusivity:** Students with a documented disability who anticipate barriers related to the format or requirements of this course, or presume to have a disability (e.g. mental health, attention, learning, vision, hearing, physical or systemic) and are in need of accommodations this semester should contact the Office of Accessibility Services (OAS) as soon as possible to learn more about the registration process and steps for requesting accommodations.

Students who are currently registered with OAS who do not receive an accommodation notification letter within the first week of class must notify OAS immediately by emailing [adsroxford@emory.edu](mailto:adsroxford@emory.edu). Students who have accommodations in place are encouraged to coordinate a face to face meetings with the instructor to communicate specific needs for the course as it relates to approved accommodations. All discussions with OAS and faculty members concerning the nature of a student's disability remain confidential. For additional information regarding OAS and how to register, please visit the website: [equityandinclusion.emory.edu/access](http://equityandinclusion.emory.edu/access).

**Support Services:** Students should utilize the following resources:

- **Office Hours:** Office hours will be posted on Canvas. These times vary due to meetings and other obligations, but most afternoons should have some availability.
- **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.
- **Supplemental Instruction:** Supplemental instructors are sophomores who have previously taken the course before and know how to be a successful student in it. Each SI will offer a weekly session to review course content and provide advice on how to prepare for the course. Attendance is optional, but students often find these sessions very helpful.
- **Math Center:** Student tutors are generally available in the Math Center (in OSB 101) Monday through Thursday afternoons. Additional online resources from the Math Center are available at <http://www.oxfordmathcenter.com>.
- **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.

**Written Style:** Thoughts are expressed through sentences, even in mathematics. Mathematical arguments will often use symbols to efficiently convey complex ideas, but these notions are still communicated through sentences. Note " $1+1 = 2$ " is a complete sentence: it has the subject " $1+1$ ", verb "=", and predicate "2". It is important to clearly communicate solutions using appropriate mathematical symbols and complete sentences; pertinent work needs to be neat and orderly to be intelligible. Taking time to be neat while working problems often eliminates careless mistakes and allows the writer (and ultimately, the audience) to focus on the main concept at hand.

THE HONOR CODE OF OXFORD COLLEGE APPLIES TO ALL WORK SUBMITTED FOR CREDIT IN THIS COURSE. BY SUBMITTING SUCH WORK, YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE ASSIGNMENT AND IN THIS SYLLABUS.

**TOPICS BY DAY**  
**Math 111, Fall 2017**

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Aug 21st	Aug 22nd	Aug 23rd <b>1</b> Introduction to Calculus	Aug 24th	Aug 25th <b>2</b> Induction and Problem Solving
Aug 28th <b>3</b> Tangent line, velocity, and other rates	Aug 29th	Aug 30th <b>4</b> Limits	Aug 31st	Sep 1st <b>5</b> Squeeze theorem
Sep 4th No CLASS (Labor Day Holiday)	Sep 5th	Sep 6th <b>6</b> Limits and compositions	Sep 7th	Sep 8th <b>7</b> Comparison of functions
Sep 11th <b>8</b> Continuity	Sep 12th	Sep 13th <b>9</b> Intermediate value theorem	Sep 14th	Sep 15th <b>10</b> The derivative
Sep 18th <b>11</b> Differentials	Sep 19th	Sep 20th <b>12</b> Test 1 wrap-up	Sep 21st <b>Test 1</b> (7:45AM)	Sep 22nd <b>13</b> Basic derivative rules
Sep 25th <b>14</b> Trigonometric derivatives	Sep 26th	Sep 27th <b>15</b> Chain rule	Sep 28th	Sep 29th <b>16</b> Implicit differentiation
Oct 2nd <b>17</b> Additional derivative rules	Oct 3rd	Oct 4th <b>18</b> Rate problems	Oct 5th <b>Gateway 1</b> (8:30AM)	Oct 6th <b>19</b> Approximation
Oct 9th No CLASS (Fall Break)	Oct 10th	Oct 11th <b>20</b> Test 2 wrap-up	Oct 12th <b>Test 2</b> (7:45AM)	Oct 13th <b>21</b> Extrema

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Oct 16th <b>22</b> Mean value theorem	Oct 17th	Oct 18th <b>23</b> Monotonicity and concavity	Oct 19th <b>Gateway 2</b> (8:30AM)	Oct 20th <b>24</b> Graphing I
Oct 23rd <b>25</b> Graphing II	Oct 24th	Oct 25th <b>26</b> Optimization problems	Oct 26th	Oct 27th <b>27</b> Antiderivatives and substitution
Oct 30th <b>28</b> Differential equations	Oct 31st	Nov 1st <b>29</b> Summation and area	Nov 2nd	Nov 3rd <b>30</b> Integration
Nov 6th <b>31</b> Test 3 wrap-up	Nov 7th <b>Test 3</b> (7:45AM)	Nov 8th <b>32</b> Average value	Nov 9th	Nov 10th <b>33</b> Fundamental theorems of calculus
Nov 13th <b>34</b> Substitution	Nov 14th	Nov 15th <b>35</b> Net change	Nov 16th <b>Gateway 3</b> (8:30AM)	Nov 17th <b>36</b> Area
Nov 20th <b>37</b> Volume I	Nov 21st	Nov 22nd NO CLASS (Thanksgiving Recess)	Nov 23rd	Nov 24th NO CLASS (Thanksgiving Recess)
Nov 27th <b>38</b> Volume II	Nov 28th	Nov 29th <b>39</b> Test 4 wrap-up	Nov 30th <b>Test 4</b> (7:45AM)	Dec 1st <b>40</b> Course wrap-up
Dec 4th <b>41</b> Final review	Dec 5th	Dec 6th	Dec 7th	Dec 8th <b>Final Exams</b> 08A: 12/11 at 2PM 09A: 12/12 at 2PM 10A: 12/13 at 9AM 12A: 12/7 at 7PM 01A: 12/7 at 2PM