

# Math 312-001

## Concepts of Real Analysis

Thomas R. Cameron  
Assistant Professor of Mathematics  
+1 814-898-6327  
trc5475@psu.edu  
www.thomasrcameron.com

### Course Information

Course Time:	M, W, Th, F: 3:35 - 4:25 pm	Office Hours:	M, T, W, F: 10:00 - 11:00 am
Course Location:	Behrend Science Building 124	Office Location:	Benson 87

### Textbooks

Book of Proof:	<a href="http://www.people.vcu.edu/~rhammack/BookOfProof/">http://www.people.vcu.edu/~rhammack/BookOfProof/</a>
Basic Analysis:	<a href="https://www.jirka.org/ra/realanal.pdf">https://www.jirka.org/ra/realanal.pdf</a>
Intro to Real Analysis:	<a href="https://digitalcommons.trinity.edu/mono/7/">https://digitalcommons.trinity.edu/mono/7/</a>

### Course Format

As Paul Halmos noted, "The only way to learn mathematics is to do mathematics." Hence, we will spend the majority of our in-person class time doing mathematics. In particular, there will be a short quiz at the beginning of each class, which usually covers important definitions, theorems, or problem solving techniques. The remaining class time is a mixture of lecture and class exercises.

### Learning Outcomes

By the end of the course, students should be able to describe the real line as a complete, ordered field; use the definitions of convergence as they apply to sequences, series, and functions; determine the continuity, differentiability, and integrability of functions defined on subsets of the real line; apply the Mean Value Theorem and the Fundamental Theorem of Calculus to problems in the context of real analysis; write solutions to problems and proofs of theorems that meet rigorous standards based on content, organization and coherence, argument and support, and style and mechanics; determine the Riemann integrability of a bounded function and prove a selection of theorems concerning integration; recognize the difference between pointwise and uniform convergence of a sequence of functions; illustrate the effect of uniform convergence on the limit function with respect to continuity, differentiability, and integrability.

### Covid Related Issues

#### Masking

Masking is no longer required in most areas on campus, with some exceptions. In addition to these areas, which will be marked with signage, and masking when sick or after testing positive for COVID-19, the university encourages anyone who wishes to wear a mask on campus to feel free to do so.

#### Student Absences due to illness

Student absences due to illness, be it Covid-19 or another illness, will be treated as before the pandemic. Penn State is no longer communicating students' isolation status to instructors. If a long term absence extends to a large portion of the semester, we recommend the student contact Student Affairs about the possibility of a withdrawal for the semester.

## Grading Policy

Your final grade is broken up as follows.

Category	Percentage
Office Hours	5%
Daily Quizzes	10%
Homework Assignments	30%
Exams (10% each)	30%
Final Exam	25%

Your final letter grade is based on the following scale.

Grade	Percentage Interval	Grade	Percentage Interval
A	[93, 100]	C+	[77, 80)
A-	[90, 93)	C	[70, 77)
B+	[87, 90)	D	[60, 70)
B	[83, 87)	F	[0, 60)
B-	[80, 83)		

## Assignment Descriptions

### Office Hours

Each student must attend at least 3 office hour sessions, or an alternative meeting time, by the end of the semester. Credit will be given only if a pertinent question is asked during the meeting.

### Quizzes

Daily quizzes are assigned during the first 5 minutes of each class period. These short quizzes cover pertinent definitions, theorems, and problem solving methods. In addition, these quizzes serve as an attendance marker. To help alleviate students' concern with missing quizzes due to absence, the three lowest quiz scores will be dropped. Under certain cases, students may be eligible for makeup assignments.

### Homeworks

To help develop a mastery of the material, students will be given several homework assignments which cover the material in greater depth. The students are expected to write out their answers with an appropriate amount of work shown. If the student has an excused absence, they will be given additional time to complete the assignment. However, the student must communicate with the instructor prior to the assignment deadline.

### Exams

We will have 3 exams throughout the semester. These exams are intended to test your general understanding of the concepts covered up to that point, with a heavy emphasis on the main definitions, theorems, and problem solving methods. These exams will be administered in class; only those with an excused absence will be given additional time to complete the exam. Again, the student must communicate with the instructor prior to the exam date.

### Final Exam

A comprehensive final exam will be given during finals week. The final is administered in person; only those with an excused absence will be given additional time to complete the exam. Again, the student must communicate with the instructor prior to the exam date.

