MATH 101 Course Outline

Differential Calculus with Applications to Physical Sciences and Engineering

2013W Term 2

MATH 101 is a course in integral calculus and sequences and series, with applications and examples drawn primarily from physical sciences and engineering. This course is equivalent in technical content to MATH 103 and 105 and serves as a pre-requisite for many second year MATH courses. The text book for MATH 101 is *Calculus: Early Transcendentals*, 7th Edition, by James Stewart.

Please note that "Week" below typically means 3 lecture hours, but this will vary. Bracketed numbers refer to sections in the text.

There is one common midterm scheduled in the term. This will be held in the early evening and is tentatively set for Tuesday, February 25th.

This course is heavily coordinated, but individual instructors will have their own style. Be assured that the content taught will be the same across all sections in spite of this, and that all sections will be prepared for the common midterms and common final exam.

Week 1 Areas and Distances (5.1) and the Definite Integral (5.2).

Week 2 The Fundamental Theorem of Calculus (5.3). Indefinite integrals and the Net Change Theorem (5.4). The Substitution Rule (5.5).

Week 3 Areas between curves (6.1). Volumes (6.2).

Week 4 Work (6.4). Average Value of a Function (6.5). Integration by Parts (7.1 but ignore reduction formulas).

Week 5 Trigonometric Integrals (7.2 but ignore $\sin mx$, $\cos nx$, etc.). Trigonometric substitutions (7.3 but ignore inverse secant and inverse hyperbolic substitutions). Integration of rational functions by partial fractions (7.4 but ignore CASE VI: $Q(x)$ contains a repeated irreducible quadratic factor).

Week 6 Improper integrals (7.8).

Midterm Break No classes during break week.

Mid-term (Tuesday, February 25th, 6 p.m. to 8 p.m.)

Week 7 Numerical Integration (7.7). Centre of Mass (in 8.3; ignore hydrostatic pressure and force and the Theorem of Pappus in this section).

Week 8 Separable equations (9.3 but ignore orthogonal trajectories).

Week 9 Sequences (11.1 but ignore definitions 2 and 5, Example 6, and the proof of the Monotonic Sequence Theorem). Series (11.2). The Integral Test (11.3, but ignore estimates of sums). Comparison tests (11.4 but ignore estimating sums).

Week 10 Alternating series (11.5). Absolute convergence and the ratio test (11.6 but ignore the root test). Power series (11.8).

Week 11 Representations of functions as power series (11.9). Taylor and Maclaurin series (11.10 but ignore binomial series)

Week 12 Taylor and Maclaurin series (11.10 but ignore binomial series) continued