18.01, Spring Semester 2011

General Information

Class meetings: Tuesday and Thursday 11:00–12:00, Friday 2:00–3:00 in 2-142.

Text: Simmons, *Calculus with Analytic Geometry*, 2nd edition, McGraw-Hill. *18.01 Supplementary Notes* (CopyTech, 11-004).

Lecturer: David Vogan, 2-243 (x3-4991, `dav@math.mit.edu`). Office hours are Monday 3–4 and Tuesday 1–2, or by appointment.

Recitation meetings: Monday and Wednesday 2:00–3:00 in 2-142.

Recitation instructor: Lionel Levine, 2-335 (x3-7905, `levine@math.mit.edu`).

Tutoring is available in 2-102 Monday through Thursday 3:00–5:00 and 7:30–9:30 (starting the second week of class).

Homework assigned most Thursdays in lecture. Due in recitation the following Wednesday. Late work will not be accepted; if there's a medical reason for missing a problem set, please tell me.

Each assignment begins with "Part 1," consisting of problems from the text and the supplementary notes emphasizing the basic techniques you are learning. Often these problems have brief solutions in the back of the notes or the back of the text. *You need to work the problems without consulting these solutions, or the work will have no value in preparing for the exams.*

"Part 2" of each problem set consists of problems requiring more time and thought. The goal here is see how calculus can help you understand the world a little differently; and perhaps also to see how your knowledge of the world can help you to understand calculus a little differently.

Exams: One-hour exams during the lecture hour on Thursday, February 17, Friday, March 11, Friday, April 8, and Friday, April 29. Final exam Wednesday, May 18, 9:00–12:00 in 2-142. The exams will be closed book, and calculators will not be allowed.

Grading: Approximate weighting: problem sets 25%, hour exams 50%, final exam 25%.

Syllabus

In the reading assignments, "G1" means section G1 of the Supplementary Notes; "2.1–2.4" means sections 2.1, 2.2, 2.3, and 2.4 of Simmons. Doing the reading *before* class offers you the priceless (©MasterCard) possibility of catching the lecturer in an error.

1. Differentiation

Tues 2/1	Lecture 1	Derivatives, slope, velocity, rate of change	2.1–2.4, G1–4
Thurs 2/3	Lecture 2	Limits, continuity, trigonometric limits	2.5, 2.6 to p. 75, C
Fri 2/4	Lecture 3	Derivs of products, quotients, sine, cosine	3.1, 3.2, 3.4
Tues 2/8	Lecture 4	Chain rule, higher derivatives	3.3, 3.6
Thurs 2/10	Lecture 5	Implicit differentiation, inverse functions	3.5, 9.5, G5
Fri 2/11	Lecture 6	Exp and log, logarithmic differentiation	X, 8.2, 8.3 to 267, 8.4 to 271
Tues 2/15	Lecture 7	Hyperbolic functions, review for Exam 1	9.7 to 326
Thurs 2/17	Lecture 8	**EXAM 1**	

2. Applications of Differentiation

Fri 2/18	Lecture 9	Linear and quadratic approximation	A
Tues 2/22	**No Lec.**	Monday classes; Recitation at 11:00.	
Thurs 2/24	Lecture 10	Curve sketching	4.1, 4.2
Fri 2/25	Lecture 11	Max-min problems	4.3, 4.4
Tues 3/1	Lecture 12	Related rates	4.5
Thurs 3/3	Lecture 13	Newton's method and other applications	4.6, 4.7
Fri 3/4	Lecture 14	Mean value theorem, inequalities	2.6 to 77, MVT
Tues 3/8	Lecture 15	Differentials, antiderivatives	5.2, 5.3
Thurs 3/10	Lecture 16	Differential equations, separation of variables	5.4, 8.5
Fri 3/11	Lecture 17	**Exam 2**	

3. Integration with applications

Tues 3/15	Lecture 18	Definite integrals	6.3 to (4), 6.4, 6.5
Thurs 3/17	Lecture 19	First fundamental theorem of calculus	6.6, 6.7 to 215
Fri 3/18	Lecture 20	Second fund. thm. of calculus, defn. of log	PI, FT
3/21-3/25		**Spring Break**	
Tues 3/29	Lecture 21	Areas between curves, volume by slicing	7.1–7.3,
Thurs 3/31	Lecture 22	Volume by disks and shells	7.4
Fri 4/1	Lecture 23	Work, average value, probability	7.7 to 247, AV
Tues 4/5	Lecture 24	Numerical integration	10.9
Thurs 4/7	Lecture 25	Further applications, review for Exam 3	
Fri 4/8	Lecture 26	**Exam 3**	

4. Techniques of integration

Tues 4/12	Lecture 27	Trigonometric integrals	10.2–10.3
Thurs 4/14	Lecture 28	Inverse substitution, completing the square	10.4
Fri 4/15	Lecture 29	Partial fractions	10.6, F
Tues 4/19	**Holiday**		
Thurs 4/21	Lecture 30	Integration by parts, reduction formulas	10.7
Fri 4/22	Lecture 31	Parametric equations, arc length, surface area	17.1, 7.5, 7.6
Tues 4/26	Lecture 32	Polar coordinates, area in polar coordinates	16.1, 16.2, 16.3 to 570, 16.5
Thurs 4/28	Lecture 33	Review for Exam 4	
Fri 4/29	Lecture 34	**Exam 4**	

5. Improper integrals, infinite series

Tues 5/3	Lecture 35	Indeterminate forms, L'Hôpital's Rule	12.2, 12.3
Thurs 5/5	Lecture 36	Improper integrals	12.4, INT
Fri 5/6	Lecture 37	Infinite series, convergence tests	13.3, 13.5
Tues 5/10	Lecture 38	Taylor series	14.4 to 498
Thurs 5/12	Lecture 39	Review for Final Exam; **last class**	

May 16–20: Final Exam scheduled by Registrar