18.100A Introduction to Analysis   Fall 2017 Syllabus

Lectures: MWF 1-2 4-163 Arthur Mattuck 2-383 (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 (8th printing)*, (CreateSpace/Amazon)
Available from the Tech Coop and Amazon, inexpensive, incorporates known corrections
Printings 1-7 (Pearson/Prentice-Hall): for corrections, see the Web Page.

Web page: *http://math.mit.edu/~apm/f17-18100A.html*
Has the weekly reading and problems (when posted), practice material for exams (as issued); links to corrections to the textbook printings 1-7, plus general information about the course: what's covered, the approach, distinctive features, comparison with 18.100B.

It also has links to Chaps. 1-3 and App. A in the 8th printing covering the first three classes, for those who don't yet have the book when the class starts.

Total Score: P-sets 1-11: (1/2) $1\frac{1}{2}$-hour midterm: (1/6);   3-hour final: (1/3)

Problem Sets: In the syllabus, these are labeled P-0 to P-11; almost all are posted on the website late Friday afternoon, and due in class the following Friday (or the Monday after, if that Friday is a holiday). They will be returned the following Wednesday.

The exceptions to this schedule are: P-0 (diagnostic), P-9, P-10 (see Syllabus).

This Syllabus has the approximate daily topics; the weekly P-sets will have more detailed daily reading assignments. Exam and P-set dates are firm.

W	Sept. 6	1.	Chap. 1, 2.1-2, App. A Monotone seqs.; completeness; inequalities (**P-0**)
F	Sept. 8	2.	Chap. 2.3-6, 3.1 Tools for estimating; limit def'n, examples (**P-1; P-0 due**)
M	Sep 11	3.	Chap. 3.2-6, 4.1-2 Limit proofs; using the error term
W	Sept. 13	4.	Chap. 5.1-4 Limit theorems
F	Sept. 15	5.	Chap. 5.5, 6.2 Subsequences; cluster points (**P-2; P-1 due**)
M	Sept. 18	6.	Chap. 6.1,3,4 Nested intervals, B-W theorem, Cauchy seqs.
W	Sept. 20	7.	Continuation; exercises
F	Sept. 22	8.	Chap. 6.5 Completeness property for sets (**P-3; P-2 due**)
M	Sept. 25	9.	Chap. 7.1-2,4,5 Infinite series; convergence tests (positive series)
W	Sept. 27	10.	Chap. 7.3,6; 8.1,2; Abs. and cond'l convergence; Cauchy's test; power series
F	Sept. 29		Career Fair Holiday (**P-4**)
M	Oct. 2	11.	Chap. 9,10, 11.1-3 Limits and continuity of functions (**P-3 due**)
W	Oct. 4	12.	Chap. 11.4-5 Continuation. Sequential continuity
F	Oct. 6	13.	Chap. 13.1-3 Continuity thms; Extremal-value thm (**P-5; P-4 due**) *Add Date*
M	Oct. 9		Columbus Day Holiday
W	Oct. 11	14.	Chap. 12.1-2 Intermediate-value theorem
F	Oct. 13	15.	Chap. 14 Differentiation: local properties (**P-6; P-5 due**)
M	Oct. 16	16.	Chap. 15 Differentiation: global properties
W	Oct. 18	17.	Chap. 16; 17 (lightly) Convexity; Taylor's theorem
F	Oct. 20	18.	Review (**P-6 due**)
M	Oct. 23	19.	**Midterm Exam** ($1\frac{1}{2}$ hours, open book)

W	Oct.	25	20.	Chap. 13.5 Uniform Continuity
F	Oct.	27	21.	Chap. 18 Integrability of functions (**P-7**)
M	Oct.	30	22.	Chap. 19 Riemann integral: def'n and properties
W	Nov.	1	23.	Chap. 20.1-4 Two Fundamental Th'ms of Calculus: proofs, app'ns
F	Nov.	3	24.	Chap. 20.5-6 Stirling's formula; growth rate of functions (**P-8, P-7 due**)
M	Nov.	6	25.	Chap. 21.1-2 Improper integrals
W	Nov.	8	26.	Chap. 21.3-4 Gamma function, Absolute convergence
F	Nov.	10		Veterans Day Holiday (**P-9**)
M	Nov.	13	27.	Chap. 22.1-2 Uniform convergence of series, M-test (**P-8 due**)
W	Nov.	15	28.	Chap. 22.3-4 Continuity of sum; integration term-by-term
F	Nov.	17	29.	Chap. 22.5-6 Differentiation term-by-term; analyticity
M	Nov.	20	30.	Chap. 24.1-5 Continuous functions on the plane (**P-10; P-9 due**)
W	Nov.	22	31.	Chap. 24.6-7, 25.1 Plane point-set topology (*Drop date*)
F	Nov.	24		Thanksgiving Holiday
M	Nov.	27	32.	Chap. 25.2-3 Compact sets and open sets
W	Nov.	29	33.	Continuation
F	Dec.	1	34.	Chap. 26.1-2 Diff. finite integrals w.r.t. a parameter (**P-11; P-10 due**)
M	Dec.	4	35.	Chap. 26.2-3 Leibniz and Fubini theorems
W	Dec.	6	36.	Chap. 27.1-3 Improper integrals with a parameter; Laplace transform
F	Dec.	8	37.	Chap. 27.4-5 Diff. and integ. imp. integrals w.r.t. a parameter (**P-11 due**)
M	Dec.	11	38.	Chap. 23.1-2 Infinite sets, cardinality, sets of measure zero
W	Dec.	13	39.	Chap. 23.3-4 Riemann integrability; Lebesgue integral properties

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