Math 104: Introduction to Analysis
Spring 2018
Syllabus

Course information
This is an introductory analysis course. Starting with the real line, we revisit concepts in calculus (e.g. limits, series, differentiation, Riemann integration, …) in much mathematical rigor and generality. Part of the course also focuses on studying the space of (continuous) functions.

This is a proof-oriented math course. Some proof-writing experiences are helpful, but not necessary.

Lecturer: Khoa Nguyen, nglukhoa@math.berkeley.edu, Evans 847

Time: Tuesdays, Thursdays 2 pm – 3:30 pm, Hearst Mining 310.

Office hours: Tuesday, Wednesday, Thursday: 4pm – 5pm or special appointments.

Textbook: *Elementary Analysis: The Theory of Calculus*, Second Edition by Kenneth A. Ross.

Expectation: This is a 4 unit course, meaning a 12 hour of work per week (including class attendance). To students who have no proof-writing background, I may expect you will need to spend more hours. Generally, I expect you to spend at least 2 hours of reading outside of class and 7 hours of doing homework.

Homework: Homework will be posted on Bcourse at least a week before it is due. Homework will be collected at the end of Thursday lectures, or Tuesday lectures during midterm weeks. Collaboration on the homework is encouraged, but each student must write solutions in his/her own words. No late homework will be accepted. The lowest homework score will be dropped. The homework accounts for 20% of your total grade.

Homework will be graded on the scale from 0 to 20. Only a selection of the assigned homework will be graded. Make sure you check with the official solutions to evaluate your own understanding and grade corrections.

Midterms: There will be two in-class midterms on February 15th and March 31st. The higher score accounts for 28% while the lower one accounts for 12%.

Final: Monday, May 7th (11:30-2:30 pm), accounting for 40% of your total grade.

Incomplete grades: Incomplete "I" grades are almost never given. The only justification is a documented serious medical problem or genuine personal/family emergency. Falling behind in this course or problems with workload in other courses are not acceptable

reasons

Special arrangements:
If you are a student with a disability registered by the Disabled Student Services (DSS) on UCB campus and if you require special arrangements during exams, you must provide the DSS document and make arrangements via email or office hours at least 10 days prior to each exam, explaining your circumstances and what special arrangements need to be done. Also, see the lecturer as soon as possible to make arrangements for the homeworks.

Tentative schedule

Week 1 (Jan 16th, 18th)	Orientation Mathematical induction (R1)	What is a field? Fields of rational number and real number (R2, 3)
Week 2 (Jan 23rd, 25th)	Completeness axiom Infinities (R4, 5)	Sequence Limits (R7, 8)
Week 3 (Jan 30th, Feb 1st)	Limit theorems (R8, 9)	Monotone sequence Cauchy sequence Limsup, liminf (R10, 11)
Week 4 (Feb 6th, 8th)	Subsequence Bolzano-Weierstrass theorem (R11, 14)	Subsequential limits, more on limsup, liminf (R11)
Week 5 (Feb 13rd, 15th)	Series, tests for series convergence (R14)	**Midterm 1**
Week 6 (Feb 20th , 22nd)	Alternating series, integral test. Continuous function (R15, R17)	Properties of continuous functions (R18)
Week 7 (Feb 27th, Mar 1st)	Uniformly continuous (R19)	Differentiation, Mean Value theorem (R28, R29)
Week 8 (Mar 6th, 8th)	Mean Value Theorem, L'Hospital's Rule (R29, R30)	The Riemann integral (R32)
Week 9 (Mar 13th , 15th)	Properties of the Riemann integral (R33)	Fundamental theorem of Calculus (R31)
Week 10	Sequence of functions,	**Midterm 2**

(Mar 20th, 22nd)	pointwise convergence, uniform convergence (R24)	
Week 11 (Mar 26th, 28th)	*Spring Recess*	
Week 12 (Apr 3rd , 5th)	Cauchy sequence of functions, Weierstrass M test, power series (R23, 25)	More on power series (R26)
Week 13 (Apr 10th, 12th)	Taylor's theorem (R31)	Uniform convergence and integration and differentiation
Week 14 (Apr 17th, 19st)	Differentiation and integration of Power series Continuous function which is nowhere differentiable (R26)	Topological concepts of metric space I (open and closed sets, completeness)
Week 15 (Apr 23st , 25rd)	Topological concepts of metric space II (connectedness, compactness)	Topological concepts of metric space III
Week 16	*RRR Week*	
Week 17	**Final Exam**