

MATHEMATICS 120 Section 101
(Honours) DIFFERENTIAL CALCULUS

Math 120 is the honours version of Math 100, covering mostly the same topics, but in greater foundational depth and with more emphasis on harder and/or theoretical exercises.

Prerequisite: MATH 12. High-school calculus and one of (a) a score of 95% or higher in BC Principles of Mathematics 12 or Pre-calculus 12; or (b) a score of 95% or higher in the BC provincial examination for Principles of Mathematics 12 or Pre-calculus 12; or (c) BC Principles of Mathematics 12 or Pre-calculus 12 with a letter of invitation from the Mathematics Department based on performance in the Euclid Contest; or (d) permission from Mathematics Department Head.

INSTRUCTOR:

- Joel Feldman
- Math building room 221
- 604-822-5660
- feldman@math.ubc.ca
- <http://www.math.ubc.ca/~feldman/>
- office hours: Monday 1:30–2:30, Tuesday 11:00–12:00, Thursday 2:00–3:00

TEXT:

Robert A. Adams and Christopher Essex, Calculus: Single Variable, (or *Calculus: A Complete Course*) seventh edition or any earlier edition. (The earlier editions have Adams as the sole author.)

I will post all handouts, problem sets, etc. on <http://www.math.ubc.ca/~feldman/m120/>

TOPICS:

| chapter | | lecture hours |
|---------|---|------------------|
| | Preview and Review functions, absolute values, inequalities, preview of calculus | 3 |
| 1 | Limits and Continuity limits of sequences and functions, limit laws, continuity, Intermediate Value Theorem | 5 |
| 2 | Differentiation tangents and differentiability, higher derivatives, differentiation rules (including chain rule), implicit differentiation, Mean Value Theorem and applications (monotonicity, concavity) | 10 |
| 3 | Elementary Functions inverse functions and their derivatives, exponential and logarithmic functions and their derivatives, exponential growth and decay, derivatives of trig and inverse trig functions | 7 |
| 4 | Applications curve sketching, maximum and minimum problems, related rate problems, l'Hôpital's Rule | 8 |
| 4 | Approximation linearization (with error estimate), quadratic and higher approximations, Taylor polynomials and Taylor's theorem with Lagrange remainder, Taylor series for exp, sin, cos | 7 |

GRADING:

- There will be weekly problem sets. They will account for about 5% of the final mark.
- There will be two midterms (Tuesday, October 2 and Tuesday, November 6) with each accounting for about 20% of the final mark.
- The final exam will account for about 55% of the final mark.
- Grades **will probably be scaled**.

Schedule of Problem Sets, Quizzes and Midterms

| | Mon | Tues | Wed | Fri |
|------|----------------|----------------------|-----|-----|
| Sept | 3 no class | 4 no class | 5 | 7 |
| | 10 | 11 Problem Set 1 | 12 | 14 |
| | 17 | 18 Problem Set 2 | 19 | 21 |
| | 24 | 25 Problem Set 3 | 26 | 28 |
| Oct | 1 | 2 Midterm 1 | 3 | 5 |
| | 8 no class | 9 Problem Set 5 | 10 | 12 |
| | 15 | 16 Problem Set 6 | 17 | 19 |
| | 22 | 23 Problem Set 7 | 24 | 26 |
| Nov | 29 | 30 Problem Set 8 | 31 | 2 |
| | 5 | 6 Midterm 2 | 7 | 9 |
| | 12 no class | 13 Problem Set 10 | 14 | 16 |
| | 19 | 20 Problem Set 11 | 21 | 23 |
| | 26 | 27 | 28 | 30 |