18.100A Introduction to Analysis Fall 2015

Lectures: MWF 1-2 4-149 Arthur Mattuck E18-314 (617-25)3-4345 *mattuck@mit.edu*
Office hours: Thurs. 3:10-5; TA: to be posted on webpage when appointed

Text: Mattuck: *Introduction to Analysis*
Current publisher: CreateSpace-Amazon (8th printing)
Previous publisher: Pearson/Prentice-Hall div. (printings 1-7)
(The eighth printing is inexpensive and incorporates the corrections;
for corrections to the earlier printings, see "Web page" below.)

Grading: Problem sets; two 80-minute exams; 3-hour final exam; each counts about 1/3

Web page: http://math.mit.edu/~apm/f15-18100A.html
Has reading and exercise assignments (as they are made), practice material for exams (when issued), and links to corrections to textbook printings (1-7), plus general information about the course: what's covered, the general approach, distinctive features, comparison with 18.100B, Chaps. 1-3 and App. A of book.

The syllabus below is only approximate. In particular, topics after Thanksgiving may be changed depending on the interests or needs of the students.

W	Sept. 9	1.	Chap. 1, 2.1-2, App. A Monotone seqs.; completeness; inequalities
F	Sept. 11	2.	Chap. 2.3-6, 3.1 Estimations; limit of a sequence
M	Sep 14	3.	Chap. 3.2-7 Examples and proofs of limits
W	Sept. 16	4.	Chap. 4.1-2,4 Using the error term
F	Sept. 18	5.	Chap. 5.1-4 Limit theorems
M	Sept. 21	6.	Chap. 5.5, 6.2 Subsequences; cluster points
W	Sept. 23	7.	Chap. 6.1,3,4 Nested intervals, B-W theorem, Cauchy seqs.
F	Sept. 25	8.	Chap. 6.5 Completeness property for sets
M	Sept. 28	9.	Chap. 7.1-2,4,5 Infinite series; convergence tests (positive series)
W	Sept. 30	10.	Chap. 7.3,6; 8.1,2; Abs. and cond'l convergence; Cauchy's test; power series
F	Oct. 2	11.	Chap. 8.1; 9,10 Power series; functions: local and global properties
M	Oct. 5	12.	Chap. 11.1-3 Continuity; limits of functions
W	Oct. 7	13.	**Exam 1** (open book, 80 minutes)
F	Oct. 9	14.	Chap. 11.4-5 Continuity (cont'd); Sequential continuity *(Mon. holiday)*
T	Oct. 13	15.	Chap. 12 Intermediate-value theorem
W	Oct. 14	16.	Chap. 13.1-3 Continuity theorems; Extremal-value theorem
F	Oct. 16	17.	Chap. 13.4-5 Uniform continuity
M	Oct. 19	18.	Chap. 14 Differentiation: local properties
W	Oct. 21	19.	Chap. 15 Differentiation: global properties
F	Oct. 23	20.	Chap. 16; 17 (lightly) Convexity; Taylor's theorem (skip proofs)
M	Oct. 26	21.	Chap. 18 Integrability
W	Oct. 28	22.	Chap. 19 Riemann integral
F	Oct. 30	23.	Chap. 20.1-4 The two Fundamental Theorems of Calculus
M	Nov. 2	24.	Chap. 21.1-2 Improper integrals, convergence
W	Nov. 4	25.	Chap. 20.5, 21.3 Stirling's formula; Gamma function
F	Nov. 6	26.	**Exam 2** (open book, 80 minutes) *continued* ⟶

M	Nov.	9	27.	Chap. 22.1-2	Uniform convergence of series *(Wed. holiday)*
F	Nov.	13	28.	Chap. 22.3-4	Continuity of sum; integration term-by-term
M	Nov.	16	29.	Chap. 22.5-6	Differentiation term-by-term; analyticity
W	Nov.	18	30.	Chap. 24.1-5	Continuous functions on the plane
F	Nov.	20.	31.	Chap. 24.6-7, 25.1	Plane point-set topology
M	Nov.	23	32.	Chap. 25.2-3	Compact sets and open sets
W	Nov.	25	33.	App. F	Topological compactness *(Th., Fri. holidays)*
M	Nov.	30	34.	Chap. 26.1-2	Differentiating integrals w.r.t. a parameter
W	Dec.	2	35.	Chap. 26.2-3	Leibniz and Fubini theorems
F	Dec.	4	36.	Chap. 27.1-3	Improper integrals with a parameter
M	Dec.	7	37.	Chap. 27.4-5	Differentiating and integrating improper integrals
W	Dec.	9	38.	Continuation and review	

Three-hour final exam during finals week (open book)