

## Mathematics 112, Calculus II

Spring, 2007 - Dr. Evelyn C. Bailey; Dr. Kevin D. Yeomans

**Textbook:** Calculus: Early Transcendental Functions, 4<sup>th</sup> Edition by Larson, Hostetler, Edwards

**Course Content:** Mathematics 112 is the second semester of calculus and is designed specifically for students who have completed a semester of college calculus (Math 111, Math 110B, AP Calculus with placement or placement alone). Course content includes methods of integration, improper integrals, polar coordinates, sequences and infinite series, power series, and introduction to differential equations. Specific topics by class day are attached.

**Goals:** (1) Students should have a basic understanding of derivative, of antiderivative, and of limit. (2) Students should be able to use the rules of differentiation as they apply to algebraic and transcendental functions. (3) Students should be able to evaluate a variety of limits. (4) Students should be able to sketch graphs of transcendental functions by building on concepts from Math 111. (5) Students should be able to demonstrate appropriately the methods of integration (substitution, parts, trigonometric substitution, partial fractions) and use these methods with typical indefinite, definite, and improper integrals. (6) Students should be able to graph and to find area using simple polar coordinate expressions. (7) Students should be able to determine convergence of appropriate infinite series by giving logical arguments. (8) Students should have a basic understanding of power series and be able to determine the domain of appropriate power series. (9) Students should be able to derive a power series expression for specified transcendental expressions using a geometric series or Taylor's Theorem. (10) Students should be able to solve simple first-order differential equations (separable, exact, and linear).

### **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, E-Reserves).
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 expected to attend all classes since the student is responsible for work covered in class and for any announcements made in class. An inordinate amount of absences will be handled in accordance with school policies.

**Homework:** Homework assignments and specific topics included in this course are attached. Handouts (homework and class notes) are available on E-Reserves in the Library. Assignments will not be collected. It is important that the student successfully complete a majority of the problems assigned. Students will need to spend at least 3 productive hours of study for each class session, or 9 to 12 hours per week. Students should not get behind or wait until the night before a test to study.

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

**Gateway Test:** Each student MUST pass the Gateway Test to pass Math 112. To pass this test, a student must get six out of eight problems totally correct. Forty points are given for six correct problems, forty-five points are given for seven correct problems, and fifty points are given for a perfect paper. In addition, students who pass the first Gateway Test are rewarded 20 bonus points; students who pass the second Gateway Test are rewarded 10 bonus points. There are four opportunities scheduled to take the Math 112 Gateway Test on the following Friday afternoons at 3:00: **February 9, February 16, March 2, and March 23**. The student must take the Gateway Test each of the scheduled times until the student passes this test. The student may retake this test to improve your point total without loss of previous points. Problems related to not passing the Gateway Test after four attempts will be handled on an individual basis. This test includes two limits to evaluate (at least one using L'Hôpital's rule), two derivatives to find (at least one logarithmic), and four integrals to evaluate (one of each general type).

**Quizzes:** All quizzes are announced and "take home"; however, the student must be present in class to receive the quiz. The student must work each quiz at one sitting and use only the reference sheet provided for this course. There should be no discussion of quizzes until after they are turned in for a grade. Quizzes are due at class time on the class day following the indicated day on the assignment sheet attached. Each quiz is worth 25 points and the best TEN quizzes will be used to help determine the student's grade.

**Major Tests/Final Exam:** Four major tests will be given on the following Friday afternoons at 3:00: **February 2, February 23, March 30, and April 20**. The final exam will be comprehensive and will be given according to the final exam schedule. Each student is expected to take tests at the scheduled times. Any conflicts or problems will be handled on an individual basis. If your instructor considers the excuse legitimate, arrangements will be made to take a test on the afternoon prior to the testing time. Emergencies will be handled on an individual basis. Any student requiring special testing arrangements must provide documentation and give sufficient time for appropriate arrangements to be made.

