**Mathematics 111, Calculus I**
Fall, 2007 - Dr. Evelyn C. Bailey

**Textbook:** Calculus: Early Transcendental Functions, 4th Edition by Larson, Hostetler and Edwards; Houghton Mifflin Company.

**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 list of specific topics by day is attached. This 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.

**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, the student should be able to calculate derivatives, to evaluate limits and to evaluate integrals (both definite and indefinite). The student should be able to apply their calculations and evaluations to functions. 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.

**Responsibilities:**

* 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, eReserves)
  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!

* 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. Create 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.

**Class Attendance**: The student is responsible for the course material discussed in class; therefore the student is expected to attend all classes. Students who attend class on a regular basis have higher averages 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.

**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 taking quizzes, reviewing for tests, and preparing the graphing portfolio.

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.

Students taking this course need to schedule study time throughout the week to total a minimum of ten hours for this course alone.

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

**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 four opportunities for the student to earn all 50 points. If the student has only ONE mistake, the student may choose to keep a score of 35 points and not retest. 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; students making at least 35 on Gateway Exam 2 will receive a bonus of 10 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 will be provided prior to the first testing day. The Gateway Exams will be given on the following mornings in Pierce 101,102: Tuesday, **September 25**; Tuesday, **October 16**; Tuesday, **November 6**; Tuesday, **November 27**.

**Quizzes**: All quizzes are announced and "take home." A student must be present in class to receive a quiz. Students must complete quizzes during one sitting and use only authorized materials (pencil, paper, and any reference material specifically authorized for a given quiz). Quizzes are due at class time on the class day following their assignment. If you are not in class when a quiz is given out, you generally cannot receive a copy of the quiz; however, exceptions to this policy are sometimes permitted on an emergency basis.

Each quiz will be graded on a basis of 25 points although some may contain bonus points. Ten quizzes will be given and the best eight will be used as part of the grade determination for this course. The attached daily topics schedule provides the schedule for quizzes.

**Major Tests**: Three tests will be given as follows at 2:15 in Pierce 101, 102: Test 1 on Friday, **September 28**; Test 2 on Friday, **October 26**; Test 3 on Friday, **December 7**. The final exam schedule lists the date and time for the final.

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

**Graphing Portfolio:** You should use software (GRAPHMATICA) available in the computer lab to prepare a portfolio of computer generated graphs. The portfolio is to contain at least 9 distinctly different displays of graphs. Each function is to be clearly identified by the formula. You should use only algebraic, trigonometric (including inverse trigonometric), logarithmic, exponential functions or combinations of them to construct your graphs (no polar).

The student must have at least three graphical displays where the important features of the graphs are clearly labeled (maximum, minimum, inflection points, etc.) The Curve Sketching Checklist (provided during the graphing section of this course and on e-Reserves) should be used to determine what graphing aspects should be labeled. These aspects need to be marked but need not have ordered pairs, real or approximated. These are the **technical graphs**.

The remaining graphs, at least six graphical displays, should be linked by a theme and should combine several functions to make picture displays. These are the **thematic graphs**.

Students may receive help with the use of the computer and software, but students must choose their own functions and create their own printouts and portfolio.

In the past, students have indicated that 40 to 60 hours are needed to complete this project; therefore each student should plan ahead!

Evaluation of the portfolio will be made on the selection of graphs, the documentation associated with the graphs, the completeness of the technical graphs, the creativity of the thematic graphs, the oral presentation of the portfolio, and expectation based on previous students' work. Accuracy, clarity, organization and originality are important in the finished product.

This assignment is due on Monday, **November 12** at class time. Oral presentations will be given on Monday, November 12 and, if needed, on Wednesday, November 14.

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

| | |
|---|---|
| Major tests (3 @ 100 points) | 300 points |
| Quizzes (8 out of 10, as noted above) | 200 points |
| Graphing Portfolio | 150 points |
| Gateway Test | 50 points |
| Final Exam | 300 points |
| TOTAL | 1000 points |

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

A: 900 or more points
B: 800-899 points
C: 700-799 points
D: 600-699 points
F: fewer than 600 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 888 points. Ultimately, the assignment of plus and minus is dependent on the overall class distribution of sums of points.

**Outside Help:** Students are encouraged to use the following:

Office hours will be posted weekly on the class conference. Students should use this time to come by and ask specific questions related to this course. In addition, students may e-mail, either privately or on the class conference.

There is a class conference, Math 111 Fall 2007. Students should have the class conference on their desktops and should consult this conference frequently for announcements about office hours, SI sessions, tutoring, outlines for tests, posting of grade distributions, etc. Students may pose individual questions on the class conference.