## Academic Integrity

Academic integrity is a basic guiding principle for all academic activity at the University, and all members of the community are expected to adhere to this principle. Specifically, academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. It includes a commitment not to engage in or tolerate acts of falsification, misrepresentation, or deception. Such acts violate the fundamental ethical principles of the University community and undermine the efforts of others.

Violations of academic integrity are not tolerated at Penn State Behrend. Violators will receive academic sanctions and may receive disciplinary sanctions, including the awarding of an XF grade. In cases such as these, an XF grade is recorded on the transcript and states that failure of the course was due to an act of academic dishonesty. All acts of academic dishonesty are recorded so those repeat offenders can be sanctioned accordingly. For more information:

<http://behrend.psu.edu/for-faculty-staff/faculty-resources/academic-integrity>

## Extra Help

Do not hesitate to come to my office during office hours or by appointment to discuss a homework problem or any aspect of the course. You also may want to consider the Math Lab (located on the second floor of Roche Hall) or the Learning Resource Center (located in the library). Hours can be found here:

<http://psbehrend.psu.edu/Academics/academic-services/lrc>.

See a schedule for all options on TutorTrac at <https://tutorapp.bd.psu.edu>

## Disabilities and Learning Differences

Penn State is strongly committed to providing full access to its programs and services for all individuals. The University encourages academically qualified students with disabilities to take advantage of the educational programs and accommodations offered at Penn State Behrend. For more information:

<http://behrend.psu.edu/student-life/educational-equity-and-diversity/student-resources/students-with-disabilities-and-learning-differences>

## Educational Equity Concerns

Penn State takes great pride to foster a diverse and inclusive environment for students, faculty, and staff. Acts of intolerance, discrimination, harassment, and/or incivility due to age, ancestry, color, disability, gender, national origin, race, religious belief, sexual orientation, or veteran status are not tolerated and can be reported through Educational Equity at the Report Bias site:

<https://equity.psu.edu/reportbias>

## Counseling and Psychological Services

Students with academic concerns related to this course should contact the instructor in person or via email. Students also may occasionally have personal issues that arise in the course of pursuing higher education that may interfere with their academic performance. If you find yourself facing problems affecting your coursework, you are encouraged to talk with an instructor and to seek confidential assistance at the Penn State Behrend Personal Counseling Services at (814) 898-6504. For more information:

<http://psbehrend.psu.edu/student-life/student-services/personal-counseling>

## Copyright of Class Materials

You may not share any information from this course (including notes and assignments) with others who are not currently registered for the course, nor post such information electronically without the permission of the instructor—this includes online note-taking/note-sharing services (See Penn State Administrative Policy AD-40). Also prohibited in the policy is the posting of audio, video, or photographs posted to social media sites or other publicly accessible resources. Unless you have my permission, you risk disciplinary sanctions.

## Title IX

Penn State is committed to fostering an environment free from sexual or gender-based harassment or misconduct. The Office of Sexual Misconduct Prevention and Response ensures compliance with Title IX, a federal law that prohibits discrimination based on the sex or gender of employees and students. Behaviors including sexual harassment, sexual misconduct, dating violence, domestic violence, and stalking, as well as retaliation for reporting any of these acts violate Title IX and are not tolerated. The University is also committed to providing support to those who may have been impacted by incidents of sexual or gender-based harassment or misconduct and may provide various resources and support services to individuals who have experienced one of these incidents. For more information:

<https://universityethics.psu.edu/our-expertise/title-ix>

or

<https://universityethics.psu.edu/our-expertise/title-ix/t9-resources/campus-resources/behrend>

## Important Dates

Classes Begin .....	August 21
Regular Drop Deadline .....	11:59 pm August 26
Regular Add Deadline .....	11:59 pm August 27
Labor Day .....	September 4
Exam 1 .....	September 22
Final Exam Conflict Filing Period .....	September 25 – October 15
Exam 2 .....	November 3
Late Drop Deadline .....	November 10
Thanksgiving Break .....	November 19 – 25
Exam 3 .....	December 8
Classes End .....	December 8
Final Exams .....	December 11 – 15

## Disclaimer:

I reserve the right to diverge from this syllabus in the best interest of my students learning and achievement. Any changes made will be announced in advance.