

## **Mathematics 111, Calculus I**

**Fall, 2012**

Evelyn C. Bailey, office in Pierce 122  
ebailey@emory.edu

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.

Mathematics 111 is a beginning course. No prior exposure to calculus is needed! A good solid background in pre-calculus (algebra, logarithms and exponents, and trigonometry) is extremely important.

A list of specific topics by day is provided at the end of this syllabus.

### **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 the rules of differentiation.
- (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 to volume.
- (7) Evaluate definite and indefinite integrals using algebra techniques and u-substitution.

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 since both Mathematics 111 and 112 provide the student with a year of college calculus.

### **Text Material:**

Handouts and Notes on the Learnlink Class Conference and, as a reference: James Stewart, *Single Variable Calculus*.

**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 achieve better grades than those who elect to be absent occasionally. An inordinate number of absences will be handled in accordance with the College's policies and reported to the appropriate academic personnel.

**Calculators:** Calculators will not be needed or allowed on tests or quizzes.

**Grading:**

The student's final course grade will be determined as follows:

Major tests (3 @ 100 points)	300 points
Quizzes (best 12 out of 15 @ 20)	240 points
Gateway Test	50 points
Final Exam	<u>210 points</u>
TOTAL	800 points

In general, letter grades will be determined as follows, based on points each student earns:

- A: 720 or more points
- B: 640-719 points
- C: 560-639 points
- D: 480-559 points
- F: fewer than 480 points

Grades of A-, B+, B-, C+, C-, D+ may be assigned for sums of points near the above cut-off totals. For example, a B+ could be assigned for a sum of 710 points. Ultimately, the assignment of plus and minus is dependent on the overall class distribution of sums of points.

**Homework:**

Homework assignments are for the student's benefit and will not be collected. It is important, however, that each student thoughtfully completes most of the problems assigned. **The student will need to spend at least 10 good hours of study each week, not counting time spent reviewing for tests.**

Students should keep current. Cramming for calculus tests will not result in the best grade or the needed retention of material. This course builds on previous work. Students should get at least 6 hours of good rest prior to taking a calculus test; otherwise the law of diminishing returns kicks in, students will lose more than they retain.

Marathon studying does not work in calculus. Students who have had some calculus previously sometimes fail to study appropriately.

### **Gateway Exam:**

In order to pass this course, the student must pass an examination on derivatives. All 50 points will be given for a perfect paper on the Gateway Exam. There will be three opportunities for the student to earn all 50 points with a perfect paper. If the student has only ONE mistake, the student may choose to keep a score of 35 points. More than ONE mistake is not considered a passing grade. Students making at least 35 on Gateway Exam 1 will receive a bonus of 20 points. Each student needs to take each scheduled gateway exam until the student passes. Students may re-test for a better score with no penalty. Passing the Gateway Exam is a requirement for passing this course (Goal 4).

An example Gateway Exam is available on the class conference. The Gateway Exams will be given on the following days during class: **September 26, October 24, December 10.** Any student not passing one of the scheduled Gateway Exams and who attempted all three exams may petition the instructor to take a fourth Gateway Exam during the last week of classes or on Reading Day.

### **Quizzes:**

All quizzes are announced on the syllabus. A student must be present in class to take the quiz. There is no provision for making up quizzes since three will be dropped. **The Student Honor Code applies to the taking of these quizzes.**

Each quiz will be graded on a basis of 20 points although some quizzes may contain bonus points. A minimum of 15 quizzes will be given and the best 12 will be used as part of the grade determination for this course. **Quiz problems will be taken directly from the homework assignments.**

### **Major Tests:**

There will be two Thursday mornings tests (7:30am) in Pierce Hall, 2<sup>nd</sup> floor on **September 27** and **October 25**. Test 3 will be given in class in two parts on **December 5** and **December 7**. The final exam will be given according to the exam schedule and will be comprehensive.

Students are expected to take tests at the scheduled times. Conflicts, problems and emergencies will be handled on an individual basis. For reasons deemed legitimate by your professor, arrangements may be made for a student to take a test prior to the testing time; i.e., on the Wednesday prior to a Thursday morning test at 2:00 and on Tuesday or Thursday at 2:00 for test 3 parts 1 and 2. Arrangements must be made several days in advance.

Any student who needs special accommodations must provide documentation several days in advance of the needed accommodation so that appropriate arrangements may be made.

## **Responsibilities**

### **Of the Students**

As far as this course, each student needs to attend class regularly, to actively participate in the learning process both during class and outside of class, and to use the available support services in order to reach the expected competence level required in this course.

\* Each **student** has the following responsibilities:

1. Come prepared and on time to every class.
2. Complete all work on time with proper thought.
3. Consider that it is not always the fault of the instructor if the student doesn't understand the material. Use your outside help (office hours, SI sessions, class conference material)
4. Treat the instructor and peers with respect.
5. Ask questions. Asking questions is a sign of maturity, not ignorance, as long as the student thinks clearly before asking.
6. Understand that the instructor is not trying to "nit pick" when grading and remember that grading is the responsibility of the instructor. Accuracy is important in this class!