**ALL TESTS WILL BE ADMINISTERED IN PIERCE HALL,  
ROOMS 101 AND 102.**

**Graphing Portfolio:** Each student should use the software (GRAPHMATICA) available in the computer lab to prepare a portfolio of computer generated graphs. This portfolio is to contain at least 5 distinctly different displays of graphs. Each function is to be clearly identified by the formula. Within these displays, **all** algebraic, trigonometric (including inverse trigonometric), logarithmic, exponential, polar functions must be used. Appropriate combinations of these functions are acceptable. These displays should be linked by a theme and should combine several functions. 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. This assignment is due on Monday, **March 19** at which time each student will present his/her portfolio to the class. Evaluation of the portfolio will be made on the selection of graphs, the documentation associated with the graphs, variety of functions used, and their creativity. Accuracy, clarity, organization and originality are important in the finished product.

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

Major tests (4 @ 100 points)	400 points
Quizzes (Best 10 @ 25 points)	250 points
Gateway Test	50 points
Graphing Portfolio	50 points
Final Exam	<u>250 points</u>
<b>TOTAL</b>	<b>1000 points</b>

In general,

A, A-: 900 points and above  
 B+, B, B-: 800-899 points  
 C+, C, C-: 700-799 points  
 D+, D: 600-699 points  
 F: below 600 points

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

There is a class conference, Math 112 Spring 2007, for all students enrolled in Math 112. Announcements, scheduled SI sessions, questions related to problems, information can be posted at any time. Each student should place this conference on his/her desktop.

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 email, either privately or on the class conference.

There is an SI leader for Math 112. Our SI student leader 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 attend SI sessions generally do better in the courses for which there are SI leaders.

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 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 9 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 the syllabus carefully. For Math 112, your homework is listed for each class meeting. Reading the section before coming to class will aid your understanding.

### **Summary of Important Dates:**

February 2	Test 1
February 9	Gateway Test 1
February 16	Gateway Test 2
February 23	Test 2
March 2	Gateway Test 3
March 12-16	Spring Break
March 19	Graphing Portfolio Due
March 23	Gateway Test 4
March 30	Test 3
April 20	Test 4
April 30	Last Class Day
May 2	Reading 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.

**For the second half of this course, arguments must be expressed clearly to gain credit for the problem. The "answer" is only one part of an appropriate response to the problem.**

**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. 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 lose. 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 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, AND ALL SUCH WORK WILL BE PLEDGED TO BE YOURS AND YOURS ALONE. THIS INCLUDES THE TESTS AND QUIZZES.**

**TOPICS/HOMEWORK BY DAY**Wed, Jan 17**Basic Integration Rules [8.1]  
Methods of Integration Handout on E-Reserve**

p. 522: 19 to 33 (odd); 37, 39, 43, 45, 47

Fri, Jan 19**Integration by Parts [8.2]**

p. 531: 11 to 35 (odd); 47, 49, 53, 55

**QUIZ 1**Mon, Jan 22**Trigonometric Integrals [8.3]**

p. 540: 5 to 15 (odd); 25 to 37 (odd)

p. 541: 65 to 72 (all)

Wed, Jan 24**Trigonometric Substitution [8.4]**

p. 549: 23 to 39 (odd); 47 to 51 (odd)

Fri, Jan 26**Partial Fractions [8.5]**

p. 559: 7 to 31 (odd); 41 to 45 (odd)

**QUIZ 2**Mon, Jan 29**Partial Fractions [8.5]**

p. 559: 7 to 31 (odd); 41 to 45 (odd)

