CONCORDIA UNIVERSITY
GINA CODY SCHOOL OF ENGINEERING AND COMPUTER SCIENCE
APPLIED ADVANCED CALCULUS- ENGR 233 – Winter 2023

IMPORTANT NOTES

1) **This course outline has FOUR pages, with critical and equally important information with regard to the content, schedule and evaluation of this course. READ EVERY SECTION (VERY) CAREFULLY.**
2) **Changes to the information in the course outline, if any, will be announced through Moodle and will override the course outline information accordingly.**
3) **All materials related to the delivery of this course (e.g. lecture notes; live recording and/or pre-recorded lectures, IF applicable; etc. but not the textbook and tutorials) will be uploaded to the course Moodle website.**

Section XX: Lectures: Room:
            Professor:
            Office: Tel: E-mail:
            Office Hours:
            Tutorials:

Course coordinator: Professor Ali Nazemi   Office: EV 6.164   E-mail: ali.nazemi@concordia.ca
WeBWorK administrator: Masood Shamsaiee   Email: webwork.engr@concordia.ca

Lectures: 3 hours per week. Tutorial: 2 hours per week.

Prerequisite: MATH 204 and 205 previously or concurrently (cégep Mathematics 105 and 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 (1) Vector functions; (2) Functions of several variables; (3) Differential vector calculus; (4) Integral calculus for vectors; (5) Double and triple integrals; (6) Line and surface integrals; (7) Green's Theorem; (8) Stokes' Theorem; (9) Divergence Theorem; (10) Applications in applied science and engineering.

Grading Scheme:
1. Assignments (WeBWorK)   10%
2. Pop-up Quizzes[2] (5)   5% (1% each, during lectures or tutorials, 10-20 min, 1-2 problems)
3. Individual 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)
5. Final exam   60% (3 hours)

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, and pursuant to the Academic Regulations, the delivery, content, structure, location and/or evaluation scheme in this

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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.

[2] These are pop-up quizzes and therefore are unannounced.

course is subject to change. In the event of such extraordinary circumstances, students will be informed of the changes.

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 Mr. Masood Shamsaiee; email: webwork.engr@concordia.ca; 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.** Acquiring self-study skills should be one of the Course Learning Outcomes for ENGR233.

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. **Students cannot miss both midterms. In such a case, the students are encouraged to drop the course immediately.**
- There will be no replacements of quizzes, midterms, missed assignments and/or project submission for any reason whatsoever, 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 in both Term Tests and the Final Exam. 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:

Name	Role/section	Contact information

Schedule, topics and recommended problems:

Week 1 (Jan 9 [3]):
	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 (Jan 16):
	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 (Jan 23):
	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 (Jan 30):
	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 (Feb 6):
	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 (Feb 13):
	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 (Feb 20):   Midterm 1 (during tutorials; 60 minutes on material Chap 7 + Sections 9.1 to 9.7)
Please consult with the instructor about the exact date that corresponds to your tutorial section in this week

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Week 7 (Feb 20):
	9.10	Double integrals: 3,5,9,15,18,21,24,27,33,36,39,42,45,52,62,65,68
	9.11	Double integral in polar coordinates: 3,6,11,12,19,24,27,29,30,33,34

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

Week 9 (Mar 13):   9.13   Surface Integrals: 2,4,6,8,10,11,15,17,18,24,28, 29,32,33,36,37,39

Week 10 (Mar 20):   9.14   Stokes theorem: 3,4,6,9,10,12,13,14,18

Week 11 (Mar 27): Midterm 2 (during tutorials; 60 minutes on material of Sections 9.8 to 9.12)
Please consult with the instructor about the exact date that corresponds to your tutorial section in this week

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Week 11 (Mar 27):   9.15   Triple Integrals: 3,6,9,13,14,15,21,23,24,27,32,34,45,48,51,54,57,68,69,72,
75,76, 78, 81.
	9.16	Divergence theorem: 2,3,6,9,11,12

Week 12 (Apr 3 [4]):
	9.16	Divergence theorem: 13,15,17,21,22
	9.17	Change of variables in multiple integral: 3,5,7,8,9,10,13

Week 13 (Apr 10 [5]):   9.17   Change of variables in multiple integral: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

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[3] The dates refer to the Monday in each week; regardless of the days in which lectures or tutorials are held.
[4] Friday, April 7th, is Good Friday. Make up classes will be held on April 18th.
[5] Monday, April 10th is Easter Monday. Make up classes will be held on April 17th.