### **Of the Instructor**

As far as this course, the instructor is a facilitator of student learning and as such, should provide materials and the environment to enable students to learn what is expected.

\* The **instructor** has the following responsibilities:

1. Come prepared to every class.
2. Design each class so students can accomplish the cognitive objectives listed in the syllabus.
3. Provide appropriate tips for studying and study materials as seem appropriate.
4. Establish and foster a mutually respectful classroom environment.
5. Return tests and quizzes in a timely manner so that students will know their grade.
6. Grading, as far as possible, to be consistent and impersonal even though students might not agree with the decisions concerning partial credit.

## **Support Services:**

Students are expected to use the following:

**Office hours** will be posted on the class conference. Students should use this time to come by and ask specific questions related to this course. There is a study area outside Pierce 122 for you to use.

There is a **class conference**, Math 111 Fall 2012. Students should have the class conference on their desktops and should consult this conference frequently for announcements about office hours, SI sessions, tutoring; handouts, class notes and homework assignments. These handouts provide problems and explanations for the material being studied. Students may pose individual questions on the class conference.

There are **Supplemental Instruction (SI) leaders** for Math 111. Our student SI leaders will schedule review sessions each week, the topic for which will be posted on the class conference. Each student is encouraged to attend regularly. Even though these sessions are optional, students who regularly attend SI sessions generally do better in the courses for which there are SI leaders.

**Student tutors** are available (schedule to be posted as soon as it is finalized). Tutors may be found in the Mathematics Center in Pierce Hall.

**Study groups** organized by students are highly recommended. For these to be profitable, the meetings should be scheduled weekly and should be part of a regular weekly routine.

### **Written Style/Neatness:**

Neatness is one way of showing pride in individual work and courtesy toward the instructor.

Remember that thoughts in mathematics are expressed in sentences, such as “ $1 + 1 = 2$ .” There is a subject “ $1 + 1$ ”, a verb “ $=$ ”, and a predicate “ $2$ ”. Note that “ $=$ ” should not be treated as a comma “,”. When using an equality symbol, make sure that both sides of the equation are equivalent.

For all work, each student should strive to make a neat and logical presentation while using mathematical symbols appropriately. Taking time to be neat while working mathematical problems has been shown to eliminate many careless mistakes and to allow the student to focus on conceptual misunderstandings.

### **Organizational Guidelines for students:**

- (1) As soon as you get your syllabi from your courses, put important dates on a single calendar, clearly labeled.
- (2) Stay current in your subjects by setting aside 8 to 10 hours per week to study each subject. You may need more time in some subjects. Spread your per-subject time out over the week. Marathon studying, especially in mathematics, does not work well! So, make a schedule and keep to it! Be flexible enough to make changes in your schedule but don't schedule marathon studying.
- (3) Plan ahead so that you get enough sleep before a test or you will not be able to think clearly and logically.
- (4) Take advantage of the available outside help for each of your courses. Schedule at least one SI session per week for Math 111.
- (5) Plan ahead for all your papers and projects so that studying for tests is not compromised. Create and schedule mini-goals to attain the major goal of completion on time.
- (6) Have needed supplies for each course. Make sure you get copies of the handouts from the class conference PRIOR to the class for which they are needed.
- (7) Follow each syllabus carefully. For Math 111, your homework is provided in class for each class meeting. Reading the section before coming to class will help your understanding.

**Summary of Important Dates:**

September 3	Labor Day
September 26	Gateway Exam 1
September 27	Test 1 at 7:30 am Pierce Hall, 2 <sup>nd</sup> floor
October 15,16	Mid-semester break
October 24	Gateway Exam 2
October 25	Test 2 at 7:30 am Pierce Hall, 2 <sup>nd</sup> floor
November 21-25	Thanksgiving Break
December 5, 7	Test 3 Parts 1 and 2
December 10	Gateway Exam 3; Last Class Day

**Notes to the serious student:****1. How much to study:**

Calculus, to some, is a hard subject. It may be your most challenging course this semester. You should spend around 10 hours a week studying calculus, even if you have "seen it before." Don't assume you know the material! Extra time is needed to complete quizzes and the graphing portfolio. If you cannot make this level of time commitment this semester you will likely be better off taking calculus at another time.

**2. How to study:**

Students often find calculus texts hard to read. They are not to be read like a novel, or a history or even a biology text. Your text is a reference book. After class, read your notes and/or handouts obtained from the class conference and the textbook, as needed. Don't expect to understand fully much of what you've read until you start working on the exercises. In fact, you should spend most of your study time working problems, thinking about those problems, and discussing problems. As you get stuck, go back, re-read your notes or the appropriate handout or the textbook studying the examples and derivations, on a "need-to-know" basis.

**3. Homework:**

Work lots and lots of problems. When you finish the current section, you should go back and work review problems. Furthermore, you have not completed the homework just because you have the right answers, you must understand **why** your methods worked. If all you are doing is blindly applying formulas and mimicking examples, get extra help. The problems should make logical sense to you. You must get to the point where you are able to work problems correctly, from start to finish, without having "to flip" back to the answer or to previous work. Time to reflect on your work helps build confidence and speed and enables you to retain the material.

