

## Math 3012 Course Outline

**Instructor:** A. Dean , RB 2009, ext 8689. email: andrew.j.dean@lakeheadu.ca

**Office Hours:** Fridays 9:30-12:30 or by appointment or happenstance.

**Recommended Text:** *Vector Calculus*, J. Marsden and A. Tromba, 5-th edition, W.H. Freeman and Company, New York.

**Other acceptable texts:** *Calculus*, R. Larson and B.H. Edwards, 5-th edition, Brooks/Cole. *Calculus, one and several variables*, Salas, Hille, and Etgen, 10-th edition, John Wiley and Sons. *Multivariable Calculus*, 6-th edition, James Stewart, Brooks/Cole.

### Schedule

Week 1. (Sept 12) Cartesian coordinates, vectors in two and three dimensions, equations of lines and planes, inner products, length and distance, matrices, determinants, and the cross product.

Week 2. (Sept 19) Cylindrical and spherical coordinates, the geometry of real valued functions, limits and continuity.

Week 3. (Sept 26) Differentiation of functions from  $\mathbf{R}^m$  to  $\mathbf{R}^n$ , paths and curves, properties of the derivative.

#### Test # 1 on Friday September 30

Week 4. (Oct 3) Gradients and directional derivatives, iterated partial derivatives, acceleration and Newton's second law.

Week 5. (Oct 10) Arc-length and the differential geometry of curves.

Week 6. (Oct 17) Vector fields, divergence and curl.

#### Test # 2 on Friday Oct 21

Week 7. (Oct 24) Double and triple integrals

Week 8. (Oct 31) Change of variables in double and triple integrals

Week 9. (Nov 7) Applications of double and triple integrals

#### Test # 3 on Friday November 11

Week 10. (Nov 14) Path integrals, line integrals, parametrised surfaces.

Week 11. (Nov 21) Area of a surface, integrals of scalar functions over surfaces, surface integrals of vector fields.

Week 12. (Nov 28 and Monday Dec 5) Green's theorem, Stokes theorem, conservative fields, Gauss' theorem.

**Grading Scheme:** There will be three term tests worth 15% each. The homework will count for 15%, and the final exam will be worth 40%.

**Homework:** Each week, a homework assignment will be circulated by email. They will be due at 4pm on Friday afternoons, unless otherwise announced in class. There will be a box for these on the second floor of the Ryan Building. Shortly after 4pm on Fridays, the mailbox will be emptied, and it will not be examined again until the next week. Late assignments will not be accepted. Solutions to the problems will be distributed by email.

**Term Tests and Final Exam:** The three term tests will be held during the lab hour in the lab room (the dates are on the schedule). They will be **closed book with no calculators or other aids allowed**. The material the tests will cover will be announced in class as the dates draw near. **The final exam will also be closed book with no calculators or other aids allowed**. The final exam will cover the whole course.

**Marking Disputes:** If you feel you have been treated unfairly in the marking of a test or assignment, **put your complaint in writing on the front of the paper and return it to the instructor**. Do not put it back in the assignment box.

**Drop Date:** The final date to withdraw from this course without academic penalty is Friday November 4.

**Special Exams:** Students who fail this course but attain a mark of 40% may be entitled to write a special exam. See the calendar for details.

**Academic Dishonesty:** All cases of academic dishonesty will be dealt with according to the university's Code of Student Behaviour and Disciplinary Procedures, copies of which are available from the registrar.