Applied Calculus/MTH 140 (CRN 2251)

Spring 2014

**MWF 12:00 – 12:50 P.M.**

**Smith Hall 511**

**(Tentative, 1/12/2014)**

# Instructor: Dr. Bonita A. Lawrence

 Office and Lab - 311 Smith Hall

 696-3040, lawrence@marshall.edu

Office Hours: 10:00 – 11:00 A.M. M, W. F

 11: 00 A.M. – 12:00 P.M. T,R

 Or a time that we can find that

 works for both of us!

**General University**

**Policies:** By enrolling in this course, you agree to the University Policies presented below. You can read the full text of these important policies online using the following path: Marshall Home Page - Course Catalogs – Undergraduate Catalogs. At this point, choose the catalog you started under (or any catalog after that).

**Attendance Policy**: I expect you to be in class every day you are physically able. It is your responsibility to determine what you missed in the event you are unable to attend class. Requesting notes from a colleague would be wise. I am happy to give you information about any assignments you missed. If you miss an exam or a deadline for an assignment and your absence is excused, you have one week after the date of the excused absence to make it up. The University Policy that describes excused absences can be found in the Marshall University 2013 – 2014 Undergraduate Catalog on pages 83 – 84.

**Academic Dishonesty Policy:** I expect you to do your own work. You can certainly discuss the homework problems with your colleagues but what you present to me for any type of assessment must be your own. The University’s policy concerning academic dishonesty can be found in the Marshall University 2013 -2014 Undergraduate Catalog on pages 69 – 70.

**Policy for Students with Disabilities:** Marshall University is committed to equal opportunity for all. Students with physical, learning or psychological disabilities should contact the Office of Disabled Students Services (DSS) in Prichard Hall Room 117, 304 696-2271 and provide documentation of their disability. After consultation the DSS coordinator will send a letter to the student’s instructors describing the accommodations the student will need. For more information, go to <http://www.marshall.edu/disabled> or call or visit the office in Prichard Hall.

**Affirmative Action Policy:** In the spirit of equal opportunity for all, Marshall University has an Affirmative Action Policy. This can be found in the Marshall University 2013 - 2014 Undergraduate Catalog on p. 66.

**Inclement Weather Policy:** In the event of bad weather that may prevent us from coming to school, Marshall has a policy that describes how things will be handled. (Note that I have been here for 12 years and we have only shut down school one day during this time.) The policy can be found on pp. 67 -68 of the Marshall University 2013 – 2014 Undergraduate Catalog.

**Catalog Course Description:** This course is a brief survey of calculus including both differentiation and integration with applications. It cannot be substituted for MTH 229 or MTH 203.

**Course Prerequisites:** The prerequisite for the course is a grade of *C* or better in MTH 127 or MTH 130 or Math ACT 24 or above.

**Course Objectives:** This course is designed to introduce you to the power and applicability of Calculus. Physical systems can be modeled with functions. Those who study these systems (it will likely be you one day) are often interested in the behavior of the function that is used to model it over a given period of time. Perhaps you will be interested in intervals of the time when the range values increase or decrease or specific domain values where the range value is at a maximum or minimum in a given interval. Using the tools of Calculus, you can determine these properties and many more!

The course is designed to be an extension of your previous studies of function theory from your algebra training. Concepts from algebra make up the tool box you will use to study the concepts of calculus. With this in mind, we start with a brief overview of some of the important concepts from your algebra studies.

Success in the course will be measured by your ability to meet the following learning outcomes.

The ability to:

1. Analyze the graphs of polynomial, exponential, and logarithmic functions.

*Learning Outcome:* Utilize algebraic theory to construct graphs of functions and analyze their behavior.

*Skill Development:* Small group and whole group analysis of graphs of functions. Exercises assigned daily followed by timely feedback.

*Assessment:* Evaluation of written and oral presentations of analysis of functions and their associated graphs.

1. Understand the concept of the limit of a function and apply this to the determination of the function’s rate of change (or derivative) at a given point.

*Learning Outcome:* Choose appropriate methods to successfully calculate limits of functions and determine their rates of change.

*Skill Development:* Small group and whole group discussions of theory and processes for finding limits of functions and calculating rates of change. Exercises assigned daily followed by timely feedback.

*Assessment:* Evaluation of written and oral presentations for understanding of the concept of the limit of a function and its rate of change as well as for proper selection and uses of presented techniques.

1. Understand the relationship between a function and its rate of change.

*Learning Outcome:* From given information about the rate of change of a function, choose the proper method and successfully reconstruct the function (finding an anti-derivative).