4. **Studying for tests:**

If you were an athlete preparing for track meet, and you slacked off during the weeks before the meet, doing just what you needed so coach wouldn't get on your case, and then stayed up running the whole night before your meet, you'd loose. Many students prepare for tests by cramming; they procrastinate and then believe that they can "stuff in" what they need for success by staying up all night attempting to study. Your brain will not to be in top shape by marathon studying. The right way to study is to do your work at a steady pace throughout the semester. There are a few facts and formulas you'll need to remember for a test. Make note cards for those facts and formulas and "touch base" with them often. In order to think well, you need to rest sufficiently and exercise adequately. Remember that aerobic exercise circulates blood to the body and that includes the brain.

5. **Come to class and use your outside help:**

Many college students treat class attendance as optional. This may be fine for some classes; however, for calculus you can get way behind very fast. You should come to class every period unless you are seriously ill. Schedule at least one SI session per week. Stop by and see your instructor during office hours to ask pertinent questions. Take charge of your learning!

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

**TOPICS BY DAY**  
**Mathematics 111, Fall Semester, 2012**

**NOTES:**

- \* Handouts, homework, class notes are on the LEARNLINK class conference.
- \* Refer to the class conference for homework assignments.
- \* Come to class ready to work problems, not merely to copy or to observe the instructor.
- \* Read the syllabus carefully, you are responsible for the content.

Wednesday, August 29

**Review of Functions;  
Introduction to Calculus;  
Begin Limits**

Friday, August 31

**Limits**

Monday, September 3

**Labor Day holiday**

Wednesday, September 5

**Continuity**

Friday, September 7

**Limits and Continuity  
Quiz 1**

Monday, September 10

**Intermediate Value Theorem;  
Definition of Derivative, Tangent Lines  
Quiz 2**

Wednesday, September 12

**Basic Rules of Differentiation (the constant-  
multiple, sum, and difference rules; derivatives of  
powers, transcendental functions)**

Friday, September 14

**Product and Quotient Rules,  
Higher Order Derivatives  
Quiz 3**

Monday, September 17

**Chain Rule**

Wednesday, September 19

**Continuity and Differentiability**



Friday, September 21

**Review of Differentiation, including all  
Algebraic and Transcendental functions  
Quiz 4**

Monday, September 24

**Implicit Differentiation**

Wednesday, September 26

**Review then Gateway Exam 1 (30 minutes)**

Thursday, September 27

**Test 1 at 7:30, Pierce Hall**

\*\*\*\*\*

Friday, September 28

**Related Rates**

And

Monday, October 1

Wednesday, October 3

**Extrema on an Interval;  
Mean Value Theorem  
Quiz 5**

Friday, October 5

**Graphing Concepts with Application  
to Polynomial Functions**

Monday, October 8

**Infinite Limits;  
Limits at Infinity  
Quiz 6**

Wednesday, October 10

**Graphing Rational Functions**

Friday, October 12

**Review Differentiation and Graphing  
Quiz 7**

Monday, October 15

**Fall Break – no class**

Wednesday, October 17

**Graphs with Vertical Tangents;  
Some other Types of Graphs**

Friday, October 19**Review Graphing  
Quiz 8**Monday, October 22**Review for test 2 and Gateway**Wednesday, October 24**Gateway Test 2 (30 minutes), Review**Thursday, October 25**Test 2 at 7:30 am, Pierce Hall**

\*\*\*\*\*

Friday, October 26**Optimization**

And

Monday, October 29Wednesday, October 31**Antiderivatives  
Quiz 9**Friday, November 2**Sums and Sigma Notation  
Mathematical Induction  
Quiz 10**Monday, November 5**Induction continued...**Wednesday, November 7**Definite Integral, Area  
Fundamental Theorem of Calculus  
Quiz 11**Friday, November 9**Integration by Substitution**Monday, November 12**More Substitution**Wednesday, November 14**Introduction to Differential Equations  
Separation of Variables  
Quiz 12**Friday, November 16**Area Between Curves**

Monday, November 19**Volumes of Revolution - Disk Method  
Quiz 13**Wednesday, November 21

And

Friday, November 23**Thanksgiving Break**Monday, November 26**Volumes of Revolution - Shell Method**Wednesday, November 28**Volumes of Revolution - both methods  
Quiz 14**Friday, November 30**Review Area and Volume  
Quiz 15**Monday, December 3**Review for test**Wednesday, December 5

And

Friday, December 7**Test 3, Part I****Test 3, Part II**

\*\*\*\*\*

Monday, December 10**Last class day  
Evaluation and Gateway Test 3**Wednesday, December 12**Reading Day****Final Exams:****Thursday, December 14 at 9:00****Tuesday, December 18 at 2:00****Final Exam for section 09A, in EV classroom****Final Exam for section 10A, in EV classroom**