MATH 121 (Spring 2012) **CALCULUS I**

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Office Hours: MWThF 2-4 pm, and by appointment
If not in office check the MSC
Course website: This course has a Moodle website.

Section 121-01 meets MWF 9:00 – 9:50 and Th 9:30 – 10:45 in Kennedy 207

Course Description: Calculus is a powerful tool in modeling real world problems. This course provides an overview of a portion of calculus with some emphasis placed on applications. The style of this course may be different from your experience in previous math courses – even if you have studied some calculus in the past. Calculus is more than just rules for turning algebraic formulas into other algebraic formulas. Indeed, with the advances in current technology, much of the algebraic side of the subject can be done automatically by computers. Real understanding comes in knowing what the formulas tell you, and how to apply them in real and diverse situations. We will develop both a theoretical and conceptual understanding of the mathematics of calculus as well as the ability to "manipulate symbols." Additionally, we will work on skills of mathematical justification and communication, that is, showing (with mathematical rigor) how a solution is arrived upon and follows from previously established mathematical truths. Every topic is presented *algebraically*, *numerically*, *in graphs*, and *in words*. You will be asked to engage the course material from all of these points of view. Lastly, much of the content of this course will be discovered through *active learning* in which you, with your classmates (and some guidance from your instructor) will "discover" some of the fundamental properties and theorems of calculus. To this end, you will be encouraged daily, in class, to explore and discuss the mathematics of calculus with your classmates.

Prerequisites: Success in calculus relies heavily on a solid foundation of algebra skills (*Algebra I & II, Geometry, Trigonometry, knowledge of exponential & logarithmic functions*). The course assumes a solid background in high school algebra. It does **not** assume any previous experience with calculus. If you have seen some calculus before, some of the topics may seem repetitive, but you should not assume that it will automatically be easy for that reason. (If you have studied most of the topics in this course before, talk to the instructor about whether this is the right course for you.)

Course Content: We will cover topics in Chapter 2 through 5.

- *Limits*: We will examine limits graphically, numerically, and analytically. We will study the precise mathematical definition of a limit (often referred to as the ε-δ definition of a limit). We will study one-sided and infinite limits.
- *Continuity*: We will examine continuity graphically and analytically. We will study the properties of continuous functions and the intermediate value theorem.
- *Differentiation*: We will use limits to define the derivative of a function and utilize our notion of tangent lines to interpret the concept of a derivative graphically and as a rate of change. Various techniques of differentiation, such as the power, product, quotient, chain, and inverse rules, will be developed. Additionally, we will explore implicit differentiation.
- *Applications of Differentiation*: We will use information provided by the first and second derivatives of a function to aid in sketching a function and to examine problems of optimization.
- *Integration*: We will define the concept of an antiderivative and define some properties of antiderivatives. We will define and use Riemann sums to estimate the area under a curve. We will utilize the Fundamental Theorem of Calculus to find the exact area under a curve. We will develop the integration technique of substitution.

Course Materials:

- *Text*: Calculus Early Transcendentals by James Stewart. This course will attempt to cover through Chapter 5.
- *Student Solution Manual:* There is a student solution manual containing worked out solutions to odd problems available. This is a valuable tool for checking your work and seeking helpful hints when working through homework practice exercises.
- *Guided Lecture Notes*: Guided lectures notes (by Section) will be posted on Blackboard. The first couple sections will be handed out on the first day of class. After that ***you are responsible for printing out the appropriate section of guided notes and bringing them to class***.
- *Supplemental materials*: You are responsible for all handouts given in class and materials posted on the course Moodle site.
- *Scientific Calculator*: For some computations it will be advantageous to have a calculator. If you do not already have one, please acquire a scientific calculator (NOT a graphing calculator!). I recommend TI-30X IIS ($13.24 on Amazon) or TI-36X Pro ($20.53 on Amazon). You will NOT be allowed to use a scientific calculator app on your phone.

We will make use of a free FREE graphing applet called *Geogebra 4.0*. You can download this applet from http://www.geogebra.org/webstart/4.0/geogebra-40.jnlp.

