

Math 111 Calculus I Spring 2019
Oxford College of Emory University

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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.

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.
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.

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 skills in applying them are 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 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 will be assigned almost every day of class. Most of these exercises will not be collected and are for the benefit of the students. *Selected homework problems will be collected as announced.*

It is important for the success of the student that homework be completed as soon as possible after covering the material. 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. Use good style on your homework.

In general students should expect to spend at least 2 – 3 productive hours of study for each class session,

or about 6 – 9 hours per week not counting the time spent reviewing for tests. Students may ask questions during office hours and at the Math Center.

Pre-calculus skill test: A diagnostic test on pre-calculus skills will be given in class on **Friday, January 18th**. 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.

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; papers with at least two mistakes 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.

Tests: Three 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 including documented special accommodations, arrangements may be made far in advance to take a test prior to the scheduled testing time. All tests will be comprehensive.

Final Exam: The final exam will be given according to the exam schedule and will be comprehensive.

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

Homework	100 points
Pre-calculus Skill Test	50 points
Gateway Exams	50 points
Tests (3 @ 100 pts)	300 points
Final	200 points
Total	700 points

In general, letter grades will be determined as follows:

A: at least 91%; 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 cut-offs.

Calculators will NOT be allowed on quizzes or tests.

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. Students who have accommodations in place are encouraged to coordinate a face to face meeting 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.

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 Monday through Thursday afternoons. Additional online resources 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 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 Canvas.

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 most of 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. 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.

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.*

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

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 14th	Jan 15th	Jan 16th <u>1</u> <u>§</u> Introduction to Calculus	Jan 17th	Jan 18th <u>2</u> Precalculus Skill Test
Jan 21st <i>No class MLK holiday</i>	Jan 22nd Last day for changing courses.	Jan 23rd <u>3</u> Mathematical Induction	Jan 24th	Jan 25th <u>4</u> Mathematical Induction
Jan 28th <u>5</u> <u>§2.2</u> Introduction to Limits	Jan 29th	Jan 30th <u>6</u> <u>§2.3</u> Calculating limits	Jan 31st	Feb 1st <u>7</u> Calculating limits
Feb 4th <u>8</u> <u>§2.6</u> Limits at infinity	Feb 5th	Feb 6th <u>9</u> Review Limits	Feb 7th	Feb 8th <u>10</u> <u>§2.5</u> Continuity
Feb 11th <u>11</u> <u>§2.5</u> Intermediate Value Theorem	Feb 12th	Feb 13th <u>12</u> <u>§2.7, 2.8</u> Definition of Derivative	Feb 14th	Feb 15th <u>13</u> <u>§3.1, 3.2</u> Differentiation Rules
Feb 18th <u>14</u> Test 1 Review	Feb 19th Test 1 8AM – 9:30AM	Feb 20th <u>15</u> <u>§3.3</u> Differentiation Rules	Feb 21st	Feb 22nd <u>16</u> <u>§3.4</u> Differentiation Rules
Feb 25th <u>17</u> <u>§3.5</u> Implicit Differentiation	Feb 26th	Feb 27th <u>18</u> <u>§3.6</u> Derivative of logarithmic functions	Feb 28th	Mar 1st <u>19</u> Continuity and Differentiability
Mar 4th <u>20</u> <u>§3.9</u> Related Rates	Mar 5th	Mar 6th <u>21</u> <u>§3.9</u> Related Rates	Mar 7th Gateway 1 8AM – 9:30AM	Mar 8th <u>22</u> Last day to drop. <u>§3.10</u> Differentials and Approximations
Mar 11th <i>Spring Break</i>	Mar 12th	Mar 13th <i>Spring Break</i>	Mar 14th	Mar 15th <i>Spring Break</i>

Monday	Tuesday	Wednesday	Thursday	Friday
Mar 18th <u>23</u> <u>§4.1</u> Maximum and minimum values	Mar 19th	Mar 20th <u>24</u> Test 2 Review	Mar 21st Test 2 8AM – 9:30AM	Mar 22nd <u>25</u> <u>§4.2</u> Mean Value Theorem
Mar 25th <u>26</u> <u>§4.3</u> Monotonicity and Concavity	Mar 26th	Mar 27th <u>27</u> <u>§4.5</u> Graphing I	Mar 28th Gateway 2 8AM – 9:30AM	Mar 29th <u>28</u> <u>§4.5</u> Graphing II
Apr 1st <u>29</u> <u>§4.7</u> Optimization problems	Apr 2nd	Apr 3rd <u>30</u> <u>§4.9, 5.4</u> Antiderivatives and Indefinite Integral	Apr 4th	Apr 5th <u>31</u> Last day for freshman drop. <u>§5.1</u> Summation and Area
Apr 8th <u>32</u> <u>§5.2</u> Definite Integral	Apr 9th	Apr 10th <u>33</u> <u>§5.3</u> Fundamental Theorem of Calculus	Apr 11th	Apr 12th <u>34</u> <u>§5.5</u> Substitution
Apr 15th <u>35</u> <u>§5.5</u> Substitution	Apr 16th	Apr 17th <u>36</u> <u>§6.1</u> Area Between Curves	Apr 18th Gateway 3 8AM – 9:30AM Last chance	Apr 19th <u>37</u> <u>§6.2</u> Volume - Disc/washer method
Apr 22nd <u>38</u> <u>§6.3</u> Volume - Shell method	Apr 23rd	Apr 24th <u>39</u> Test 3 Review	Apr 25th Test 3 8AM – 9:30AM	Apr 26th <u>40</u> <u>§6.5</u> Average Value of a Function
Apr 29th <i>Last day of classes</i>	Apr 30th	May 1st <u>41</u>	May 2nd	May 3rd Final Exam 11: at 9AM
May 6th Final Exam 10: at 9AM	May 7th	May 8th Final Exams 9: at 9AM 8: at 2PM	May 9th	May 10th <u>42</u>