

### Week-by-week outline

Lecture Week	Topic	Content	Course Notes
1	Riemann sums	Upper and lower Riemann sums Definition of definite integral Non-positive functions	Chapter 1 Chapter 2
2	Definite integral: Theory & applications	Evaluation of integrals Estimation of integrals and sums Properties of the definite integral Fundamental Theorem Part <b>II</b>	Chapter 3
3	Further applications	Areas and volumes by slicing Integration by substitution I Volumes	Chapter 4 Chapter 6 (except last section - Trigonometric Substitutions)
4	Further applications Indefinite integral	Integration by parts Fundamental Theorem Part I Functions defined	Chapter 7 – Integration by parts and Reduction Formulas Chapter 5 (first 4 pages)
5	Log & exp functions	Natural logarithm Natural	Chapter 5
6	Introduction to models and DEs	Properties of models Direction fields Visualization of solution curves	Chapter 8
7	First-order DEs I	Classification of differential equations Separable equations Integration by substitution <b>II</b>	Chapter 9 Chapter 6 last section
8	First-order DEs <b>II</b>	Models including growth and decay Partial fractions	Chapter 7 – partial fractions (omit Wallis Product and Computer Algebra Systems) Chapter 10
9	First-order DEs <b>III</b>	Linear equations Examples and models	Chapter 11
10	Further examples and models	Radioactive dating Flow and mixing problems	Chapter 11
11	Higher-order equations	Second-order homogeneous linear Boundary conditions Factorization, equal root case	Chapter 12
12	Systems of equations	Reduction to second-order Predator-prey systems	Chapter 13