

University of North Texas at Dallas
Fall 2015
SYLLABUS

MATH 3000.090		Real Analysis		3Hrs
Department of	Mathematics and Information Sciences	Division of	Liberal Arts & Life Sciences	
Instructor Name:	<i>Dr. Noureen Khan</i>			
Office Location:	223 DAL2			
Office Phone:	972 338 1567			
Email Address:	noureen.khan@unt.edu		(This is my preferred email address)	
Office Hours:	Monday & Wednesday 11: 30 am - 2: 30 pm VIRTUAL HOURS: Tuesday & Thursday 12:00 pm – 2:00 pm or by appointments.			
Classroom Location:	DAL2 – 240			
Class Meeting:	Monday & Wednesday 10:00 am – 11:20 am			
Course Catalog Description:	Introduction to mathematical proofs through real analysis. Topics include sets, relations, and types of proofs, continuity and topology of the real line.			
Prerequisites:	MATH 1720 Calculus II (at least C grade)			
Required Text:	<i>Analysis with an Introduction to Proof, 5/E Steven R. Lay</i> ISBN-10: 032174747X			
Reference Books	<ul style="list-style-type: none"> • Walter Rudin, Principles of mathematical analysis, McGraw-Hill, New York 1964 • Edward D. Gaughan, Introduction to analysis, Brooks/Cole Publishing Co., 1993. 			
UNT Dallas Math Lab	Math Lab (DAL1, 3rd floor) is an open lab, where tutors are available to help. You can also make appointments for one to one <i>Tutoring</i> or Group Study Sessions.			
Prerequisites:	UNT Dallas Library: phone: (972) 780-3625; web: http://www.unt.edu/unt-dallas/library.htm UNT Dallas Bookstore: phone: (972) 780-3652; e-mail: 1012mgr@fhcg.follett.com			
Calculator Policy:	This course DOES NOT REQUIR a graphing calculator.			

Course Goals: The goals of this course are to

1.	Learn the concepts of Relations, Properties of Relations, Equivalence Relations, Properties of Equivalence Classes, Congruence Modulo n , The Integers Modulo n .
2.	Demonstrate the ability to use different strategies to prove mathematical statements like, Direct Proof, Proof by Contrapositive, Proof by Contradiction etc.
3.	Distinguish different types of Functions, The Set of all Functions, One-to-One and Onto Functions, Bijective Functions, Composition of Functions, Inverse Functions, Permutations.
4.	Learn the concepts of Completeness, Convergence, Subsequences, Continuity and the topology of real line.
5.	Learn about Numerically Equivalent Sets, Denumerable Sets, Uncountable Sets, Comparing Cardinalities of Sets,

Learning Outcomes (Program):

Mathematical Reasoning:

MR 1.	Read, understand, formulate, explain, and apply mathematical statements.
MR 2.	Formulate conjectures by considering examples that move from the specific to the general.
MR 3.	Identify prove or disprove approach to Conjectures and Testing Statements methods.
MR 4.	State and apply The Principle of Mathematical Induction to prove mathematical statements.
MR 5.	Use a variety of techniques – such as, proof by contradiction, or direct application of axioms and previously proven theorems – to prove propositions.

General skills:

GS 1.	Solve mathematical problems individually and cooperatively.
GS 2.	Formulate strategies for solving novel analytical – both theoretical and applied – problems.
GS 3.	Communicate, both verbally and in writing, mathematical ideas at a variety of levels from technical to intuitive.

Course Outline:

This course will examine the theoretical foundations of real analysis, or in other words, we will learn why calculus works. The course is also aimed at improving students' proof writing abilities and getting them more comfortable with precise mathematical rigor. Students will learn to think clearly and critically to be able to prove simple statements on their own. Topics include rigorous treatment of fundamental concepts: including Sets, Logic, Mathematical Induction, and Equivalence relations, Cardinality of sets and Functions. Emphasis will be placed upon understanding and constructing mathematical proofs. Attendance is essential for effective learning and is required for this class. UNT Dallas provides all possible help to assure student success, such as Math lab where math tutors are available to help most of the day. Due to the nature of this course, you are encouraged to make regular visits during my office hours or make an appointment for help.

Course Evaluation Methods:

This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course.

Homework – Assigned and collected **weekly**

Quizzes – Weekly short quizzes

Exams – **Two** Midterm Exams

Project – Problem Solving & Technology

Final Exam – Comprehensive **Final Exam**.

Home Work – As a general rule, homework will be assigned in every class meeting, however, only “**assigned**” problems will be collected for grades on every Monday before class starts.

Reading – The reading is fundamental component for this course. You are expected to read the assigned section before coming to class.

