Math 441: Introduction to Analysis I

Fall 2024

Class meeting: M, W, F: 11 - 11:50 AM at SCB 209
Instructor: Dr. Tuan Pham
Email: tpham@byuh.edu
Office: SCB 316, telephone: 808-675-3044
Office hours: M, W, F 12:00-1:30 PM or by appointment
Canvas: https://byuh.instructure.com/courses/1479784
Course website: https://web.engr.oregonstate.edu/~phamt3/Courses/F24-Math-441
Prerequisite: Math 214 and Math 301.
Credit hours: This 3-credit hour course approximates one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately 14 weeks.
Textbook: *"Basic Analysis I: Introduction to Real Analysis, Volume I"*, version 6.0 (July 11, 2023) by Jiri Lebl. The book is available for download at https://www.jirka.org/ra/realanal.pdf. You can also buy a physical copy on Amazon for only $18.50.

Course description: This course covers elementary topological aspects of real numbers, metric properties, sequences, limits, continuity, differentiation, and Riemann Integration. It aims to provide students with a strong foundation in real analysis, focusing on rigorous proofs and a deeper understanding of calculus concepts.

Learning Outcomes: Upon successful completion of this class, a student will be able to:

1. Understand and apply the concepts of topological properties, metric spaces, and the structure of real numbers;

2. Demonstrate proficiency in working with sequences, series, and limits of functions, including the ability to determine convergence or divergence;

3. Analyze the concepts of continuity, differentiability, and integrability for functions of a single real variable, and apply these concepts to solve problems;

4. Construct rigorous proofs of mathematical statements related to real analysis, using precise definitions and logical reasoning;

5. Develop a deeper understanding of the theoretical underpinnings of calculus, enhancing the ability to connect real analysis to other areas of mathematics;

6. Communicate mathematical ideas clearly and effectively, both in written proofs and oral explanations, demonstrating the ability to convey complex concepts to others.

Course goals: The course goal is to help students achieve the following learning outcomes. The table below indicates which outcomes will be addressed in Math 441.

Learning outcomes	Where/when addressed
Demonstrates proficiency in Algebra and Trigonometry necessary for success in Advanced mathematical studies. [low priority]	Good Algebra skills are required to work many of the exercises on the homework and exams.
Demonstrates proficiency in Differential, Integral, and Multivariable Calculus necessary for success in Advanced mathematical studies. [medium priority]	Limits, Derivatives, Continuity Sequences, Series, and Integrals will be covered rigorously.
Demonstrates content knowledge of both abstract and applied mathematical disciplines by stating definitions, salient theorems, and proofs of major theorems and concepts that are core content in upper division courses. [high priority]	Theorems will be investigated and used to work many of the exercises on homework and exams.
Organize and explain their knowledge of logic and mathematical content in the structure of original valid proofs. [high priority]	Proofs will be covered in great detail.
Communicate mathematical ideas effectively in both written and oral context. [high priority]	Throughout the course in homework and exams.
Apply major definitions, theorems and algorithms in problem solving. [very high priority]	Throughout the course in homework and exams
Use appropriate technological tools while solving mathematical problems. [low priority]	
Prepare professionally for graduate school or employment in mathematics or related fields. [medium priority]	Advanced Calculus is typically an important part of any graduate mathematics degree program.

Grading components:

Homework: 35%
Presentations: 15%
Attendance: 10%
Midterm: 20%
Final exam: 20%
There will be opportunities for extra credit during the course.

Evaluation:

- **Homework**: all homework assignments are to be written and turned in class. Students can work with each other but must write their own homework. The writing skill is very important in this course.

- **Presentations**: on Fridays, pre-assigned students will take turn to present their solution to an assigned homework problem to the class. The presenter must email their legibly-written solution to the class the day before their presentation at the latest. The audience can ask questions. If the presenter fails to answer a question that he/she should be able to answer, the present will lose some points.

- **Attendance**: after the deadline for dropping the class, the instructor will check attendance every day of class.

- **Exams:** there will be one midterm exam and one final exam. See the class schedule for the dates

of those exams. The final exam will be from 11:00 AM to 1:50 PM on **Monday, December 9, 2024** at the regular classroom (SCB 209).

