18.100A Introduction to Analysis   Fall 2018 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 and Graders: TBA; will be posted on Web page 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/f18-18100A.html*
(or just *http://math.mit.edu/18100A* for this semester).
   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: Psets 1-11 1/2; Midterm 1/6; 3-hour final 1/3.

Problem Sets: In the syllabus, these are labeled P-0 to P-11; almost all are available online late Friday afternoon, and due in class the following Friday (or the Monday after, if that Friday is a holiday). The exceptions are shown in the Syllabus below.

   The syllabus below has the approximate daily topics; the weekly P-sets will have more detailed daily reading assignments.

W	Sept. 5	1.	Chap. 1, 2.1-2, App. A Monotone seqs.; completeness; inequalities (**P-0**)
F	Sept. 7	2.	Chap. 2.3-6, 3.1 Tools for estimating; limit def'n, examples (**P-1; P-0 due**)
M	Sep 10	3.	Chap. 3.2-6, 4.1-2 Limit proofs; using the error term
W	Sept. 12	4.	Chap. 5.1-3,5.5 Limit theorems
F	Sept. 14	5.	Chap. 5.4, 6.2 Subsequences; cluster points (**P-2; P-1 due**)
M	Sept. 17	6.	Chap. 6.1,.3 Nested intervals, B-W theorem.
W	Sept. 19	7.	Cauchy seqs.
F	Sept. 21		Career Fair Holiday (**P-3**)
M	Sept. 24	8.	Chap. 6.5 Completeness property for sets (**P-2 due**)
W	Sept. 26	9.	Chap. 7.1-2,4,5 Infinite series; convergence tests (for positive series)
F	Sept. 28	10.	Chap. 7.3,6; 8.1,2; Abs. and cond'l conv.; Cauchy test; power series (**P-4; P-3 due**)
M	Oct. 1	11.	Chap. 9,10, 11.1-3 Limits and continuity of functions
W	Oct. 3	12.	Chap. 11.4-5 Continuation. Sequential continuity
F	Oct. 5	13.	Chap. 13.1-3 Continuity thms; Extremal-value thm (**P-5; P-4 due**) *Add Date*
M	Oct. 8		Columbus Day Holiday
W	Oct. 10	14.	Chap. 12.1-.2 Intermediate-Value theorem
F	Oct. 12	15.	Chap. 14 Differentiation: local properties (**P-6; P-5 due**)
M	Oct. 15	16.	Chap. 15 Differentiation: global properties
W	Oct. 17	17.	Chap. 16, 17 (lightly) Convexity; Taylor's theorem
F	Oct. 19	18.	Review (**P-6 due**)
M	Oct. 22	19.	**Midterm Exam** (open book only)

W	Oct.	24	20.	Chap. 13.5 Uniform Continuity
F	Oct.	26	21.	Chap. 18 Integrability of functions (P-7)
M	Oct.	29	22.	Chap. 19 Riemann integral: def'n and properties
W	Oct.	31	23.	Chap. 20.1-4 Two Fundamental Th'ms of Calculus: proofs, app'ns
F	Nov.	2	24.	Chap. 20.5-6 Stirling's formula; growth rate of functions (**P-8; P-7 due**)
M	Nov.	5	25.	Chap. 21.1-2 Improper integrals
W	Nov.	7	26.	Chap. 21.3 Gamma function
F	Nov.	9	27.	Chap. 22.1-2 Uniform convergence of series, M-test (**P-9; P-8 due**)
M	Nov.	12		Veteran's Day Holiday
W	Nov.	14	28.	Chap. 22.3-4 Continuity of series sum; integration term-by-term
F	Nov.	16	29.	Chap. 22.5-6 Differentiation term-by-term; analyticity
M	Nov.	19	30.	Chap. 24.1-5 Continuous functions on the plane (**P-10; P-9 due**)
W	Nov.	21	31.	Chap. 24.6-7, 25.1 Plane point-set topology (*Drop date*)
F	Nov.	23		Thanksgiving Holiday
M	Nov.	26	32.	Chap. 25.2-3 Compact sets and open sets
W	Nov.	28	33.	Notes on open sets and closed sets
F	Nov.	30	34.	Chap. 26.1-2 Diff. finite integrals w.r.t. a parameter (**P-11; P-10 due**)
M	Dec.	3	35.	Chap. 26.2-3 Leibniz and Fubini theorems
W	Dec.	5	36.	Chap. 27.1-3 Improper integrals with a parameter; Laplace transform
F	Dec.	7	37.	Chap. 27.4-5 Diff. and integ. imp. integrals w.r.t. a parameter (**P-11 due**)
M	Dec.	10	38.	Appendix F Topological compactness
W	Dec.	12	39.	Continuation and review

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