**Course Outline**
**Mathematics 320 Sections 101 and 102– Real Variables I**
**2016W Term 1 Sept.-Dec., 2016**

**Prerequisite:** 68% in MATH 226; or one of Math 200/217/226/253/263 and 80% in MATH 220.

Webpage for Section 101 (E. Perkins):
`http://www.math.ubc.ca/~perkins/teaching.html`

Webpage for Section 102 (I. Laba):
`http://www.math.ubc.ca/~ilaba/teaching/math320_F2016/`

**Text:** Principles of Mathematical Analysis, 3rd edition, Walter Rudin, McGraw-Hill.

**Topics:**

1. Number Systems (Ch. 1)
•ordered fields

•rational, real and complex numbers.

•the Archimedean property and the nonstandard reals

•supremum, infimum, completeness

2. Sequences and Series of Real Numbers (Ch. 3)
•limits of sequences, algebra of limits

•Bolzano-Weierstrass Theorem

•Cauchy sequences

•limsup, liminf

•limits of series, convergence tests, absolute and conditional convergence

•power series

3. Metric Spaces (Ch. 2)
•countable and uncountable sets; elementary set theory

•sequences in a metric space, completeness of metric spaces

•open and closed sets, closure, interior, boundary

•compact sets, Heine-Borel Theorem

•the Cantor set

•relatively open and closed sets

•connected sets

4. Continuity (Ch. 4)
•continuous functions on $R$ and on metric spaces

•continuity and compactness, the Fundamental Theorem of Extreme Values

•continuity and connectedness, the Intermediate Value Theorem

•uniform continuity

•monotone functions

5. Differentiation; a brief review (Ch. 5)
•definitions, mean value theorem

•Taylor's theorem

**Grading:** Weekly or biweekly homework sets–30%
(The lowest HW score will be dropped.)

One midterm (scheduled in class for Fri. Oct. 21 )–20%

Final exam–50%

The grades may be slightly scaled at the end of the course.

**Other Reading**

•Calculus, by M. Spivak (for axioms of the reals and sequences and series of real numbers)

•Naive Set Theory by P. Halmos (for set theory and cardinality)

•Introduction to Topology and Modern Analysis by G.F. Simmons (for more on metric spaces).