Time Commitment: In addition to the time spent in class (4 hours a week), ***you should expect to spend between 9 – 12 hours outside of class engaged in homework and study***. If you choose to participate in the peer-led study groups, count this are part of your study time. Please be aware of the level of time commitment for this course when planning extracurricular activities.

Course Grading:

Component	Frequency	% of Grade
Graded Homework	each section collected 2 class days after section is completed	15 %
Practice Homework	collect by section with graded homework	15 %
Attendance/Feedback	collected daily	5 %
Exams	3 total	45 %
Final Exam	at end of semester	20 %

"Learning is experience. Everything else is just information." – Albert Einstein

Homework: There will be one homework exercise set for each section of the text we cover. A homework exercise set will consist of two parts: **practice exercises** and **graded exercises**.

The **practice exercises** will be odd numbered problems in the text and you will need to check and compare your solutions to those in the student solution manual. The practice problems are to be done on blank 8.5" × 11" white paper. See sheets at the end of this syllabus for an example (copies are posted on moodle). Your name, the section number, and the date should be written at the top of each page, and the page number in the bottom right of each page. The remainder of the page is to be divided into two columns. In the left column, work the assigned practice problem. After you have worked the problem, check your answer in the back of the book or in the student solution manual. If you worked the problem correctly, indicate that you did so in the right column. If the problem is incorrect, identify where you went wrong, and record this in the right column. Being able to identify where an error has occurred is a very important skill! The grading for practice problems will be based on completion, so do not worry about getting every problem completely correct.

% of Practice Problems Completed/Attempted	Grade
80 – 100 %	Full credit (2 points)
20 – 80 %	Half credit (1 point)
0 – 20 %	No credit (0 points)

** Percentage of problems will be rounded up to the nearest problem. So if 80% is 9.2 problems, then you must do 10 problems to receive full credit.*

Two practice exercises grades will be dropped when computing the final grade.

The **graded exercises** will be 3 even numbered problems. At least one of these will be a challenging problem designed to stretch your mind and understanding of calculus. Each graded problem will be graded on a 10 points scale since that is the typical amount of points given to an exam problem. Use the graded homework as an opportunity to gauge your understanding. Write up the solution as if it were on an exam. For full credit, write neatly and show all your work.

Each homework set will be collected two class days after a section is completed. For example, if we finish a section on Friday, the homework for that section will be due the following Wednesday. If you are absent the day a homework set is collected, you are still responsible for making sure your homework is turned in to your instructor. No late homework will be accepted.

Additionally, there will be three **homework projects** which will be counted as multiple homework assignments. The first homework project will count as 5 practice homeworks, and the second two homework projects will count as 5 graded homeworks each.

On occasion, some graded problems will be assigned for extra credit. This will be a way to make up extra points, or make up for a missed assignment.

"I hear and I forget. I see and I remember. I do and I understand." – Confucius

Homework Collaboration Policy: Working together with other people is a great way to learn mathematics. I encourage you to work together on the homework, if you find that it helps you to learn. However, homework for this course is also graded, as part of your final course grade. Each student must write up his or her own homework solutions. By handing in homework solutions to be graded, you are promising that you took part in solving the problems, and that you are not just copying someone else's work. Handing in homework to be graded when you did not participate in solving the problems is a violation of the Honor Code.

Attendance/Feedback: There is a direct correlation between attendance and success in this course. You should plan on attending every class. At the end of every class you will be asked to provide some feedback on the lecture and activities of that particular class. Turning in this feedback will mark your attendance. Three absences will be excused, no questions asked. Any additional absences must be excused and accompanied by a memo or letter from the dean of students. If you are absent for any reason, you are responsible for all material and notes covered on the day of your absence.

