CONCORDIA UNIVERSITY
GINA CODY SCHOOL OF ENGINEERING AND COMPUTER SCIENCE
APPLIED ADVANCED CALCULUS- ENGR 233 – Fall 2021

IMPORTANT NOTES

1) **This course outline has FIVE pages, with critical and equally important information with regard to this course, ENGR 233.**
2) **Please note important implications of Covid-19 pandemic to the delivery and examination of this course, summarized at the end of this outline.**
3) **Changes to the information in the course outline, if any, will be announced through Moodle and the course outline will be modified accordingly.**
4) **All materials related to the delivery of this course (live recording and/or pre-recorded lectures, lecture notes, etc. but not the textbook) will be uploaded in the course Moodle website.**

Section Q: Lectures: Tuesdays and Thursdays 13h15-14h30 Room: FG C080 SGW
Professor: Alexei Kokotov
E-mail: alexey.kokotov@concordia.ca
Office Hours: Tuesday 15-00 –16-00 (can be longer if needed); S-LB 901-29
Tutorials: QA Mondays 10h45 – 12h25 & QB Fridays 8h45 – 10h25

Course coordinator: Professor M. Nik-Bakht E-mail: coordinator.engr233@gmail.com

WeBWorK administrator: Siavash Hedayati Nasab Email: siavash.h.n@gmail.com

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Lectures: Three hours per week **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, **7th Edition**[1], 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, the maximum combined mark for the first three components (WebWork + Quizzes + Projects) is 20%.

Important Notes:

- If your total score before the final exam is less than 40% and you decide to defer the final exam, you will receive an ***R*** grade which prevents you to defer the final exam
- In order to pass the class, both your cumulative score and the final examination must be **above 50%**
- In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

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[1] Please note that 5th and 6th editions have very minimal difference with the 7th section. Some exercises at the end of each sections might have been re-ordered.

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 been presented in either the regular lectures or during tutorials.**

General rules:

- If the student misses one mid-term test for a reason, acceptable by the course coordinator, including illness*, then the final examination will count for 70% of the total grade. **Students cannot miss both midterms.**
- 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** during examinations and are prohibited in the examination rooms. Only "Faculty Approved Calculators" will be allowed for midterm and final exams [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
Tutor Sec: Name, E-mail, Office
Tutor Sec: Name, E-mail, Office
Marker: Name, E-mail, Office (or TBA)Marjan Moghadam <marjanjalalimoghadam@gmail.com>
Abdel Rehman Idrais **<abdelrahmanidries88@gmail.com>**

Schedule, topics, and recommended problems:

Week 1 (Sep 06): 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 (Sep 13):	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, 36, 39, 42, 45
Week 3 (Sep 20):	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 (Sep 27)	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, 43, 44
Week 5 (Oct 04):	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 11):	9.8	Line integrals (end): 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 18):	9.10	Double integrals: 3, 5, 9, 15, 18, 21, 24, 27, 33, 36, 39, 42, 45, 52, 62, 65, 68

Week 7/8: Midterm 1 (during tutorials):

Sections QB: 08h45 to 09:45 Friday Oct 22)
Sections QA, PA and PB: 10h45 to 11h45 Monday Oct 25)

on material Chap 7 + Sections 9.1 through 9.7

Week 8 (Oct 25):	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 (Nov 01):	9.13	Surface Integrals: 2, 4, 6, 8, 10, 11, 15, 17, 18, 24, 28, 29, 32, 33, 36, 37, 39
Week 10 (Nov 08):	9.14	Stokes theorem: 3, 4, 6, 9, 10, 12, 13, 14, 18

Week 10/11: Midterm 2 (during tutorials) (during tutorials):

Sections QB: 08h45 to 09:45 Friday Nov 12)
Sections QA, PA and PB: 10h45 to 11h45 Monday Nov 15)

on material of Section 9.8 through Section 9.13

Week 11 (Nov 15):	9.15	Triple Integrals: 3, 6, 9, 13, 14, 15, 21, 23, 24, 27, 32, 34, 45, 48,
Week 12 (Nov 22):	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 29):	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	