MTH 435W
Advanced Calculus I
Fall 2013

General Information

Instructor: Dr. Waleed Al-Rawashdeh
Location: Office: Museum 110
Phone: (406)496-4407 (no voicemail)
Email: walarawashdeh@mtech.edu

Office hours: MWF: 10am – 11am, TR: 1pm - 2pm. (others by appointment).

I encourage you to come by my office if you have any questions, need help with homework problems, or would just like to talk about the material. If for some reason you are unable to make it to office hours, you are welcome to email me to set up an appointment for another time.

Course Materials


Prerequisites: M242(Methods of Proof) and M323(Methods of Proof II)

Material: We will cover most of the first six chapters of the textbook, with additional topics as time allows.

Course Description: This class serves as an introduction to Real Analysis. This course designed to bridge the gap between the introductory calculus courses, which typically stress calculation rather than rigor, and the sophisticated analysis courses found at the senior and graduate levels.

Topics include: properties of the real number system, sequences and series, limits, properties of continuous functions, and derivatives. In this course we will look more deeply at the concepts you learned in your calculus classes, in these courses you have learned a variety of facts and had experience computing limits, derivatives, and integrals to solve specific problems. In this class we will discuss how to prove many of the facts you have used in the past and look more deeply at what make the computations work. We will also examine the precise definitions of notions (e.g. limits, continuity, and differentiability) that in the past you may have had only an intuitive understanding of them. This will give you a deeper understanding of the concepts, and make your reasoning more rigorous. The course will also develop the ability of students to express themselves clearly and concisely in writing, which becomes increasingly important in more advance courses.

A major component of this course will be exposing you to proofs for the first time. The goal is for you to learn how to read, write, and understand proofs. Throughout the course there will be great emphasis placed on communication and writing. It is not enough to simply know to solve a problem; you are also responsible for explaining that solution and communicating it in written form.
**Course Objectives:** This course is designed to give the students the opportunity to learn the importance of the mathematical rigor, to think logically, precisely and mathematically, and to construct mathematically correct and concise proofs. Upon successful completion this course the students should be able to:

- Provide proofs of statements involving the properties of natural numbers and real numbers.
- Compute limits of sequences and prove statements about limits.
- Compute limits of functions, identify discontinuities of functions, and prove statements using the intermediate value theorem and the extreme value theorem.
- Compute derivatives, prove statements about derivatives using the critical point theorem, the mean value theorem and L’Hopital’s rule.

**Class Policies:**

The course requirements are listed below. They are designed to assist you in understanding and mastering the course material. You are expected to spend several hours each day outside of class reading, studying and solving problems. If you have difficulties following the class, be sure to ask questions in class or during office hours. If you are unable to go to my office hours to ask questions, I encourage you to make an appointment to see me at other times.

**Attendance and Class Participation:** Attendance is required and will be taken daily. You are expected to be on-time and remain the entire class time. It is your responsibility to find out what was discussed in a missed class. There are no points for attendance. However, if your final grade is on the borderline and you have been absent three or more times during the semester you will be given the lower letter grade. In addition to merely attending class, you are expected to participate in discussions, question-and-answer sessions and other classroom activities. No question will be too trivial to ask.

**Homework:** Homework problems will be given in class at the beginning of each section and some of them will not be from our textbook, part of it will be collected for grading about one week later. Completing the homework assignment is the most important activity in the course, as they will help you to prepare for the exams. Since a major component of this course is training in correct mathematical writing, you are expected to write neat, clear, mathematically correct solutions to the assigned problems. Your proofs will be graded on the degree to which they are: correct, clear, and concise. HOMEWORK WILL NOT BE ACCEPTED LATE and it will be due at the beginning of the class that day. Homeworks are to be pledged. Team discussion of homework is encouraged. However you should work on the problems on your own first and then ask for hint or help when you have difficulties. Looking at solutions before you try it by yourself will NOT help you to master the material NOR improve your skills. Everyone should write out his/her own solutions.

**Advice:** Read the notes and the textbook slowly. You may need to read the material many times to really understand the concepts and ideas. You need to understand definitions and theorems before you try to solve homework problems. Read and try to understand the material before the next class meeting.

Making mistake is a common step towards the success in the course. Do not be afraid to make mistakes. However you are very strongly encouraged to understand why it is a mistake and how to
fix it. You should never let the mistake go and never give up on yourself. I am willing to talk to you whenever you need help.

**Exams:** There will be three in-class exams and a comprehensive final exam. The dates in the syllabus are tentative and subject to change. If you know that you are going to miss class on an exam day for school business please arrange to take the exam in advance. Makeup exams will be available for two class days after the missed exam. If the missed exam is not made up by that time, you will receive a zero on the missed exam. Documentation must be provided to receive a makeup exam. The exams’ dates are:

- **Exam #1:** Monday, September 23.
- **Exam #2:** Monday, October 21.
- **Exam #3:** Friday, November 22.
- **Final Exam:** Wednesday, December 18. (8:00am – 10:00am) **This time can not be changed.**

**Grade Distribution:**

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**Grading Scale:**

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**Cell Phone Policy:** No cell phones on desks at any time. Put phone on vibrate.

**Academic Honesty:** Academic Dishonesty as defined on page (39) of the student handbook will not be tolerated.

**Amendments:** Any changes to this syllabus will be announced in class, and an updated version will be posted on Moodle.