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Department of Mathematics

MATH 2130   Engineering Mathematical Analysis 1

Winter 2014

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Instructor: Dr. M. Davidson
431 Machray Hall
204 474 8090
`davidsom@cc.umanitoba.ca`

Lectures: 8:30 - 9:20 MWF

Tutorial: Thursday 11:30 - 12:45

Office Hours: 10:00 - 11:00   Monday, & Wednesday
2:00 - 3:00   Thursday

Course Webpage : http://home.cc.umanitoba.ca/∼davidsom

Textbook: *Calculus for Engineers* fourth edition, Don Trim, Prentice-Hall

Course Outline:

1. Vector Algebra; three-dimensional geometry including lines, planes, cylinders and quadratic surfaces; lengths and tangent vectors for space curves

2. Limtis, partial derivatives, gradients, chain rules, implicit differentiation, directional derivatives, tangent lines and planes, relative and absolute extrema

3. Double and triple integrals applied to area, volume, centers of mass, moments of inertia, fluid pressure, and surface area; iterated integrals in polar, cylindrical, and spherical coordinates

Evaluation:

The two tests will each count 20% of the final grade.
A three hour final examination, to be scheduled by the Student Records Office, will count for the remaining 60% of the final grade.

Tests: **Two tests** will be administered in the tutorial sessions on the following dates:
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February 6 and **March 13**

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Calculators and/or reference material will NOT be allowed on tests or final examination.

Notes:

- If you miss a test, you will be assigned a mark of "zero" unless reasons and acceptable supporting evidence are provided. Make-up tests will not be scheduled for missing tests.

- Voluntary Withdrawal Deadline is Wednesday **March 19**, 2014.

Instructional Objectives: At the completion of the course, the student is expected to be able to:

1. Sketch curves and surfaces in space, and their projections in the coordinate planes

2. Find distances among points, lines, and planes in space

3. Find the derivative and integral of vector-valued functions depending on a single variable

4. Find tangent vectors to, and lengths of, curves in space

5. Calculate limits, partial derivatives, gradients, and directional derivatives of functions of more than one variable

6. Develop chain rules for multi-variable composite functions

7. Use Jacobians to calculate partial derivatives of implicitly defined functions

8. Find equations for tangent lines to curves and tangent planes to surfaces

9. Find critical points of functions of multi-variable functions and classify them as giving relative maxima, relative minima, or saddle points for functions of two variables

10. Find absolute maxima and minima of multi-variable functions

11. Evaluate double and triple iterated integrals in Cartesian coordinates

12. Use double integrals to find volumes of solids of revolution, fluid pressure, centres of mass, moments of inertia, and surface area

13. Use triple integrals to calculate volumes in space

14. Evaluate iterated integrals in polar, cylindrical, and spherical coordinates

Note on Academic Honesty:

The Department of Mathematics, the Faculty of Science and the University of Manitoba regard acts of academic dishonesty in quizzes, tests, examinations or assignments as serious offenses and may assess a variety of penalties depending on the nature of the offense.

Acts of academic dishonesty include bringing unauthorized materials into a test or exam, copying from another student, plagiarism and examination personation. Students are advised to read section 7 (Academic Integrity) and section 4.2.8 (Examinations: Personations) in the "General Academic Regulations and Requirements" of the current Undergraduate Calendar. Note, in particular that **cell phones and pagers are explicitly listed as unauthorized materials, and hence may not be present during tests or examinations.**

Penalties for violation include being assigned a grade of zero on a test or assignment, being assigned a grade of "**F**" in a course, compulsory withdrawal from a course or program, suspension from a course/program/faculty or even expulsion from the University. For specific details about the nature of penalties that may be assessed upon conviction of an act of academic dishonesty, students are referred to University Policy 1202 (*Student Discipline Bylaw*) and to the Department of Mathematics policy concerning minimum penalties for acts of academic dishonesty.

All students are advised to familiarize themselves with the *Student Discipline Bylaw* , which is printed in its entirety in the Student Guide, and is also available on-line or through the Office of the University Secretary. Minimum penalties assessed by the Department of Mathematics for acts of academic dishonesty are available on the Department of Mathematics web-page.