

**Introduction to Analysis**  
**Math 471–01    Spring 2020**

**TR    09:30–10:45 am    WORKC 109**

**Instructor:**    Dr. Bixiang Wang  
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**Office Hours:** TR 08:00–09:30 am, F 08:00–09:00 am (or by appointment)  
**Prerequisite:** Math 372 passed with grade C- or better  
**Textbook:**     *Principles of Mathematical Analysis*, by Walter Rudin, third edition, 1976.

**Course Learning Outcomes:** This is a second course in real analysis to provide solid background in rigorous axiomatic mathematics. This course introduces the concepts of sequence, limit and continuity in metric spaces which include  $\mathbb{R}^n$  as a special case. The properties of metric spaces and functions defined in these spaces will be discussed. The Riemann-Stieltjes integral and Lebesgue integral will be developed and studied in details. By the end of this course, students will

- Understand the concept of metric space as well as sequence, limit and continuity in these spaces.
- Understand compactness in metric spaces and be able to prove the compactness of subsets under certain conditions.
- Be able to calculate the Riemann-Stieltjes integral using definition, formulas and fundamental theorems of calculus.
- Understand the concepts of Lebesgue measure and Lebesgue integral.
- Master the ideas and techniques to prove the Lebesgue integrability of functions.
- Be able to apply the Monotone Convergence Theorem, the Lebesgue Dominated Convergence, and the Fatou Lemma to investigate the limit of a sequence of Lebesgue integrable functions.
- Understand the concepts of almost everywhere convergence, almost uniform convergence, convergence in  $L^p$ , and convergence in measure. Master the relations between these convergences and be able to prove such convergence for a sequence of measurable functions.

**Program Learning Outcomes:** Learning objectives for the math departments undergraduate and graduate degree programs can be found at

<http://infohost.nmt.edu/~math/about/learningoutcomes.html>

**Course Contents:** The course will cover the following material.

- Chapter 2 Basic Topology
- Chapter 3 Numerical Sequences and Series
- Chapter 4 Continuity
- Chapter 5 Differentiation
- Chapter 6 The Riemann-Stieltjes Integral
- Chapter 7 Sequences and Series of Functions
- Chapter 11 The Lebesgue Theory

**Attendance:** It is important that students attend every class scheduled for this course. Students are responsible for all announcements and material covered in class.

**Exams:** There will be two take-home exams for this course. The exam dates will be announced in class at least one week in advance. The students have to show their work in detail and in an organized way. A correct answer without all necessary intermediate steps will not guarantee full credit.

**Homework:** The homework will be assigned in class every Tuesday and is due in class the following Tuesday. Please first write the problem, and then write your answer. Every assignment will be collected, but not necessarily graded. No late homework will be accepted. Students must show their homework in detail so that it is easy to follow how they arrive at their answers. Please staple your homework together.

**Cell Phones:** Your cell phones should be set on vibrate when you come to class.

**Grading:** Your grade in the course will be determined by the points you have earned. A maximum of 100 points is possible distributed in the following way.

Homework .....	40 points
Exams .....	60 points

90-100: A; 80-89: B; 70-79: C; 60-69: D; below 60: F. Plus/minus grades will also be used, but there are neither A+ nor D- grades.

**Counseling and Disability Services:** New Mexico Tech is committed to protecting the rights of individuals with disabilities. Qualified individuals who require reasonable accommodations are invited to make their needs known to the Office of Counseling and Disability Services (OCDS) as soon as possible. In addition, New Mexico Tech offers mental health and substance abuse counseling through the Office of Counseling and Disability Services. The confidential services are provided free of charge by licensed professionals. To schedule an appointment, please call 835-6619.

**Academic Honesty:** New Mexico Tech's Academic Honesty Policy can be found starting on page 59 of the NMT catalog,

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You are responsible for knowing, understanding, and following this policy.

**Changes:** The instructor reserves the right to modify the course plan when necessary. But any changes will be announced in class.