Mathematics 112, Calculus II
Spring, 2015

Mathematics 112 is the second semester of calculus and is designed specifically for students who have completed a semester of college calculus (Math 111, AP Calculus scores of 4 or 5, or a comparable background). 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 is provided at the end of this syllabus.

Goals:

Generally, students should grow by learning fundamental principles of mathematics, gaining factual knowledge related to calculus, and learning to apply course material and techniques to more advanced problems.

Building upon Calculus I, students should know and/or demonstrate:
  (1) A basic understanding of derivative, of anti-derivative, and of limit.
  (2) Use the rules of differentiation as they apply to algebraic and transcendental functions.
  (3) Evaluate a variety of limits and appropriately interpret findings.
  (4) Sketch graphs of transcendental functions by building on concepts from Calculus I.
  (5) All variations for the u-substitution method of integration, definite and indefinite integrals.

Additional goals for Calculus II, students should know and demonstrate:
  (6) New methods of integration (parts, trigonometric substitution, partial fractions) for typical indefinite, definite, and improper integrals.
  (7) Be able to graph and to find area using simple polar coordinate expressions.
  (8) Determine convergence of appropriate infinite series by giving logical arguments.
  (9) A basic understanding of power series and be able to determine the domain of appropriate power series.
  (10) Be able to derive a power series expression for specified transcendental expressions using a geometric series or Taylor's Theorem.
  (11) Be able to solve simple first-order differential equations (separable, exact, linear).

Text Material:

Handouts and Notes are located at the Blackboard online course site. James Stewart's *Single Variable Calculus: Early Transcendentals 7th edition* is suggested as a reference.

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. Students accumulating an inordinate number of absences will be referred to the assistant dean of academic services.

Electronics:

No electronics of any sort will be permitted during assessments. During lectures, students are encouraged to use devices responsibly: large-screen devices (e.g. laptops and tablets) may be used to access electronic copies of the text and lecture notes; small-screen devices (e.g. cell phones) should be used sparingly, if at all. Research seems to indicate that taking notes with pencil and paper is more effective than recording them electronically; if there is a need to have an electronic copy, it is suggested to initially record them the old-fashioned way in class and type/write them after class. Calculators will not be used in this course.

Grading:

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

Major tests (6 @ 90 points)	540 points
Project 1	60 points
Project 2	60 points
Project 3	70 points
Gateway Exam	50 points
Final Exam	220 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+ <u>could</u> be assigned for a sum of 880 points. Ultimately, the assignment of plus and minus is dependent on the overall course distribution of sums of points.

Homework/Studying:

Time spent preparing out of class is just as crucial to success as time spent learning in class. Students should review class material in the lecture notes before coming to each class. After each lecture, students should more thoroughly study the lecture notes, completing any problems that were not finished in class, reviewing or re-doing the problems seen in class, and working all problems assigned as homework. Next, students should read the handout corresponding to the day's material and complete problems found there.

Homework assignments are for the student's benefit and will not be collected; however, **these are a <u>mandatory component</u> of the course!** It is important that each student thoughtfully complete most of the problems assigned. **The student will need to spend <u>at least 10 good hours</u> of study each week, not counting time spent reviewing for tests.** Merely looking over a solution is no replacement for actually working through it personally; worse yet, trying to memorize a solution is almost always a waste of time and effort.

Students should keep current with the course material, working through problems from both the lecture notes and corresponding handout for each day. Cramming for calculus tests often results in poor grades and forgotten material; this course builds on previous work and so it is vital to regularly practice both new and old material. Students should get at least 6 hours of good rest prior to taking a calculus test; otherwise, the law of diminishing returns kicks in and students will lose more than they retain. Marathon studying does not work in calculus!

Gateway Exam:

In order to pass this course, **the student <u>must</u> pass a timed examination on derivatives, limits, and integration techniques**. 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 <u>one</u> mistake, the student may choose to keep a score of 35 points. More than <u>one</u> mistake will receive a score of zero. Students making at least 35 on Gateway Exam 1 will receive a bonus of 20 points. Students must take each scheduled gateway exam until one is passed. Students may re-test for a better score with no penalty. Passing the Gateway Exam is a requirement for passing this course (Goals 2, 5, & 6).

Previous Gateway Exams are available on Blackboard. The Gateway Exam will be given during class on the following dates: **February 11**, **March 18**, and **April 6**. 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.

Projects:

There will be three projects related to concepts covered in class. Further details on these assignments will be discussed in class and posted on Blackboard.

Major Tests:

Each test will be given on the date indicated on the calendar below. 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 <u>prior to the testing time</u>. Arrangements must be made several days in advance. No retests will be permitted.

