

MATHEMATICS 320 Section 101

Real Variables I

2014W Term 1, September–December 2014

PREREQUISITE:

- Either (a) a score of 68% or higher in MATH 226 or (b) one of MATH 200, MATH 217, MATH 226, MATH 253, MATH 263 and a score of 80% or higher in MATH 220.

INSTRUCTOR:

- Joel Feldman
- Math building room 221
- 604-822-5660
- feldman@math.ubc.ca
- <http://www.math.ubc.ca/~feldman/>
- office hours: Monday 10:00–11:00, Tuesday 10:00–11:00, Thursday 11:00–12:00

TEXT: Walter Rudin, *Principles of Mathematical Analysis*, third edition.

I will post all handouts, problem sets, etc. on the web at

<http://www.math.ubc.ca/~feldman/m320/>

OTHER REFERENCES:

- Tom M. Apostol, *Mathematical Analysis*
- Maxwell Rosenlicht, *Introduction to Analysis*
- Arthur Mattuck, *Introduction to Analysis*.
- Kenneth Ross, *Elementary Analysis: The Theory of Calculus*
- William F. Trench, *Introduction to real analysis*
http://ramanujan.math.trinity.edu/wtrench/texts/TRENCH_REAL_ANALYSIS.PDF

TOPICS:

1. Number Systems (§1):
 - ordered fields
 - rational, real and complex numbers
 - Archimedean property
 - supremum, infimum, completeness
2. Sequences and Series of Real Numbers (§3):
 - limits of sequences, algebra of limits
 - Bolzano–Weierstrass Theorem
 - Cauchy sequences, liminf, limsup
 - limits of series, convergence tests, absolute and conditional convergence
 - power series
3. Metric Spaces (§2):
 - metric spaces
 - convergence, completeness, completion
 - open sets, closed sets, compact sets, Heine Borel Theorem
 - connected sets
4. Continuity (§4):
 - functions, cardinality
 - continuity
 - continuity and compactness, existence of \min_{\max} imizers, uniform continuity
 - continuity and connectedness, Intermediate Value Theorem
 - monotone functions and discontinuities
5. Differentiation (§5):
 - differentiation
 - Mean Value Theorem
 - L'Hôpital's Rule
 - Taylor's Theorem

see over

GRADING:

- There will be two midterms, each accounting for about 20% of the final mark.
- There will be weekly problem sets accounting for about 10% of the final mark.
- The final exam will account for about 50% of the final mark.
- Grades **will probably be scaled**.

POLICIES:

- The midterm and final examination will be strictly closed book: no formula sheets or calculators will be allowed.
- Missing a homework or midterm normally results in a mark of 0. Exceptions may be granted in two cases: prior consent of the instructor or a medical emergency. In the latter case, the instructor must be notified within 48 hours of the missed test, and presented with a doctor's note immediately upon the student's return to UBC. When an exception is granted for a missed midterm, there is no make-up midterm, and the final exam mark will be used instead.