There are SI leaders for Math 111. Our SI student leaders will schedule review sessions each week, the topic for which will be posted on the class conference. Each student is encouraged to pick at least one of the times per week and attend regularly. Even though these sessions are optional, students who 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). Study groups organized by students are highly recommended. The meetings should be scheduled weekly and should be part of a regular weekly routine.

e-Reserves are available through the library. Each student needs to have these handouts prior to when they will be needed for the class. These handouts provide additional problems and explanations to the material being studied.

**Organizational Guidelines for students:**

(1) As soon as you get your syllabi from your courses, put all 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 this course.
(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 e-Reserves PRIOR to the topic for which they are needed.
(7) Follow each syllabus carefully. For Math 111, your homework is listed for each class meeting. Reading the section before coming to class will help your understanding.

**Summary of Important Dates:**

| | |
|---|---|
| September 3 | Labor Day |
| September 25 | Gateway Exam 1 at 8:30 |
| September 28 | Test 1 at 3:00 |
| October 8, 9 | Mid-semester break |
| October 16 | Gateway Exam 2 at 8:30 |
| October 26 | Test 2 at 3:00 |
| November 6 | Gateway Exam 3 at 8:30 |
| November 12 | Graphing Portfolio Due/ Oral Presentations in class |
| November 21-23 | Thanksgiving Break |
| November 27 | Last Gateway Exam at 8:30 |
| December 7 | Test 3 at 3:00 |
| December 10 | Last Class Day |

**Written Style:** Neatness is one way of showing courtesy toward your instructor and pride in your work. Thoughts in mathematics are expressed in sentences, such as “1+1=2”. There is a subject “1+1”, a verb “=”, and a predicate “2”. Remember that “=” should not be treated as a comma ”,”. The student should strive to be neat and to use mathematical symbols appropriately.

**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 and should be read in a series of passes. The first pass through a section, done **before** the class for which the topics will be studied, you should skim through it lightly, reading definition and theorems, and trying to **work** through some of the examples. After class, re-read the text, your notes and/or e-Reserves. 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, rereading the text or your notes or the e-Reserves, 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/HOMEWORK BY DAY**
**Mathematics 111, Fall Semester, 2007**

**NOTES:** All tests will be in Pierce 101 and 102. Handouts are on e-Reserves. See the class conference for a listing of the handouts as they are available. Bring your copy of the handouts to class.

Wednesday, August 29 — **Review of Functions [Chapter 1]; Introduction to Calculus [2.1]; Limits [2.2]**

p. 8: 1-4, 37, 41, 47, 49, 51, 53
p. 16: 1, 3, 7, 9, 15, 19, 23, 31, 35, 39
p. 27: 1, 7, 13, 15, 29, 51
p. 44: 1, 3, 5, 7, 53, 57, 59, 91, 95
p. 54: 1, 3, 5, 7, 9, 13, 19, 21, 25, 27, 39, 41, 49, 63, 67, 71, 75, 77
p. 57: 1, 7, 13, 17, 19, 21, 25, 34, 35, 36, 51, 53, 57, 59
p. 59: 1, 5, 7, 9
p. 75: 11, 13, 15, 17

Friday, August 31 — **Limits [2.3]**

p. 87: 5-43 (odd), 51-61 (odd)

Monday, September 3 — **Labor Day, no class**

Wednesday, September 5 — **Continuity [2.4]**

p. 98: 1-19 (odd), 25, 27, 63, 65

Friday, September 7 — **No Class. . . instructor gone to conference**

Monday, September 10 — **Intermediate Value Theorem [2.4]; [Infinite limits [2.5] later in course]**

p. 101: 91-94 (all)
p. 111: 7-10 (all), 15-26 (all), 44-57 (all)
p. 113: 4, 5, 6, 9
**Quiz 1**

Wednesday, September 12 — **Definition of Derivative, Tangent Line Problem, Differentiability [3.1]**

p. 124: 5-23 (odd), 33, 35, 39-42 (all), 47, 71-86 (all)

Friday, September 14 — **Basic Rules of Differentiation (the constant-multiple, sum, and difference rules; derivatives of powers, transcendental functions) [3.2]**

p. 136: 3-23 (odd), 39-51 (odd), 57-61 (odd), 91-94 (all), 99, 100, 109, 111

Monday, September 17 — **Product and Quotient Rules, Higher Order Derivatives [3.3]**

p. 147: 3, 4, 5-15 (odd), 23-53 (odd), 69, 71, 73, 75, 83-93 (odd), 103, 105
**Quiz 2**

