MATH 521 004– Analysis I, Fall 2019

INSTRUCTOR

Brian Hepler (Van Vleck Visiting Assistant Professor)
Office: Van Vleck 626
Email: bhepler@math.wisc.edu
Office Hours: Mondays 1:30pm-3:30pm (or by appointment).

Credits

3

URL: https://canvas.wisc.edu/courses/161887

Course Designations and Attributes

Breadth - Natural Science
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Honors - Honors Optional

Honors Optional

If you are taking this course for Honors, you will be assigned extra homework problems (which are available to non-honors students for extra credit), but will count toward the homework grade for Honors students.

Meeting Time and Location

MWF 9:55am-10:45am
Van Vleck B135

This class meets for three 50-minute class period each week over the fall/spring semester and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2 hours out of

classroom for every class period. The syllabus includes additional information about meeting times and expectations for student work.

OFFICIAL COURSE DESCRIPTION

The real numbers, elements of set theory, metric spaces and basic topology, sequences and series, limits, continuity, differentiation, integration, sequences and series of functions, uniform convergence.

Requisites

MATH 322, 341, 376, or 421 or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program

GRADING

Homework: 15%
Midterms Exams: 25% each
Final Exam: 35% (cumulative).

Grade Cutoffs:

>87% A	>81% AB
>71% B	>65% BC
>55% C	
>40% D	

TEXTBOOK

W. Rudin. *Principles of Mathematical Analysis*, 3rd ed.
ISBN: 9780070542358
(Note: the text is also available on reserve through the UW libraries.)

EXAMS

We will have two midterm exams and one two-hour final exam during the final exam period. Makeup exams will be scheduled only with the instructor's consent, and only in cases of illness or family emergency (your final exam can also be rescheduled if you have more than two exams during a 24-hour period). No books, notes, or electronic devices will be allowed during the exams.

Midterm 1: Wednesday Oct 2
Midterm 2: Wednesday Nov 6

The final exam is 12/14/2019 from 10:05am-12:05pm. Do not make travel plans that conflict with the final exam.

HOMEWORK

There will be approximately 10 homeworks (generally assigned weekly), posted on the canvas webpage, and are **assigned and due in class on Mondays**.

- All homework should be written legibly and in complete sentences.
- Collaboration on homework is permitted (and encouraged), however, all solutions you submit must be written independently (i.e., you may work together to generate solutions to problems, but you should write the solution you submit on your own).
- All homework should be submitted in hard copy at the start of the lecture on the day it is due.
- There will be no credit for copied or unexcused late homework. Valid excuses for late homework are illness or family emergency. Other personal and academic circumstances may be considered on a case-by-case basis.
- Please also note the additional rules regarding homework described in the section on academic integrity below.

COURSE LEARNING OUTCOMES

Students will be able to

- explain the Least Upper Bound axiom, the real number field and the Euclidean space
- state and prove the Schwarz inequality in R^n
- state and use the definitions of finite, countable and uncountable sets
- define a metric space and check the definition for simple examples
- state and prove properties of open and closed sets and of compact sets in a metric space
- state and use the definition of sequence, subsequence, convergent sequence and Cauchy sequence
- define a monotone sequence and work out the lim sup and lim inf of a sequence
- define convergent, absolutely convergent and conditionally convergent series
- use the geometric series, root test and ratio test for covergence of series
- state and use the ε–δ definitions of continuity and limits for functions and verify them in simple examples
- state and prove theorems relating to continuous functions on compact and connected sets
- define the derivative of a real valued function and apply L'Hˆopital's rule

- state and prove the Mean Value Theorem
- define the Riemann-Stieltjes integral and prove its basic properties
- explain the criteria for integrability and the integral of step functions
- state and prove the fundamental theorem of calculus and explain why the hypotheses are necessary
- compute change of variables in an integral and explain the relationship between differentiation and integration
- explain pointwise and uniform convergence of functions
- show properties of integrability and differentiability of the uniform limit of a sequence of functions
- explain uniform convergence of series and the Weierstrass M-test

RULES, RIGHTS & RESPONSIBILITIES

- To see the Guide's Rules, Rights and Responsibilities information, refer to http://guide.wisc.edu/undergraduate/#rulesrightsandresponsibilitiestext.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: "The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify

and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA."
http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: "Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world." https://diversity.wisc.edu/