*Skill Development:* Small group and whole group discussions of applications of methods for reconstructing a function from its rate of change. Exercises assigned daily followed by timely feedback.

*Assessment:* Evaluation of selection and application of methods for reconstructing a function from its rate of change in both written and oral presentations.

1. Recognize the relationships between physical systems and functions that are used to model them.

*Learning Outcomes:* Describe the connection between a physical system and a given model used to study it. Create a mathematical model from the known behavior of a physical system and used the developed calculus to study the system.

*Skill Development:* Small group and whole group discussions of the development and analysis of mathematical models. Exercises assigned daily followed by timely feedback.

*Assessment:* Evaluation of the construction of mathematical models from a given physical system and the use of developed calculus theory to analyze the system in both written and oral presentations.

1. Understand the mechanics of the differential analyzer and how it can be used to study the behavior of functions.

*Learning Outcome:* Program the differential analyzer to construct particular functions.

*Skill Development:* Small group and whole group laboratory experiences in the Marshall Differential Analyzer Lab. Lab experience supported and enhanced by formatted lab reports.

*Assessment:* Evaluation of lab reports describing setup and output of the differential analyzer and analysis of what the output offers.

1. Present all of your mathematical discussions clearly in both written and oral form. Organization and logical flow will be the secrets to success in meeting this objective.

*Learning Outcome:*  Presentation of written and oral discussions in a valid and logical format.

*Skill Development:* Small group and whole group discussions of logical organization of information in both written and oral formats. . Exercises assigned daily followed by timely feedback.

*Assessment:* Evaluation of all written assignments and oral presentations at the board for validity and logical flow.

1. Recognize and appreciate various approaches to the same problem.

*Learning Outcome:* Construction of at least two different valid and logical approaches to a given problem.

*Skill Development:* Small group and whole group discussions with peers of various approaches to exercises.

*Assessment:* Evaluation of solutions of exercises that require the use of more than one approach to an exercise presented in both written and oral form.

**Textbook:** Applied Calculus for the Life and Social Sciences,

Ron Larson and David C. Falvo,

 Houghton Mifflin Harcourt Publishers, Boston.

**Grading Procedure:** You grade will be calculated using the following percentages:

 Lab Exercises and Boardwork 10%

 Challenge of the Week 20%

 2 Chapter Exams 50%

 Final Exam: 20%

There will be three exams during the semester, including the final exam (**Friday, May 9, 10:15 – 12:15 P.M.).**  At the end of this document you have a schedule of topics and exam dates. In the event you have a University excused absence and are not able to take the exam on the scheduled date (See Attendance Policy on the first page of this document), if possible, contact me before the scheduled exam time so that we can plan a time for you to take the exam early. Otherwise, with an excused absence, you have one week from the date of the excused absence to make-up your exam.

I will assign homework problems every day. At the beginning of each class I will ask a few of you to present some of your fine works of art at the board for my enjoyment as well as that of your peers. This is what I call “Boardwork”. You must visit the board at least three times during the semester to receive full credit for your boardwork.

Once a week I will give you a couple of exercises to do on your own, something I call the “Challenge of the Week”. You will have about 15 minutes to do two or three problems. Keep up to date with your reading and your homework exercises and ask questions that come to mind when you are studying and you will do well on the “Challenge of the Week”.

Your final grade will be determined using the following scale:

90% - 100% A

80% - 89% B

70% - 79% C

60% - 69% D

0% - 59% F

My best advice (It’s free!) is for you to keep up with your reading and homework assignments.

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**Have a great semester and let me know what I can do to help you with your studies.**

**Cheers!**

**Dr. Lawrence**

**A Program of Events for MTH 140**

**Class Days Topics and Events**

**Week 1 A Review of Algebraic Topics:**

**January 13, 15, 17 Ordering the Real Line**

**Absolute Value and Distance**

**Evaluating Expressions with Exponentials and Radicals.**

**Factoring Polynomials**

**Rational Expressions**

**Rationalizing Numerators and Denominators**

**The Cartesian Plane**

**Boardwork**

**Challenge of the Week - Friday**

**Week 2 A Touch More Review:**

**January 22, 24 Lines and their Slopes in the Cartesian Plane**

 **Functions**

 **Boardwork**

 **Challenge of the Week – Friday**

**Week 3 Limits**

**January 27, 29, 31 Continuity**

 **The Derivative / The Slope of a Graph**

 **Boardwork**

**Challenge of the Week - Friday**

**Week 4 Rules of Differentiation**

**February 3, 5, 7 Rates of Change**

 **Boardwork**

 **Exam I - Friday**