

**CONCORDIA UNIVERSITY**  
**FACULTY OF ENGINEERING AND COMPUTER SCIENCE**  
**APPLIED ADVANCED CALCULUS- ENGR 233 – Fall 2020**

**IMPORTANT NOTES**

- 1) This course outline has SEVEN 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.
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<b>Section :</b> Lectures:	Room	REMOTE	Professor:
Office:	Tel:		E-mail:
Office Hours:			
Tutorials			

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<b>Course coordinator:</b> A. Nazemi	Office:	REMOTE	E-mail: ali.nazemi@concordia.ca
<b>WeBWorK administrator:</b> 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, **6<sup>th</sup> Edition**<sup>1</sup>, Published by Jones and Bartlett.

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**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.

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**Grading Scheme:**

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|--------------------------|--|
| 1. Assignments (WeBWorK) | 10%  |
| 2. Pop-up Quizzes (5)    | 5% (1% each, during lectures, tutorials or as homework, Course Moodle)                     |
| 3. Team projects (2)     | 10% (5% each, 1 hour; during tutorials in teams of 2 or take home; online)                 |
| 4. Term tests (2)        | 40%, (20% each, during lectures, tutorials or homework, online see next page) <sup>2</sup> |
| 5. Final exam            | 40% (2 hours) <sup>3</sup>   |

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

**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 extraordinary circumstances beyond control, the content and evaluation may change.
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<sup>1</sup> Please note that 5<sup>th</sup> and 6<sup>th</sup> editions have very minimal difference with one another. Some exercises at the end of each sections might have been re-ordered.

<sup>2</sup> The online platform for execution of midterm and final exams will be announced to students by the September 25<sup>th</sup>, 2020.

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**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](mailto: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. This is to develop the culture of self-learning.**
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**General rules:**

- If the student misses one mid-term test for any reason, including illness, then the final examination will count for 60% of the final grade. Student cannot miss both midterms.
- Since there is a 5% 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 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 exams.**

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**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.

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**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.
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**Tutors and Markers Info**

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

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**Marker:** Name, E-mail, Office

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**ACADEMIC HONESTY AND CODE OF CONDUCT**

Violation of the Academic Code of Conduct in any form will be severely dealt with. This includes copying (even with modifications) of program segments in assignments and exams. Students must demonstrate independent thought through your submitted work. The Academic Code of Conduct of Concordia University is available at:

<http://www.concordia.ca/students/academic-integrity/offences.html>

**Notes:**

- All students must read and sign the Expectations of Originality form and submit the signed copy to course instructor by September 24, 2020.
  - It is expected that during class discussions and in your written assignments you will communicate constructively and respectfully. Sexist, racist, homophobic, ageist, and ableist expressions will not be tolerated.
  - Also see addendum for academic conduct issues that apply in general in page FIVE.
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## Schedule, topics and recommended problems:

**Week 1-Sep 7:** 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 14:** 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 21:** 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 28:** 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 5 :** 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 12:** 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 19:** 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** (1-hour exam during tutorials: Day and time )

**on material Chap 7 + Sections 9.1 through 9.7**

**Week 8 Oct 26:** 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 2:** 9.13 Surface Integrals: 2,4,6,8,10,11,15,17,18,24,28, 29,32,33,36,37,39

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

**Week 10/11: Term Test 2** (1-hour exam during tutorials: Day and time )

**on material of Section 9.8 through Section 9.13**

**Week 11 Nov 16:** 9.15 Triple Integrals: 3,6,9,13,14,15,21,23,24,27,32,34,45,48,

**Week 12 Nov 23:** 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 30 :** 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

## CONDITIONS SPECIFIC TO REMOTE TEACHING AND ASSESSMENT

1. All students are expected to have access to a computer with following capabilities:
  - a. reliable internet connection
  - b. camera and microphone (your computer and/or cellphone)
  - c. document scanning application such as Adobe Scan app  
([https://play.google.com/store/apps/details?id=com.adobe.scan.android&hl=en\\_CA](https://play.google.com/store/apps/details?id=com.adobe.scan.android&hl=en_CA))
2. All students should install VPN for remote desktop access to Concordia University computer labs  
<https://www.concordia.ca/it/support/connect-from-home.html>  
Once you have VPN connection to Concordia University, you can access to all available software in Gina Cody School labs by following the process described in:  
<https://www.concordia.ca/ginacody/aits/support/faq/connect-from-home.html>
3. Download Microsoft Office 365: <https://www.concordia.ca/it/services/office-365-education.html>
4. All students are expected to do online, timed exams
  - a. Both midterm and final exams will be online and may include live-invigilation.
  - b. Course instructor reserves the right to conduct an individual oral examination to verify student's response and rationale to online exam questions.
5. Notes on Third-party software/website and personal information
  - a. Note that, as a part of this course, some or all of the lectures and/or other activities in this course may be recorded. Recordings will be focused on the instructor and will normally exclude students. It is possible, however, that your participation may be recorded. If you wish to ensure that your image is not recorded, speak to your instructor as soon as possible. Also, please note that you may not share recordings of your classes and that the instructor will only share class recordings for the purpose of course delivery and development. Any other sharing may be in violation of the law and applicable University policies, and may be subject to penalties.
  - b. By using the external software or websites, students agree to provide and share their work and certain personal information (where applicable) with the website/software provider. Students are advised that the University cannot guarantee the protection of intellectual property rights or personal information provided to any website or software company. Intellectual property and personal information held in foreign jurisdictions are subject to the laws of such jurisdictions.
  - c. Students may be asked to submit or consent to the submission of their work to an online service. Students are responsible for reading and deciding whether or not to agree to any applicable terms of use. Use of this software and service is voluntary. Students who do not consent to the use the software or service should identify themselves to the course instructor as soon as possible to discuss alternate modes of participation that do not require them to give copyright or the right to use their work to a third party.
  - d. External software and/or websites may be used in the course and students may be asked to submit or consent to the submission of their work to an online service. Students are responsible for reading and deciding whether or not to agree to any applicable terms of use. Use of this software and service is voluntary. Students who do not consent to the use the software or service should identify themselves to the course instructor as soon as possible to discuss alternate modes of participation that do not require them to give copyright or the right to use their work to a third party.
  - e. Students are advised that By using the external software or websites, students agree to provide and share their work and certain personal information (where applicable) with the website/software provider. Students are advised that the University cannot guarantee the protection of intellectual property rights or personal information provided to any website or software company. Intellectual property and personal information held in foreign jurisdictions are subject to the laws of such jurisdictions.

# 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 and online delivery of the course, 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.