Intro to Higher Mathematics\MTH 300 (CRN 3647)

Spring 2014

**M, W 2:00 P.M. – 3:50 P.M.**

**Smith Hall 518**

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

# Instructor: Dr. Bonita A. Lawrence

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 696-3040, 696-3854, lawrence@marshall.edu

Office Hours: 10:00 A.M. – 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:** A transition between elementary calculus and higher

mathematics with emphasis on techniques of proof.

**Course Prerequisites:** A grade of C or better in MTH 230 – Calculus II

In this course our interest is to develop your ability to read, with understanding, proofs presented to you and to construct logical and valid proofs of your own. One of area of mathematics we will use as our proving ground will be the theory of functions. Your calculus training will serve as a foundation for these discussions.

**Course Objectives:** This course is designed to develop your skills at proof writing. Mathematics is a collection of axioms, definitions, lemmas, theorems and corollaries. The development of our mathematics relies on the discovery of new ideas. Such ideas can only become part of the mathematics we use and appreciate if they can be proved using established results. In this course, my primary goals are to teach you to read and understand classical mathematical proofs and to write logical and valid proofs of your own. This can be a fantastic experience that is a bit different than the mathematics courses you are used to and will be very much a creative endeavor.

 I am looking forward to an exciting semester!

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

 The ability to

1. Exhibit an understanding of mathematical logic.

*Learning Outcome:* Utilize the theory of logic to create truth tables and use them to determine the truth value of given statements.

*Skill Development:* Small group and whole group discussions of the foundations of logic. Daily exercises with review the following class period.

*Assessment:* Evaluation of written and oral presentations of the determination and analysis of truth values for complex mathematical statements.

1. Exhibit an understanding of a variety of proof writing techniques.

*Learning Outcome:* Determine proper approaches for proving a given proposition.

*Skill Development:* Small group and whole group analysis of classical proofs as well as arguments that fall short of proving a proposition. Daily exercises with review the following class period.

*Assessment:* Evaluation of written and oral analyses of proofs of propositions that require you to describe the techniques used in given proofs and how it was applied to the particular proposition. Written analysis of arguments that fall short of a valid proof will also be assessed. These we call “poofs”.

1. Construct formal proofs of propositions that address concepts discussed during the course of the semester.

*Learning Outcome:* Construction of logical and valid proofs of propositions.

*Skill Development:* Small group and whole group creation of proofs of stated propositions. Daily exercises with review the following class period.

*Assessment:* Evaluation of proofs you create yourself in both written and oral formats for logical flow, validity and clarity.

1. Present your work clearly and concisely 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 or oral discussions in a valid and logical format.

*Skill Development:* Small group and whole group creation of proofs of stated propositions. Daily exercises with review the following class period.

*Assessment:* Evaluation of written and oral presentations for clarity 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 of proofs. Daily exercises with review the following class period.

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

**Textbook and**

**Required Materials:** Bridge to Abstract Mathematics

Ralph W. Oberste-Vorth, Aristides Mouzakitis, Bonita A. Lawrence

 Publisher: Mathematical Association of America

I will grade your homework papers and return them to you. I will ask you to collect these papers in a notebook and submit this portfolio at the end of the semester.

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

 Homework Portfolio: 10 %

 Boardwork: 10 %

 Exam I 20%

Exam II 20%

Exam III 20%

 Final Exam: 20 %

There will be four exams during the semester including the final exam, (**Monday, May 3, 2014, 12:45 P.M. – 2:45 P.M**.). The dates for the chapter exams can be found in the schedule of events at the end of this document. 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.

You will be assigned homework in almost every class period. You will submit your homework at the beginning of each class. I will not accept late homework. I will return your work and ask you to collect them in a nice notebook. This portfolio of work will be collected at the end of the semester. You can use this collection of work during the semester to study for your exams!

I will ask to you 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 get full credit for your boardwork.

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.

**Have a great semester and let me know if I can help you**

**Cheers!**

**Dr. Lawrence**

**A Program of Events for MTH 300**

**Class Days Topics and Events**

**Week 1 A Historical Perspective and the**

**January 13,15 Axiomatic Method**

 **Mathematical Statements and Connectives**

 **Symbolic Logic**

 **Compound Statements**

 **Boardwork**

**Week 2 Compound Statements**

**January 22 Predicates and Quantifiers**

 **Quantified Statements**

 **Loads of truth tables**

 **Boardwork**

**Week 3 And the Proof Writing Begins…**

**January 27, 29 Direct Proof**

 **Proof by Contraposition**

 **Proof by Contradiction**

 **Proof Constructions**

 **The Poof! (not proof)**

 **Boardwork**

**Week 4 Proof by Induction**

**February 2,5 Loads of Proof Writing**

 **Boardwork**

 **Exam I - Wednesday**