Math 156    Applied Honors Calculus II    Topics

Lecture notes will be provided on the course website, but students may also consult the following books (or any other calculus textbook).
1. "Calculus II", by Jerrold Marsden and Alan Weinstein, **from the Caltech library**
2. "Calculus", by James Stewart, cheap used copies are available from online booksellers

Topics

| **Part 1. Integration** | Marsden-Weinstein | Stewart (5th edition) |
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| 1.1 sigma notation | 4.1 | App. E |
| 1.2 area | 4.2 | 5.1 |
| 1.3 definite integral | 4.3 | 5.2 |
| 1.4 fundamental theorem of calculus | 4.4, 4.5 | 5.3, 5.4 |
| 1.5 work | 9.5 | 6.4 |
| 1.6 improper integrals | 11.3 | 8.8 |
| 1.7 arclength | 10.3 | 9.1 |
| 1.8 surface area | 10.3 | 9.2 |
| 1.9 center of mass | 9.4 | 9.3 |
| 1.10 probability density functions | | 9.5 |
| **Review as needed** | | |
| R.1 substitution | 7.2 | 5.5 |
| R.2 integration by parts | 7.4 | 8.1 |
| R.3 trigonometric substitution | 10.1 | 8.2, 8.3 |
| R.4 partial fractions | 10.2 | 8.4 |
| R.5 hyperbolic functions | 8.3 | 7.6 |
| R.6 L'Hôpital's rule | 11.2 | 7.7 |
| **Part 2. Differential Equations** | | |
| 2.1 1st order equations | 8.2 | 10.1 |
| 2.2 exponential growth/decay | 8.2 | 10.3, 10.4 |
| 2.3 Newton's law of cooling/heating | | |
| 2.4 logistic equation | 8.5 | 10.5 |
| 2.5 Euler's method | 8.5 | 10.2 |
| **Part 3. Series** | | |
| 3.1 sequences | 11.4 | 12.1 |
| 3.2 series | 12.1 | 12.2 |
| 3.3 convergence tests (integral, comparison) | 12.2, 12.3 | 12.3, 12.4 |
| 3.4 alternating series | 12.2 | 12.5 |
| 3.5 ratio test | 12.3 | 12.6 |
| 3.6 power series | 12.4 | 12.8, 12.9 |
| 3.7 Taylor series | 12.5 | 12.10, 12.11 |
| 3.8 binomial series | 12.5 | 12.12 |
| **Additional Topics (time permitting)** | | |
| A.1 parametric curves | 10.4 | 11.1 |
| A.2 arclength and area in polar coordinates | 10.5 | 11.2, 11.3 |
| A.3 complex numbers | 12.6 | App. G |
| A.4 2nd order equations, oscillations | 8.1 | 18.1, 18.2, 18.3 |