**QUIZ 3**Wed, Jan 31**Review for Test 1 Handout on E-Reserve**Fri, Feb 2**Test 1 at 3:00 p.m.**

<u>Mon, Feb 5</u>	<b>Indeterminate Forms and L'Hôpital's Rule [8.7] L'Hôpital's Rule and Improper Integrals Handout on E-Reserve</b>
p. 574: 5 to 35 (odd)	
<u>Wed, Feb 7</u>	<b>Improper Integrals [8.8]</b>
p. 585: 15 to 47 (odd)	
<u>Fri, Feb 9</u>	<b>Improper Integrals [8.8]</b>
p. 586: 49, 50, 53 to 59 (odd) <b>QUIZ 4</b> <b>Gateway Test 1 at 3:00 p.m.</b>	
<u>Mon, Feb 12</u>	<b>Graphing Logarithmic and Exponential Functions Handout on E-Reserve</b>
<u>Wed, Feb 14</u>	<b>Polar Coordinates and Polar Graphs [10.4] Handout on electronic reserve</b>
p. 736: 23 to 41 (odd); 81 to 91 (odd) <b>QUIZ 5</b>	
<u>Fri, Feb 16</u>	<b>Area in Polar Coordinates [10.5]</b>
p. 745: 1 to 11 (odd); 17 to 25 (odd) <b>Gateway Test 2 at 3:00 p.m.</b>	
<u>Mon, Feb 19</u>	<b>Review for Test 2 Handout on E-Reserve</b>
<b>QUIZ 6</b>	
<u>Wed, Feb 21</u>	<b>Review for Test 2 Handout on E-Reserve</b>
<u>Fri, Feb 23</u>	<b>Test 2 at 3:00 p.m.</b>

Mon, Feb 26**Sequences [9.1]  
Handout on E-Reserve**

p. 602: 1 to 13 (odd); 15 to 20 (all); 25 to 29 (odd); 47 to 67 (odd)

Wed, Feb 28**Series and Convergence [9.2]  
Handout on E-Reserve**

p. 612: 17 to 24 (all); 35 to 46 (all)

Fri, Mar 2 & Mon, Mar 5 **$n^{\text{th}}$  Term Test, Integral Test and p-Series [9.3]**

p. 612: 7 to 16 (all)

p. 620: 1 to 7 (odd); 11 to 20 (all); 29 to 35 (odd)

p. 623: 79 to 90 (all)

**QUIZ 7 (on Friday)****Gateway Test 3 at 3:00 p.m.**Wed, Mar 7**Comparisons of Series [9.4]**

p. 628: 3 to 35 (odd)

**QUIZ 8**Fri, Mar 9**Alternating Series [9.5]**

p. 637: 11 to 27 (odd); 47 to 61 (odd)

Mon, Mar 12 to Fri, Mar 16**Spring Break**Mon, Mar 19**Graphing Portfolio Presentations****QUIZ 9**Wed, Mar 21**Ratio and Root Test [9.6]**

p. 645: 5 to 10 (all); 13 to 41 (odd); 51 to 65 (odd)

Fri, Mar 23**Review Infinite Series Handout on E-Reserve****QUIZ 10****Gateway Test 4 at 3:00 p.m. (LAST CHANCE)**Mon, Mar 26 & Wed, Mar 28**Review for Test 3 Handout on E-Reserve**Fri, Mar 30**Test 3 at 3:00 p.m.**



Mon, Apr 2

**Power Series [9.8]  
Handout on E-Reserve**

p. 666: 1 to 39 (odd)

Wed, Apr 4

**Representation of Functions by Power Series [9.9]**

p. 674: 1 to 25 (odd); 39 to 42 (all)

Fri, Apr 6

**No Class due to Good Friday**

Mon, Apr 9

**Representation of Functions by Power Series [9.9]**

p. 674: 1 to 25 (odd); 39 to 42 (all)

Wed, Apr 11

**Review Power Series  
Handout on E-Reserve**

p. 682: Review Chart  
**QUIZ 11**

Fri, Apr 13

**Taylor and Maclaurin Series [9.10]**

p. 685: 1 to 12 (all); 21 to 29 (all)

Mon, Apr 16

**Taylor and Maclaurin Series [9.10]**

p. 685: 1 to 12 (all); 21 to 29 (all)  
**QUIZ 12**

Wed, Apr 18

**Review for Test 4 Handout on E-Reserve**

Fri, Apr 20

**Test 4 at 3:00 p.m.**

Mon, Apr 23

**Differential Equations: Separation of Variables [6.3]  
Handout on E-Reserve**

p. 413: 7 to 19 (odd); 27 to 43 (odd)

Wed, Apr 25

**First-Order Linear Differential Equations [6.5]**

p. 430: 1 to 13 (odd)

**QUIZ 13**

Fri, Apr 27

**Review for Final Handout on E-Reserve**

Mon, Apr 30

**Evaluation**

Wed, May 2

**Reading Day**

The Final Exam will be given in accordance to the final exam schedule and college policies.