CONCORDIA UNIVERSITY
FACULTY OF ENGINEERING AND COMPUTER SCIENCE
APPLIED ADVANCED CALCULUS- ENGR 233 - Fall 2018

Instructors:
Section P: Tuesdays and Thursdays, 1:15 p.m. – 2:30 p.m.,   Room H 110   Dr. A, PARADIS
            Office: Tel: E-mail: alexandre.paradis@concordia.ca
            Office Hours: T.B.A
Section Q: Tuesdays and Thursdays, 1:15 p.m. – 2:30 p.m.,   Room H 937   Dr. D. KOROTKIN
            Office: Tel: E-mail: dmitry.korotkin@concordia.ca
            Office Hours: T.B.A

Course coordinator: A. Sebak   Office: EV 15.179   E-mail: abdel.sebak@concordia.ca
WeBWorK administrator: Siavash Hedayati Nasab   Email: siavash.h.n@gmail.com

Course Description: This course introduces first year engineering students to multivariable calculus and its applications to mathematical models.

The main topics include: Vector functions; Functions of several variables; Differential vector calculus; Integral calculus for vectors; Double and triple integrals; Line and surface integrals; Stokes' Theorem; Divergence Theorem; Applications in engineering including fluid dynamics and electrostatics.

Lectures: three hours per class. Tutorial: two hours per week.

Prerequisite: MATH 204 (cégep Mathematics 105) previously or concurrently; MATH 205 (cégep Mathematics 203)).

Textbook: Advanced Engineering Mathematics, by Dennis G. Zill and Warren S. Wright, 5th Edition, Published by Jones and Bartlett, 2014.

Grading Scheme:
1. Assignments (WeBWorK)   10%
2. Pop-up Quizzes (5)   10% (2% each, during lectures or tutorials, 20 min, 1-2 problems)
3. Team projects (2)   5% (2.5% each, 1 hour; during tutorials in teams of 2 or take home)
4. Term tests (2)   20%, (10% each, during tutorials, 60 min each, see next page for details)
5. Final exam   60% (3 hours)

The grading scheme implies 5% bonus. However, maximum combined mark for the first three components (WebWork + Quizzes + Projects) is 20%.

WeBWorK: Every student will be given access to an online system called WeBWorK. Students are expected to submit assignments online using WeBWorK. Late assignments will not be accepted. Assignments contribute 10% to your final grade. Working regularly on the assignments is essential for success in this course. Students are also strongly encouraged to do as many problems as their time permits from the chapters of the textbooks listed below in this outline.

<u>YOU MUST PASS THE FINAL EXAM (50% or better) TO PASS THE COURSE</u>

- If the student misses one mid-term test for any reason, including illness, then the final examination will count for 70% of the final grade.
- Since there is a 5% team projects bonus allocation, there will be no replacements of quizzes for any reason, including illness.
- Students are responsible for finding out the date of the final exam. The Examination Office posts the time and place of the final exam once the schedule becomes available. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office. Students are expected to be available until the end of the final examination period. Conflicts due to travel plans will not be accommodated.

NOTE: Electronic communication devices (including cellphones) **will not be allowed** in examination rooms. Only "Faculty Approved Calculators" will be allowed in examination rooms [SHARP EL-531 or CASIO FX-300MS].

Topics and recommended problems:

Week 1-Sept 4: Review of the following topics:

        7.1 Vectors in 2-space; problems: 1,21,30,41,50

        7.2 Vectors in 3-space;   11,24,32,34,52

        7.3 Dot product: 12,15,23,29,31, 41,48

        7.4 Cross product: 3,13,22,28,41,42,45,49,52

Week 2 Sept 11:   7.5 Lines and planes in space: 5,12,17,24,33,36,39,49,57,61,66,75

                 9.1 Vector functions: 1,4,10,18,25,34,3639,42,45

Week 3 Sept 18:   9.2   Motion on a curve: 4,9,11,13,14,19,22,27,28,29

                 9.3   Curvature. Components of Acceleration: 1,6,9,16,17,20,23

Week 4 Sept 25:   9.4   Partial derivatives: 2,3,6,9,15,21,24,26,27,36,39,42,48,49,51,55,56,57

                 9.5   Directional derivative: 3,6,12,14,15,18,24,27,28,33,41,4344

Week 5 Oct 2:   9.6   Tangent planes and normal lines: 3,4,14,15,25,34,39

               9.7   Curl and Divergence: 7,11,15,21,24,27,30,39,40,43,44

Week 6 Oct 9:   9.8 Line integrals   3,6,9,15,21,25,27,28,30,33,36,40

              9.9 Independence of path   3,6,15,18,21,24,26,27,28,30

Week 7:   **Term Test 1** (during tutorials: sections QA, PA and PB: 10:45 to 11:45 Monday Oct 15)

                                      sections QB: 8:45 to 9:45 Friday Oct 19)

                          on material Chap 7 + Sections 9.1 through 9.8)

Week 7 Oct 16:   9.10 Double integrals: 3,5,9,15,18,21,24,27,33,36,39,42,45,52,62,65,68

Week 8 Oct 23:   9.11 Double integral in polar coordinates: 3,6,11,12,19,24,27,29,30,33,34

               9.12   Green's theorem: 3,4,6,8,12,18,19,23,24,25,27,33

Week 9 Oct 30:   9.13   Surface Integrals: 2,4,6,8,10,11,15,17,18,24,28, 29,32,33,36,37,39

Week 10 Nov 6:   9.14   Stokes theorem: 3,4,6,9,10,12,13,14,18

Week 10/11: Term Test 2 (during tutorials: sections QB: 8:45 to 9:45 Friday Nov 10)

                                sections QA, PA and PB: 10:45 to 11:45 Monday Nov 12)

                          on material of Section 9.8 through Section 9.13

Week 11 Nov 13:   9.15   Triple Integrals: 3,6,9,13,14,15,21,23,24,27,32,34,45,48,

Week 12 Nov 20:   9.15   Triple Integrals: 51,54,57,68,69,72,75,76,78,81

               9.16   Divergence theorem: 2,3,6,9,11,12,13,15,17,21,22

Week 13 Nov 27:   9.17 Change of variables in multiple integral: 3,5,7,8,9,10,13,15,17,22,23,25,27

Time permitted :   Review: 1-20,24,26,29,30,32,36,38,43,46,50,51,53,54,56,57,58,60,63,65

GRADUATE ATTRIBUTES

ENGR233 emphasizes and develops the CEAB (Canadian Engineering Accreditation Board) graduate attributes and indicators: Knowledge base for engineering -Problem Analysis (Problem identification, Modeling, Problem solving) -Life-long Learning.

COURSE LEARNING Outcomes (CLOs)

Upon successful completion of ENGR233, the students will be able to:

- Apply multivariable calculus to engineering problems. Extract all the pertinent information *vis-à-vis* the physics and practicality of the problem. This component is examined through an applied problem in the final exam.
- Learn how to work within a team. This is done through one or two Team Projects.
- Acquire new knowledge by self-study. This is accomplished by making students responsible for certain material on assignments and exams, without that material being lectured on.

Tutors and Markers Info:

Tutor Sec
Tutor Sec
Tutor Sec
E-mail:
Marker:

The WeBWorK administrator is Siavash Hedayati Nasab email: siavash.h.n@gmail.com, any questions related to WeBWorK assignments should be directed to him.

Students are also responsible for topics covered in assignments that have not be presented in either the regular lectures or during tutorials.

In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.