Wednesday, September 19 — **Chain Rule [3.4]**

p. 161: 9-35 (odd), 47-54 all, 55-93 (odd), 101-106 (all), 149, 151

Friday, September 21 — **Review of Differentiation**

p. 197: 1-10, 17-32, 37, 41-57, 59-62, 67-96
**Quiz 3**

Monday, September 24 — **Implicit Differentiation [3.5]; Derivatives of Arcsine and Arctangent functions [3.6]**

p. 171: 1-38 (all), 41-46 (all), 65-68 (all)
p. 179: 13, 14, 17, 18, 19, 20, 22, 31, 33, 34, 35, 40

Tuesday, September 25 — **Gateway Exam 1 at 8:30**

Wednesday, September 26 — **Review**

Friday, September 28 — **Test 1 at 2:15**

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Monday, October 1
and
Wednesday, October 3 — **Related Rates [3.7]**

p. 187: 1-4 (all), 9, 10, 15, 18, 19, 20, 21, 22, 23, 24, 27, 28, 30, 31, 32, 33, 34, 35, 36, 39, 43
p. 199: 119-130 (all) no calculators, 137, 138, 141, 144, 147, 148
p. 201: 4, 9
**Quiz 4**

Friday, October 5 — **Extrema on an Interval [4.1]**
**Mean Value Theorem [4.2]**

p. 209: 7-10, 11-38 (odd), 59-62, 66
p. 216: 7-21 (odd), 35-43 (odd)

Monday, October 8 — **Mid-Semester Break**

Wednesday, October 10 — **Graphing Concepts [4.3, 4.4] with Application to Polynomial Functions**

Graphing handout

Friday, October 12 — **Infinite Limits [2.5]**
**Limits at Infinity [4.5]**

Graphing Handout
**Quiz 5**

Monday, October 15 — **Graphing Rational Functions [4.6]**

Graphing Handout

Tuesday, October 16 — **Gateway Exam 2 at 8:30**

Wednesday, October 17 — **Review Differentiation and Graphing**

Friday, October 19 — **Graphs with Vertical Tangents, Other Types of Graphs [4.6]**

Graphing handout
**Quiz 6**

Monday, October 22 — **Review**

Wednesday, October 24 — **Review**

Friday, October 26 — **Test 2 at 2:15**

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Monday, October 29
and
Wednesday, October 31 — **Optimization [4.7]**

p. 265: 2-10 (all), 17, 18, 19, 23, 24, 26, 27, 29, 33, 37, 38, 43
p. 280: 80, 81

Friday, November 2 — **Antiderivatives [5.1]**

p. 291: 15-44 (odd), 73-79 (all), 87
**Quiz 7**

Monday, November 5 — **Sums and Sigma Notation [5.2]**
**Induction**

p. 303: 7-14 (all)
Induction handout

Tuesday, November 6 — **Gateway Exam 3 at 8:30**

Wednesday, November 7 — **Induction continued…**

**Quiz 8**

Friday, November 9 **Definite Integral, Area [5.3]**
**Fundamental Theorem of Calculus [5.4]**

p. 314: 3, 5, 7, 15, 17, 19, 23-28, 31, 32, 33, 35, 37, 39
p. 327: 5-37 (odd), 41-49 (odd), 85-109 (odd), 139, 140, 141

Monday, November 12 **Graphing Portfolios due/ presentations**

Wednesday, November 14 **Integration by Substitution [5.5]**

p. 340: 7-38 (odd), 47-77 (odd)

Friday, November 16 **More Substitution [5.7, 5.8]**

p. 358: 1-35 (odd)
p. 366: 1-43 (odd)

Monday, November 19 **Introduction to Differential Equations**
**Separation of Variables [6.1, 6.2]**

p. 391: 1-9 (all)
p. 400: 1-6 (all), 33-68 (odd)
p. 380: 3-11 (odd), 21, 37-51 (odd), 63-79 (all), 97-114 (all)
**Quiz 9**

Wednesday, November 21 – Friday, November 23 **Thanksgiving Break**

Monday, November 26 **Area Between Curves [7.1]**

p. 452: 1-6 (all), 15-30 (odd)

Tuesday, November 27 **Last Gateway Exam, Exam 4 at 8:30**

Wednesday, November 28 **Volumes of Revolution - Disk Method [7.2]**

p. 463: 1-22 (all), 23-32 (odd)

Friday, November 30 **Volumes of Revolution - Shell Method [7.3]**

p. 472: 1-20 (all)
p. 513: 1-10 (all), 21-28 (all)

Monday, December 3 **Review of Area and Volume**
**Quiz 10**

Wednesday, December 5 **Review**

Friday, December 7 **Test 3 at 2:15**

Monday, December 10 **Evaluation**

Final Exam will be administered in accordance with the approved final exam schedule.