

18.01A-18.02A Calculus Fall 2010

A syllabus is given below; specific readings and exercises are on the problem sets.)

Admission Requirements: *(strictly monitored for both subjects)*

18.01A: 4 or 5 on the AB test or on the AB subscore of the BC test, or a comparable grade on the A-level or IB exams, or in a comparable college calculus subject (show transcript and syllabus), or a pass on Part I of the M.I.T. 18.01 AP test (given R/O week);

18.02A: pass 18.01A, or AP credit for 18.01 through usual mechanisms

Text: Simmons: Calculus with Analytic Geometry, second edition (McGraw-Hill)

18.01A Supplementary Notes (sold by Copy Tech, Basement Bldg. 11)

Lectures: T-Th 1, F 2 26-100 18.01A A. Mattuck 2-241 3-4345 mattuck@mit.edu

18.02A John Bush 2-346 3-4387 bush@math.mit.edu

Administrator: Galina Lastovkina 2-108 3-4977 galina@math.mit.edu

Recitations: M-W; change section on Stellar (cf. "18.01A Website" below)

Problem Sets: Given out Thursdays in lecture; available afterwards on 18.01A website; due on Thursdays, 12:45 in 2-106; returned in recitation following Monday with solutions; unclaimed sets put in horizontal file in 2-108 (left wall) after recitation Monday.

18.01A Website: <http://math.mit.edu/~apm/1801A.html>

Has problem sets, practice exams, and corrections in *pdf* format, and link to Stellar website, where you can check your record (grades on exams and problem sets).

Tutoring: 2-102 Mon-Tues-Wed-Thurs: 3-5 and 7:30-9:30 PM. (Starts second week.)

Exams: 18.01A: One hour-exam; two-hour evening final (dates on syllabus).

18.02A (first half): One hour-exam; two-hour midterm during finals week.

Students who fail an hour-exam receive e-mail that evening; they can take a make-up exam once during certain hours the following week. (No make-ups for the two-hour exams.)

Grading: A grade is given for 18.01A, and a temporary grade for 18.02A (first half). Each grade is based on a cumulative total score for that half-semester. For this, each problem set counts 35-45, each hour-exam 100, each two-hour-exam 200.

In addition to this, to pass 18.01A (i.e., be at level C- or better), you must pass the two exams and make a reasonable effort on three of the four problem sets. Students who do not pass 18.01A Exam 1 (or its makeup) must transfer to 18.01.

Exceptions to these for borderline fails will be considered on a case-by-case basis.

18.02A second half: Offered twice: IAP (Jan.), and the first half of the spring semester. The final grade for 18.02A will be the average of the grades for each half. (Note that if you finish 18.02A in the spring, a letter grade (ABC/NR) will appear on your transcript.)

Questions: Academic problems and concerns: Recitation Teacher

Problems with exams or homework (away games, illness, emergencies): Administrator

18.01A SYLLABUS

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| W | Sept. 8 | 0. | Rec.: Review of differentiation |
| Th | Sept. 9 | 1. | Linear and quadratic approximations |
| F | Sept. 10 | 2. | Indeterminate forms $0/0$, ∞/∞ ; L'Hospital's rule |
| Tu | Sept. 14 | 3. | Definite integral; First fundamental theorem; applications |

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| Th | Sept. 16 | 4. Second fund. theorem; $\ln x$ | Prob. Set 1 due |
| F | Sept. 17 | 5. Geometric applications: volumes, arc length, surface area | |
| Tu | Sept. 21 | 6. Other applications: work, average value | |
| Th | Sept. 23 | 7. Integration by direct and inverse substitution; trig. integrals | Prob. Set 2 due |
| F | Sept. 24 | 8. Partial fractions decomposition | |
| Tu | Sept. 28 | 9. Integration by parts | |
| Th | Sept. 30 | Exam 1 , covering Lectures 1-9 | |
| F | Oct. 1 | 10. Improper integrals | |
| Tu | Oct. 5 | 11. Infinite series: integral test, convergence of $\sum 1/n^k$ | |
| Th | Oct. 7 | 12. Geometric series; power series, radius of convergence | Prob. Set 3 due |
| F | Oct. 8 | 13. Taylor series; operations on power series | |
| Tu | Oct. 12 | 14. (<i>Holiday Mon.</i>) Intro. to discrete probability; mean; Poisson distribution | |
| Th | Oct. 14 | 15. Continuous probability distributions; exponential distribution | Prob. Set 4 due |
| F | Oct. 15 | 16. Normal distribution; applications. | |
| Tu | Oct. 19 | 17. Continuation and review. | |
| Th | Oct. 21 | Two-hour final in evening 7:30 - 9:30 , covering 1-17 | |

18.02A SYLLABUS: FIRST HALF

Vectors

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| Fri | Oct. 22 | 1. Intro. to vectors; scalar (dot) product | |
| Tu | Oct. 26 | 2. Determinants; vector (cross) product | |
| Th | Oct. 28 | 3. Matrices; inverse matrices | |
| F | Oct. 29 | 4. Theorems about square systems; Cramer's rule, eqns. of planes | |
| Tu | Nov. 2 | 5. Parametric eqns: eqns. of lines and curves; cycloid | |
| Th | Nov. 4 | 6. Vector derivatives; curvature | Prob. Set 1 due |
| F | Nov. 5 | 7. Applications; Kepler's second law | |

Partial Differentiation

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| Tu | Nov. 9 | 8. Intro to fcns. of sev. vars.; graphs, level curves, partial derivs, tangent plane approximation | |
| F | Nov. 12 | 9. (<i>Thurs. holiday</i>) 2D-directional derivative, 2D-gradient. | Prob. Set 2 due |
| Tu | Nov. 16 | Exam 1 , covering Lectures 1-9 | |
| Th | Nov. 18 | 10. Applications in 3D: contour surfaces, tangent planes. | |
| F | Nov. 19 | 11. Max-min problems; method of least squares | |
| Tu | Nov. 23 | 12. Second deriv. test. Lagrange multipliers. (<i>Holiday Th., Fri.</i>) | |
| Tu | Nov. 30 | 13. Chain rule and applications. | |
| Th | Dec. 2 | 14. Chain rule for non-indept. variables | Prob. Set 3 due |

Double Integration

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| F | Dec. 3 | 15. Double and iterated integrals in rect. coord's | |
| Tu | Dec. 7 | 16. Polar coordinates. Double integrals in polar coord's, applications. | |
| Th | Dec. 9 | 17. Continuation and review | |

Two-hour midterm during finals week, covering 18.02A first half (Lectures 1-17)