

**Tennessee Technological University
Mathematics Department**

**MATH 4110-4120/5110-5120
Advanced Calculus I-II**

I. COURSE DESCRIPTION FROM CATALOG:

Rigorous treatment of functions of one and several variables, improper integrals, sequences, infinite series, uniform convergence and applications. Students are expected to improve their ability to work in an abstract setting using precise definitions and formal proofs and to present their work in class. Lec 2-2, Rec 2-2, Credit 3-3

II. PREREQUISITE(S)

MATH 4110 (5110): C or better in MATH 3400 or consent of instructor.

MATH4120 (5120): C or better in MATH 4110 or 5110

III. COURSE OBJECTIVE(S):

One of the main objectives of the course is to bridge the gap between undergraduate calculus to graduate courses by giving rigorous treatment of topics like real number system, sequences and series, continuity, differentiation, integration in one and higher dimensions, and uniform convergence.

IV. STUDENT LEARNING OUTCOMES:

MATH 4110/5110

Upon successful completion of the course students will understand basic topological and metric properties of the real line; be able to compute the Riemann-Stieltjes integral of various functions; and be able to use basic theorems about the continuity, differentiability, and integrability of functions of a single real variable to create proofs of simple results related to these concepts.

MATH 4120/5120

Upon successful completion of the course students will understand the Lebesgue measure and integral on the real line; be able to use basic theorems about sequences and series of functions to create proofs of simple results related to these concepts; and be able to use basic theorems about metric spaces, Lebesgue measure and integral, and Fourier series to create proofs of simple results related to these concepts.

V. TOPICS TO BE COVERED

4110/5110:

1. The Real Numbers
2. Differential Calculus of Functions of One Variable
3. Integral Calculus of Functions of One Variable
4. Numerical Sequences and Series
5. Sequences and Series of Functions
6. Metric Spaces.

4120/5120:

1. Functions in Metric Spaces
2. Limits and continuity for functions of several variable and vector-valued functions
3. Differentiation for functions of several variables and vector-valued functions.
4. Lebesgue Measure
5. Lebesgue Integral
6. Fourier Series

VI. ADDITIONAL INFORMATION

Graduate credit is earned on the basis of additional work required by the instructor per TTU Graduate Catalog

VII. POSSIBLE TEXTS AND REFERENCES:

MATH 4110/5110 – *The Real Numbers & Real Analysis, 2011* by Ethan Bloch
ISBN-9780387721774

MATH 4110/5110 - *Introduction to Real Analysis* by William F. Trench

MATH 4120/5120 - *Methods of Real Analysis*, 2nd ed. by Goldberg

MATH 4110/5110 - *Principles of Mathematical Analysis* by Rudin

MATH 4120/5120 - *Mathematical Analysis: An Introduction* by Andrew Browder

VIII. ANY TECHNOLOGY THAT MAY BE USED:**IX. STUDENT ACADEMIC MISCONDUCT POLICY:**

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at [Policy Central](#).

X. DISABILITY ACCOMMODATION:

Students with a disability requiring accommodations should contact the Office of Disability Services (ODS). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The ODS is located in the Roaden University Center, Room 112; phone 372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at [Policy Central](#).