ADDENDUM

ACADEMIC CONDUCT ISSUES THAT APPLY IN GENERAL

The basic ten rules that make you a good engineer

The Undergraduate Engineering program is set to satisfy most of the requirements for your education and prepares you for a professional engineering career that requires dedication and knowledge. What you learn, and how you learn, will be used extensively in your engineering profession for the next 30 to 40 years. Therefore, the four years spent in the engineering program are crucial towards your professional formation. The first step is for you to learn to "think like an engineer" which means:

- Accept responsibility for your own learning

- follow up on lecture material and homework

- learn *problem-solving skills,* not just how to solve each specific homework problem

- build a body of knowledge integrated throughout your program

- behave professionally, ethically and responsibly

One of the mainstays of being a professional engineer is a professional code of conduct and as an engineering student this starts with the Academic Code of Conduct (Article 16.3.14 of the undergraduate calendar). However, you may encounter situations that fall outside the norm and in such cases, you use your common sense. Further, the following issues should be given serious consideration:

- Attendance at lectures and tutorials are major learning opportunities and should not be missed. Class and tutorial attendance is important for you to comprehend the discipline and make the connections between engineering skills. You are strongly encouraged to participate in the class, ask questions and answer the instructor's questions. Tutorials are just extensions of the classes in which application of the concepts presented during the lectures are presented and problems are practically solved.

- One key objective of midterms is to check on your comprehension of the material and allow time for whatever action is necessary (from more study time to discontinuing a course). Plan to attend the class tests even if they are not mandatory. If you pay attention in the lectures, it will take you significantly shorter time to comprehend the material. **Note also** that if you are unable to write a final exam due to medical reasons and seek a deferral, this may not be possible if the instructor has no information indicating that you have been attending the course and assimilating the material (i.e. through midterms, quizzes, assignments etc.).

- Homework is usually mandatory and it has some weight in the final grade (see information above). Homework may also be conceived as training material for the class tests. Under all circumstances, it is highly recommended to carry out the home work on time and submit it on the prescribed date. Late submissions will be penalized (see the related information above). This is part of the training for being in the workforce where deadlines have to be met. Plan your work to submit all the assignments on time and in the correct form.

- Office hours with class instructors are listed in the course outline. Please respect these office hours and in case you have a serious conflict, contact the instructor asking for a special time arrangement.

- Due to Covid-19, the exams are not returned to the student. If you wish to discuss your exam, be aware that most instructors allow only a narrow window of time for that purpose. For the fall term, exams may usually be reviewed in January and May for the spring term.

- When you see your marked work (assignments, midterms, final exam etc), be aware that you are supposed to review your material and see the type of errors you made and if marks have been added incorrectly. This is not an opportunity to try and "negotiate" a higher grade with the instructor. If you believe that your grade is not right, you may apply for a formal Course Re-evaluation through the Birks Student Centre.

- Writing tests and exams represents a major component of your course work. These tests and exams have rigorous requirements that are communicated in the UG Calendar. These requirements are there to eliminate any possible misunderstanding. Disciplinary measures are taken when the rules are not followed.

- Respect your colleagues and those that you meet during the class: tutors, instructors, lab instructors, technical personnel, assistants, etc. Use appropriate communication means and language. Be considerate for all human beings. Concordia University is a very diverse group of people and a very large multicultural community.

- Communication is part of your future profession. Learn how to communicate effectively and efficiently in the shortest time possible. Write short but meaningful e-mails, make effective phone calls, etc. If your instructor accepts emails make sure that your request is clear with the course number and your name in the *Subject* line. Do not ask for special treatment as instructors have to treat all students equitably.

- Respect all the above and you will get closer to your future profession.