Math 6250 Real Analysis III syllabus

Dr. Zachariah Sinkala
Office number KOM 201E
Office Telephone 898-2679
Office hours 9.30-11.15am TR
1.00-4.15pm TR
Zachariah.Sinkala@mtsu.edu

Pre-requisites:
MATH 6200 or an equivalent course.

OBJECTIVES: In this course you will study Functional analysis. It is the branch of mathematics dealing with spaces of functions. It is a valuable tool in theoretical mathematics, engineering and biology. It is at the very core of numerical simulation.

In this course, I will discuss the concepts of convergence and talk about topology. You will understand and differentiate between strong convergence and weak convergence. You will also see how these two concepts can be used.

After completing this course, you would have learnt about different types of spaces including metric spaces, Banach Spaces, Hilbert Spaces. You would have seen beautiful lemmas and theorems such as Riesz and Lax-Milgram. You would have also describe Lp spaces, Sobolev spaces and provided a few details about PDEs, or Partial Differential Equations.

REQUIREMENTS:
In general, you are expected to

• attend class lectures;

• read and study class assignments and solve assigned problems;

• ask questions in class when you are unsure of any concept or unclear on any assigned problem;

• come to my office for additional assistance as necessary;

• take all exams (including the Final) on the day they are scheduled
• come to class prepared (this includes completing homework in a timely manner, and bringing your textbook)

1 Textbook

1. An introductory course in Functional Analysis 3rd edition by Adam Bowers
3. Introduction to functional analysis by Laurent W. Marcoux 4. Linear Functional Analysis 2nd by Brayan M.A. Youngson

2 Course content

2.1 Quick review of topology
Continuity and convergence of a sequence in a topological space.

2.2 Spaces
Metric and normed spaces; completeness

2.3 Banach spaces
Banach spaces; linear continuous functions; weak topology

2.4 Hilbert spaces
Hilbert spaces; The Riesz representation theorem; The Lax-Milgram Lemma

2.5 Specific spaces
Properties of the Lp spaces; Distributions and Sobolev Spaces

2.6 Applications
Integral and differential equations Application: simulating a membrane
3 Grading policy

Homework problems count 40 percent. Midterm exam count 30 percent and Final Exam (Project) count 30 percent.//

90-100 A, 80-89 B, 70-79 C, 60- 69 D Below 60 F.

The Grade I indicates that the student has not completed all course requirements because of illness or other uncontrollable circumstances especially which may occur toward the close of the term. Mere failure to makeup work or turn in required work on time does not provide a basis for the grade I.

Please note the following dates and information: Last day to drop the course without a grade: February 1st, 2016
Last day to drop with a "W": March 27, 2015.

Reasonable Accommodations for Students with Disabilities: Reasonable Accommodations for Students with Disabilities: Middle Tennessee State University is committed to campus access in accordance with Title II of the Americans with Disabilities Act and Section 504 of the Vocational Rehabilitation Act of 1973. Any student interested in reasonable accommodations can consult the Disability & Access Center (DAC) website www.mtsu.edu/dac and/or contact the DAC for assistance at 615-898-2783 or dacemail@mtsu.edu

Lottery Scholarship Policy: Do you have a lottery scholarship? To retain the Tennessee Education Lottery Scholarship eligibility, you must earn a cumulative TELS GPA of 2.75 after 24 and 48 attempted hours and a cumulative TELS GPA of 3.0 thereafter. A grade of C, D, F, FA, or I in this class may negatively impact TELS eligibility.

If you drop this class, withdraw, or if you stop attending this class you may lose eligibility for your lottery scholarship, and you will not be able to regain eligibility at a later time.

For additional Lottery rules, please refer to your Lottery Statement of Understanding form (http://www.mtsu.edu/financial-aid/forms/LOTFEV.pdf) or contact your MT One Stop Enrollment Counselor (http://www.mtsu.edu/one-stop/counselor.php).

3.1 Examinations

Tentative date for the midterm are:

- Tuesday, March 3rd
Make-up exam will be given only for documented reasons of illness, family emergency or participation in a University sponsored event. Excuses such as oversleeping and lack of studying are explicitly noted as unacceptable grounds for a make-up test. Final Examination will be from 10.30am-12.30pm on Thursday, April 19, 2016.

3.2 Homework

Homework is intended as a vehicle for learning, not as a test. Moderate collaboration with your classmates is allowed. However, I urge you to invest enough time alone to understand each homework problem, and independently write the solutions that you turn in. All problems assigned on or before Thursday's class will be due on the Next Thursday.

3.3 Attendance

Attendance at every class meeting is important and expected.

3.4 Judicial Statement/Academic Misconduct

3.5 Academic Honesty

Cheating and plagiarism will not be allowed. You may discuss homework problems with others, but do not copy work from another student or from a book. Violations of this policy will be dealt with according to University guidelines.