Exams: Three exams will be given (one after each chapter 2, 3, and 4). Material from chapter 5 will be included on the final exam along with material from the other three chapters. Each exam will be given at least one week after we finish the chapter, on a Tuesday or Thursday evening. In order to remove the pressure of a time constraint, these exams will be given in the evening with a wide window of time (5-6 hours). You may take the exam for as little or as much of that time as needed. However, the exams will not be designed to take the full length of time. A make-up exam will only be given if both of the following two conditions are satisfied:

1. You contact the instructor prior to the test being given (at least one week in the case of absence due to the attendance of an official school function).
2. You provide the proper documentation.

Final Exam: The final exam will cover all material covered in this course. Unless otherwise notified, the exam will be closed book and closed notes. See below for schedule based on your section.

Section 121-01: Final Exam on Tuesday, May 1, 2012 @ 5:30 pm (Kennedy 207)

Final letter grades are determined as follows:

A	93 – 100 %	C	73 – 76.9 %
A -	90 – 92.9 %	C -	70 – 72.9 %
B +	87 – 89.9 %	D +	67 – 69.9 %
B	83 – 86.9 %	D	63 – 66.9 %
B -	80 – 82.9 %	D -	60 – 62.9 %
C +	77 – 79.9 %	F	0 – 59.9 %

Disability Services:
If you need course adaptations or accommodations due to a documented disability, please contact the Office of Disability Services at Burrow Student Center, Fourth Floor, 901-843-3885. Hours: M-F, 8:30 am – 5:00 pm.
See http://www.rhodes.edu/disabilityservices/default.asp for details.

Math Suppport Center:
Calculus I (Math 121) is a course that is supported by the Math Support Center (MSC, http://www.rhodes.edu/academics/18410.asp). That means there are traditional drop-in peer tutoring and peer-led group study available, for free, at the Math Support Center located on the third floor "library" of Ohlendorf.
See http://www.rhodes.edu/academics/18413.asp for schedule for traditional drop-in one-on-one peer tutoring at the MSC.

For more information about peer-led group study, see the last page of the syllabus.

Classroom Etiquette:
Please be considerate of the instructor and your classmates around you. Come to class on time and stay the entire period. Turn off cell phones or any beeping/ringing devices during class (this means no sending text messages during class).

The Honor Statement:
You are expected to conduct yourself within the guidelines of the College's Honor Code. If you have any questions about what is or is not allowed, please ask.

The note that this syllabus is a guide and not a contract, and thus is subject to change at the discretion of the instructor.

Name _____ Section _____ Date _____

Name Prof B Section Example Date Today

#1 Find the value of x if $4 = e^{3x+1}$.

$$4 = e^{3x+1}$$

$$\ln 4 = \ln\left(e^{3x+1}\right) = 3x+1$$

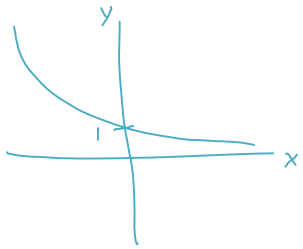
$$\ln 4 - 1 = 3x$$

$$x = \frac{\ln 4 - 1}{3}$$

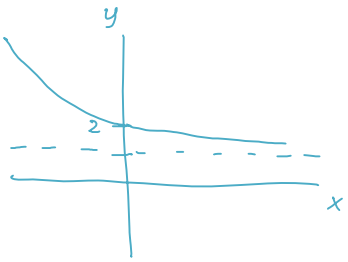
Answer and method are correct

#3 Draw the graph of $y = e^x + 1$.

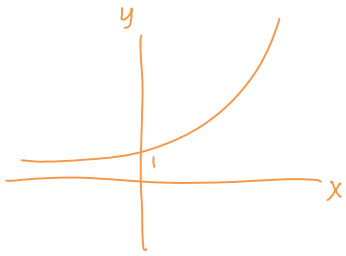
If have $y = e^x$, then



So $y = e^x + 1$ is



← Whoops! Started with $y = e^{-x}$. Need $y = e^x$



#7 Solve for x when $x^2 - x + 7 = 1$

$$x^2 - x + 7 = 1$$

$$x^2 - x + 6 = 0$$

$$(x+3)(x-2) = 0$$

$$x = -3, 2$$

← Messed up signs

Should be

$$(x-3)(x+2) = 0$$