Make-up work and due-date extension: make-up exams will be given only in exceptional circumstances, with appropriate documentation, such as illness or family emergency. If possible, notify the professor as soon as you are aware of the issue. Extension of due dates for assignments may be considered under similar conditions.

Grade lines: the course grade lines will not be harder than the standard grade lines: A 100-93%, A-92.99-90%, B+ 89.99-87%, B 86.99-83%, B- 82.99-80%, C+ 79.99 - 77%, C 76.99-73%, C- 72.99-70%, D+ 69.99-67%, D 66.99-63%, D- 62.99 - 60% and F < 60%.

Other Learning Resources:

- The instructor has office hours dedicated to help you. Don't hesitate to make an appointment if the office hours conflict with your schedule.
- Your fellow classmates are also a good resource. Form a study group and you will find it helpful.
- You can find peer tutors at the Math Lab, located in SCB 302. Online tutoring is also available. Check out their hours here: https://mc.byuh.edu/math-lab.

Student Academic Grievance policy:
Students, who feel that their work has been unfairly or inadequately evaluated by an instructor, are encouraged to pursue the matter as an Academic Grievance by following the steps found in the Academic Grievance policy at https://catalog.byuh.edu/policies-procedures/grievances.

Final Exam Schedules: Final exams are to be offered on the specific day and time as determined by the official final exam schedule. Students must plan travel, family visits, etc., in a way that will not interfere with their final exams. Less expensive air fares, more convenient travel arrangements, family events or activities, and any other non-emergency reasons are not considered justification for early or late final exams.

Honor Code: The Honor Code exists to provide an education in an atmosphere consistent with the ideals and principles of the Church of Jesus Christ of Latter-day Saints. Students, faculty and staff are expected to maintain the highest standards of honor, integrity, morality, and consideration of others in personal behavior. Academic honesty and dress and grooming standards are to be maintained at all times on and off campus. For specific information see http://honorcode.byuh.edu.

Discrimination: The University is committed to a policy of nondiscrimination on the basis of race, color, sex, pregnancy, religion, national origin, age, disability, genetic information or veteran status in admissions, employment or in any of its educational programs or activities. For specific information see the non-discrimination policy at https://policies.byuh.edu.

Title IX and Sexual Misconduct: The University will not tolerate any actions proscribed under Title IX legislation, specifically sexual harassment, sexual violence, domestic or dating violence or stalking perpetrated by or against any university students, university employees or participants in university programs. For specific information see https://titleix.byuh.edu. All faculty and staff are deemed responsible reporting parties and as such mandated to report incidents of sexual misconduct including sexual assault to the Title IX.

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Title IX Office
Lorenzo Snow Administrative Building
55-220 Kulanui St.
Laie, HI  96762
Office Phone: (808) 675-4585
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Accommodating Students with Disabilities: Disability Services is dedicated to assisting students with disabilities by providing opportunities for success and equal access at Brigham Young University-Hawaii. We are committed to coordinating reasonable accommodations as outlined by Federal and State law. To learn more about available supports, go to https://disability.byuh.edu, call (808) 675-3518 or go to McKay Building 181 across from the Cafeteria. You may also email disabilityservices@byuh.edu with questions. For Canvas Accessibility Issues, please fill out this online form https://titanium.byuh.edu/Titanium_Disability_Intake.

Mental Health Resources: As a college student, there may be times when personal stressors interfere with your academic performance and/or negatively impact your daily life. If you or someone you know is experiencing mental health challenges at BYUH, please contact Counseling Services at (808) 675-3518. Services are free and confidential. For more information, visit https://counseling.byuh.edu/. Free mental health self-help resources are available through TAO Connect. To access them, simply go to https://us.taoconnect.org/register and sign in using your BYUH email address. In a crisis situation, or after hours, please contact BYUH Campus Safety at (808) 675-3911 or call 911 if you are off campus. You can also call the 24-hour crisis hotline at 1-800-753-6879 or contact the Crisis Text Line at 741-741.

Report a Concern: If you have a concern to report go to http://about.byuh.edu/reportaconcern. If you have reason to believe a student or dependent of a student is a danger to self or others please do one of the following depending on the urgency of the situation:

a. Call 911,

b. Call BYU-H Public Safety (675-3911),

c. Report a concern to the Behavior Intervention Team.