Instrument	Value	Points	Percentages %
Homework	10 Assignments	50	10
Quizzes	Weekly Quiz	125	25
Exams	Two Midterm Exams	150	30
Class Project	Presentation	50	10
Final Exam	Comprehensive Final Exam	125	25
Total:		500	100

Grade Determination:

Grade	Points	Percentage %
A	450 or more	90 or better
B	400 – 449	80 – 89
C	350 – 399	70 – 79
D	300 – 349	60 – 69
F	299 or less	less than 60

Class room Policies:

- *Come prepared!*
- Use of Cell Phones & other Electronic Gadgets (Laptops, IPADS, etc.) other than class related work is prohibited in the classroom.
- Participate in class discussions.
- No eating or drinking during lectures.
- Maintain healthy learning environment.

Anyone caught cheating will receive an **F** for the course. Cheating includes receiving help from anyone or anything that is not allowed on homework, test or final exam.

This schedule is subject to change by instructor at any time.

Monday	TOPICS	Wednesday	TOPICS
Aug. 24	Syllabus & Pre - Test <u>Introduction to Real Analysis</u>	Aug. 26	Chapter – 1 Logical Connectives
Aug. 31	Chapter – 1 Quantifiers	Sep. 02 Quiz #1	Chapter – 1 Techniques of Proof I
Sep. 07	Labor Day	Sep. 09	Chapter – 1 Techniques of Proof I
Sep. 14	Chapter – 1 Techniques of Proof II	Sep. 16 Quiz #2	Chapter – 1 Techniques of Proof II
Sep 21	Chapter – 2 Basic Set Operation	Sep 23 Quiz #3	Chapter – 2 Relations and Functions
Sep 28	Chapter – 2 Cardinality	Sep 30 Quiz #4	Chapter – 2 Axioms of Set Theory
Oct 05	Review Exam #1	Oct 07	Exam #1
Oct 12	Chapter – 3 Natural Numbers & Induction	Oct 14 Quiz #5	Chapter – 3 More on Mathematical Induction
Oct 19	Chapter – 3 Ordered Fields	Oct 21 Quiz #6	Chapter – 3 The Completeness Axiom
Oct 26	Chapter – 3 Topology of Real Numbers	Oct 28 Quiz #7	Chapter – 3 Compact Set
Nov 02	Chapter - 4 Sequences	Nov 04 Quiz #8	Chapter - 4 Convergence
Nov 09	Chapter - 4 Monotone and Cauchy sequences	Nov 11 Quiz #9	Chapter - 4 Subsequences
Nov 16	Chapter - 5 Limits and Continuity	Nov 18 Quiz #10	Chapter – 5 Limits and Continuity
Nov 23	Chapter - 5 Limits and Continuity	Nov 25	Exam #2
Nov 30	Project Presentations	Dec 02	Review Final Exam
12/08/14	NO CLASS	Dec 09	FINAL EXAM (10:00 – 12:00 noon)

University Policies and Procedures:

Students with Disabilities (ADA Compliance):

The University of North Texas Dallas faculty is committed to complying with the Americans with Disabilities Act (ADA). Students' with documented disabilities are responsible for informing faculty of their needs for reasonable accommodations and providing written authorized documentation. For more information, you may visit the Office of Disability Accommodation/Student Development Office, DAL 2 Suite 115 or call at 972-338-1779.

Student Evaluation of Teaching Effectiveness Policy:

The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider the SETE to be an important part of your participation in this class.

Academic Integrity:

Academic integrity is a hallmark of higher education. You are expected to abide by the University's code of conduct and Academic Dishonesty policy. Any person suspected of academic dishonesty (i.e., cheating or plagiarism) will be handled in accordance with the University's policies and procedures. Refer to the Student Code of Conduct at http://www.unt.edu/csrr/student_conduct/index.html for complete provisions of this code.

Bad Weather Policy:

On those days that present severe weather and driving conditions, a decision may be made to close the campus. In case of inclement weather, call UNT Dallas Campuses main voicemail number (972) 780-3600 or search postings on the campus website www.unt.edu/dallas. Students are encouraged to update their Eagle Alert contact information, so they will receive this information automatically.

Attendance and Participation Policy:

*The University attendance policy is in effect for this course. Class attendance and participation is expected because the class is designed as a shared learning experience and because essential information not in the textbook will be discussed in class. The dynamic and intensive nature of this course makes it impossible for students to make-up or to receive credit for missed classes. Attendance and participation in all class meetings is essential to the integration of course material and your ability to demonstrate proficiency. Students are responsible to notify the instructor if they are missing class and for what reason. Students are also responsible to make up any work covered in class. It is recommended that each student coordinate with a student colleague to obtain a copy of the class notes, if they are absent. **Excessive absences (more than 3 classes, with or without excuse) may result in being dropped from the class or receiving an F for the course.***

Diversity/Tolerance Policy:

Students are encouraged to contribute their perspectives and insights to class discussions. However, offensive & inappropriate language (swearing) and remarks offensive to others of particular nationalities, ethnic groups, sexual preferences, religious groups, genders, or other ascribed statuses will not be tolerated. Disruptions which violate the Code of Student Conduct will be referred to the Center for Student Rights and Responsibilities as the instructor deems appropriate.