Any student requiring special accommodations must present their letter of accommodation provided by the college; the student must make arrangements for these accommodations several days in advance of the scheduled test date.

Responsibilities
Of the Student:

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, online course 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, is 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 Blackboard. 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 **Blackboard online course**, Spring 2015 Math 112. Students should consult Blackboard 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 discussion boards.

There are **Supplemental Instruction (SI) leaders** for Math 112. Our student SI leaders will schedule review sessions each week, the topic for which will be posted on Blackboard. 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 Monday through Thursday from 3pm to 6pm. 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 each of your courses by setting aside 8 to 10 hours per week per course to study and really grapple with the material. 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 so you will 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 112.
(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 Blackboard prior to the class for which they are needed.
(7) Follow each syllabus carefully. For Math 112, your homework is provided in the notes and handouts for each class meeting. Reading the handout before coming to class will help your understanding.

Summary of Important Dates:

January 19	Martin Luther King Jr. Holiday
January 20	Last Day for Changing Courses
January 30	Test 1
February 9	Project 1 Due
February 13	Gateway Exam 1
February 20	Test 2
February 27	Project 2 Due
March 6	Test 3; Last Day to Drop
March 9-13	Spring Break

March 18	Gateway Exam 2
March 27	Test 4
April 3	Last Day to Petition for Freshmen Withdrawal
April 6	Gateway Exam 3
April 10	Test 5
April 17	Project 3 Due
April 24	Test 6
April 27	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 projects. 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 online course 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. When you get stuck, go back and re-read your notes, handouts, and/or the textbook, studying the examples and derivations long enough to find how to proceed.

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. Taking time to reflect on your work helps to build confidence, speed, and retention.

4. **Studying for tests:**

    Imagine an athlete who slacked off during the weeks before a big track meet, doing just enough so that their coach wouldn't get on their case; if they then stayed up running the whole night before the meet, they would get crushed by the competition! 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, including 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 every class meeting 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 ASSIGNMENTS IN THIS COURSE. BY YOUR SUBMISSION OF SUCH WORK, YOU PLEDGE THAT WORK WAS DONE IN ACCORDANCE WITH THE RULES STIPULATED ON THE ASSIGNMENT OR IN THIS SYLLABUS.

TOPICS BY DAY
Mathematics 112, Spring Semester, 2015

NOTES:

✳Handouts, homework, class notes are on the Blackboard online course.

✳Refer to the online course 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.

Monday	Wednesday	Friday
	1/14: Calculus I Review {1}	1/16: Integration by Parts {2}
1/19: (No Class) *MLK Jr. Holiday*	1/21: Trig. Substitution {3}	1/23: Partial Fractions I {4} *Start Project 1*
1/26: Partial Fractions II {5}	1/28: Review {6}	1/30: **Test 1**
2/2: L'Hôpital's Rule {7}	2/4: Log. & Exp. Graphs I {8}	2/6: Log. & Exp. Graphs II {9}
2/9: Polar Coordinates I {10} **Project 1 Due** *Start Project 2*	2/11: Polar Coordinates II{11}	2/13: Improper Integrals I {12} **Gateway Exam 1**
2/16:Improper Integrals II{13}	2/18: Review {14}	2/20: **Test 2**
2/23: Infinite Sequences {15}	2/25: Series & nth-Term {16}	2/27: Int. Test & p-Series {17} **Project 2 Due**

Monday	Wednesday	Friday
3/2: Comparison Tests {18}	3/4: Review {19}	3/6: **Test 3**
3/9: (No Class) *Spring Break*	3/11: (No Class) *Spring Break*	3/13: (No Class) *Spring Break*
3/16: Alternating Series {20}	3/18: Ratio & Root Tests {21} **Gateway Exam 2**	3/20: Differential Eq. I {22}
3/23: Differential Eq. II {23} *Start Project 3*	3/25: Review {24}	3/27: **Test 4**
3/30: Power Series I {25}	4/1: Power Series II {26}	4/3: Power Series III {27}
4/6: Power Series IV {28} **Gateway Exam 3**	4/8: Review {29}	4/10: **Test 5**
4/13: Taylor Series I {30}	4/15: Taylor Series II {31}	4/17: Taylor Series III {32} **Project 3 Due**
4/20: Taylor Series IV {33}	4/22: Review {34}	4/24: **Test 6**
4/27: Final Exam Review {35} *Last Day of Class*		**Final Exam Dates** 4/29 at 9am for 09A 4/30 at 9am for 10A 5/1 at 9am for 12A