MATH 3345 – Introduction to Analysis
Policies and Syllabus

Instructor Contact Information

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Office Hours: 11:00 a.m. – 11:50 a.m. MW, 1:00 – 1:50 TR

Required Text

An Introduction to Analysis, Third Edition by William R. Wade

Prerequisites

You may enroll in MATH 3345 if you have successfully completed MATH 2414 (Calculus II) and MATH 3425 (Foundations of Mathematics).

Catalog Description of Course

Study of metric spaces, sequences, series, and continuous functions. Emphasis is given to real and complex number systems.

Disability Statement

If you have a disability, including a learning disability, for which you request disability support services and/or accommodation(s), please contact Ida MacDonald in the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability support services and/or accommodation(s) must provide appropriate documentation of his/her disability to the Disability Support Services counselor. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579). Additional information may also be obtained at the following UT Tyler Web address: http://www.uttyler.edu/disabilityservices.

Social Security Statement

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number.

Note Regarding Student Absence due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor by the second class meeting of such absences.

Grade Replacement

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grape point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

Evaluation

Your grade will be determined by percentage from the following categories:

Midterm Exams	40%
Final Exam	25%
Homework	35%

The grade scale will be as follows:

90% or better	=	A
$80\% \leq x < 90\%$	=	B
$70\% \leq x < 80\%$	=	C
$60\% \leq x < 70\%$	=	D
$x < 60\%$	=	F

Homework

Homework will be assigned and collected at most class meetings. The student's approach to completing the homework is the single most important factor in whether or not the student succeeds in the course. Time and time again, it is seen that students who work independently on their homework have much higher exam grades (which constitute 65% of the grade for this course). Sometimes, these independent students do not have the highest homework average, because they refrained from asking for too much "help" from their classmates. Too often, students get so caught up in trying to get good grades on homework (often by unscrupulous means) that they loose sight of the fact that the main purpose of the homework is *practice*. The real assessment done in this course is on the exams – the 35% of the grade apportioned to homework is merely serves as a motive for students to do the homework. The skill that is being practiced in homework is the ability to solve problems. If a student never really solves any homework problems, how should that student expect to solve problems on the exams?

Midterm Exams

There will be three to four midterm exams. The dates will be announced at least one week ahead of time. The exams will mostly test whether or not students can prove facts about analysis. Very few problems will test rote memorization skills or mechanical computational skills. This is a "proofs course" and you will be expected to prove things!

Final Exam

A final comprehensive examination will be given on **Wednesday, December 12, 10:15 a.m. – 12:15 p.m.** No alternative times will be scheduled to accommodate travel plans or work schedules.

Attendance and Make-ups

You are expected to attend every class meeting. No make-ups for homework or exams will be granted for unexcused absences. More than three unexcused absences will result in an overall letter grade reduction, five unexcused absences will result in a two letter grade deduction, and more than five unexcused absences will result in a grade of F. If you know ahead of time that you must miss a class, you need to let your professor know ahead of time and you will be expected to turn the work due on the day of the absence early. If you must miss class due to some unforseen reason, it is your responsibility to inform your professor at the earliest possible moment; failure to do so will result in an unexcused absence. It is the discretion of the professor to decide which absences are excused.

Visiting Your Professor

You are highly encouraged to visit your professor when you have questions. If you can arrange these visits to occur during the professor's office hours, it is preferable. But, your professor is happy to schedule a meeting outside of his regular office hours. Also, your professor maintains an open door policy, which means if his door is open, then come one in; if it is closed, he is probably busy and would prefer to not be disturbed if possible. His door is open most of the time when he is in the office, though.

Course Outline

Chapter 1: The Real Number System

- 1.1 Ordered field axioms
- 1.2 Well-Ordering Principle
- 1.3 Completeness Axiom
- 1.4 Functions, countability, and the algebra of sets

Chapter 2: Sequences in $\mathbb{R}$

- 2.1 Limits of sequences
- 2.2 Limit theorems
- 2.3 Bolzano-Weierstrass Theorem
- 2.4 Cauchy Sequences
- 2.5 Limits supremum and infimum

Chapter 3: Continuity on $\mathbb{R}$

- 3.1 Two-sided limits
- 3.2 One-sided limits and limits at infinity
- 3.3 Continuity
- 3.4 Uniform continuity

Chapter 4: Differentiability on $\mathbb{R}$

- 4.1 The derivative
- 4.2 Differentiability theorems
- 4.3 Mean Value Theorem
- 4.4 Monotone functions and Inverse Function Theorem

Chapter 5: Integrability on $\mathbb{R}$

- 5.1 Riemann integral
- 5.2 Riemann sums
- 5.3 Fundamental Theorem of Calculus
- 5.4 Improper Riemann integration
- 5.5 Functions of bounded variation
- 5.6 Convex functions

Student Learning Objectives

By the end of this course, the student should be able to do the following:

- Prove facts pertaining to the real numbers and subsets of the real numbers (including the natural numbers, the integers, and the rational numbers) and involving the concepts of completeness, density, bounds, functions, and other basic concepts.
- Prove facts about the convergence and nonconvergence of sequences in $\mathbb{R}$.
- Prove facts about limits of functions on $\mathbb{R}$.
- Prove facts about continuity of functions on $\mathbb{R}$.
- Prove facts about derivatives of functions on $\mathbb{R}$.
- Prove facts about integrals of functions on $\mathbb{R}$.