CONCORDIA UNIVERSITY
FACULTY OF ENGINEERING AND COMPUTER SCIENCE
APPLIED ADVANCED CALCULUS- ENGR 233 - Fall 2019

Section P: Tuesdays and Thursdays, 1:15 p.m. – 2:30 p.m., Room Professor: Dr. A, PARADIS
Office: Tel: E-mail: alexandre.paradis@concordia.ca
Office Hours: T.B.A
Tutorials PA &PB: Mondays, 10:45am--12:25pm

Section Q: Tuesdays and Thursdays, 1:15 p.m. – 2:30 p.m., Room Professor: Dr. T FREIBERG
Office: Tel: E-mail: tristan.freiberg@concordia.ca
Office Hours: T.B.A
Tutorials QA: Mondays, 10:45am--12:25pm
Tutorials QB: Friday, 8:45--10:25am

Course coordinator: A. Nazemi Office: EV 6.164 E-mail: ali.nazemi@concordia.ca
WeBWorK administrator: Siavash Hedayati Nasab Email: siavash.h.n@gmail.com

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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 or 6th Edition, Published by Jones and Bartlett.

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 applied science and engineering.

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%.

YOU MUST PASS THE FINAL EXAM (50% or better) TO PASS THE COURSE

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

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.

- 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.**

General rules:

- 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].

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: Name, E-mail, Office
Tutor Sec: Name, E-mail, Office
Marker: Name, E-mail, Office

Schedule, topics and recommended problems:

Week 1-Sept 2: 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 9: 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 16: 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 23: 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 Sept 30: 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 7	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 Oct 14:	9.10 Double integrals:	3,5,9,15,18,21,24,27,33,36,39,42,45,52,62,65,68

Week 7/8: Term Test 1 (during tutorials: Sections QB: 8:45 to 9:45 Friday Oct 18)
Sections QA, PA and PB: 10:45 to 11:45 Monday Oct 21)
on material Chap 7 + Sections 9.1 through 9.7

Week 8 Oct 21:	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 28:	9.13 Surface Integrals:	2,4,6,8,10,11,15,17,18,24,28, 29,32,33,36,37,39
Week 10 Nov 4:	9.14 Stokes theorem:	3,4,6,9,10,12,13,14,18

Week 10/11: Term Test 2 (during tutorials: Section QB: 8:45 to 9:45 Friday Nov 8)
Sections QA, PA and PB: 10:45 to 11:45 Monday Nov 11)
on material of Section 9.8 through Section 9.13

Week 11 Nov 11:	9.15 Triple Integrals:	3,6,9,13,14,15,21,23,24,27,32,34,45,48,
Week 12 Nov 18:	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 25:	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