CONCORDIA UNIVERSITY
FACULTY OF ENGINEEING AND COMPUTER SCIENCE

ENGR 233:   Applied Advanced Calculus - Winter 2016

Course web site: http://users.encs.concordia.ca/~n233_4/

Instructor:
Contact Info:
Office Hours:
Coordinator: Dr. A. Sebak, Office: EV 15-179, abdo@ece.concordia.ca,   514-848-2424 x 4082

Course objectives:

To ensure that students acquire the mathematical knowledge and skills needed in their engineering courses and to provide a basis for the more advanced techniques which are needed in subsequent years of their study program. Over the course span, students should master the necessary knowledge and skills to be able to solve mathematical problems at an appropriate level in: Vectors and vector functions; Functions of several variables; Parametric representation of curves and surfaces; 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, heat conduction, waves,…

Graduate Attributes:

1. Knowledge base for engineering
2. Problem Analysis (Problem identification, Modeling, Problem solving)
3. Life-long Learning

Course Learning Outcomes (CLOs)

1- Apply vector calculus to solve several variables functions.
2- Solve multiple dimension integrals.
3- Acquires the necessary skills for the need of the program they are in.
1. Understand and use Stokes, Divergence and Green Theorem.
2. Learn how to relate the concept to actual application and how to go beyond the subject of the course.

Textbook: *Advanced Engineering Mathematics:* D G Zill & W S Wright, Jones and Bartlett, 5th ed.

Evaluation	*Description*	*Weight*
Assignments	Assignments are posted on the course web site. However you do not hand in the solutions and they are not graded. The midterm test and final exam are based on the assignments and lectures.	**0 %**
Workshops	To be held **during tutorial sessions**. Bonus quizzes may pop-up during the class time slots.	**15%**
Midterm Test	Tuesday **March 1, 2015 @ 8:30 PM** (Location TBA during class). A term test missed for any reason, including illness, cannot be made up. If you miss the midterm test, the final exam will count for **85%.**	**25%**
Final Exam	Date TBD. Additional information below. If the grade of final is greater than the grade of midterm, the final will be worth 75% and midterm 10%	**60%**

Class Attendance: Students are expected to attend all classes and tutorials and are responsible for any missed work. **Up to a 5% bonus points will be awarded to all students who submit their pop-up quizzes to supplement tutorial workshop marks to bring them to the maximum 15%.**

NB: NO CALCULATOR, NO BOOKS are allowed in test and final exam.

A formula sheet will be provided during the midterm test and final exam.

Course outline

Wk	Theme	Workshop Problems
1	**7-1** Vectors in 2-Space **7-2** Vectors in 3-Space **7-3** Dot product	**7-1**: 21,30,50 **7-2**: 24,27,29,43 **7-3**: 12,21,39,45,46,48
2	**7-4** Cross product **7-5** Lines and Planes in 3-Space	**7-4**: 3,13,45,48,51 **7-5**: 3,21,27,31,39,47,51,59,63
3	**9-1** Vector functions **9-2** Motion of a curve **9-3** Curvature. Components of Acceleration	**9-1**: 4,5,1,24,25,27,29,33,39, 41,42,45 **9-2**: 3,9,13,18 **9-3**: 9,10,17,18,21,22,24
4	**9-4** Partial Derivatives **9-5** Directional Derivative **9-6** Tangent Planes and Normal Lines	**9-4**: 3,6,9,15,21,24,27,33,34, 36,39,42,48,49,51,55 **9-5**: 3,6,12,15,18,24,27,33,41,43 **9-6**: 3,14,15,37,39
5	**9-7** Divergence and Curl **9-8** Line Integrals (to be continued)	**9-7**: 9,15,21,27,30,37,40 **9-8**: 3,6,9,15,21,27,30,33,36,40
6	**9-8** Line Integrals (end) **9-9** Independence of Path	**9-8**: 3,6,9,15,21,27,30,33,36,40 **9-9**: 3,6,15,18,21,24,27
	Term Test (**Tu Mar 01,2016 @8:30pm**)	**Sections 7-1 through 9-9**
7	**9-10** Double Integrals	**9-10**: 9,15,21,27,33,36,39,42,62
8	**9-11** Polar Coordinates **9-12** Green's Theorem	**9-11**: 3,6,12,24,27,30,33 **9-12**: 3,6,9,12,18,19,24,25,27
9	**9-13** Surface Integrals **9-14** Stokes' Theorem	**9-13**: 3,6,15,18,30,33,36,37 **9-14**: 3,6,9,12,13,18
10	**9-15** Triple Integrals **EXTRA (supplemental material):** del operator in cylindrical and spherical coord	**9-15**: 6,15,21,24,27,34,45,48, 51,54,57,69,72,75,78,81
11	**9-16** Divergence Theorem	**9-16**: 3,6,9,12,15,17,18,22
12	**9-17** Change of Variables in Multiple Integrals	**9-17**: 3,7,9,13,23,27
13	Miscellaneous & Review	

Notes:

1. **Final exam**: Students are responsible for finding out the date and time of the final exam once the schedule is posted by the Examination Office. Any conflicts or problems with the scheduling of the final exam must be reported directly to the Examination Office, not to your instructor.

2. Your principal task in the course is to learn to solve the assigned problems. **Solving the assigned problems is vital to learning the course material**. The quizzes, class test and final exam are based on the assigned problems (tutorials, assignments, in-class examples, etc.).

3. **You are training to be a professional engineer**. Consequently, we expect you to behave like a professional. A professional engineer is polite, considerate and respectful of others. It is rude, inconsiderate, and disrespectful to your fellow students and to the professor to talk in class. No one can learn if you are chatting to your neighbor!

4. Cell Phones are not allowed in the class room. You lose attendance points if you use a cellphone.

5. Computers are allowed if you use them for course materials. No surfing on the web, please.

6. **All Concordia University students must abide by the University's Academic Code of Conduct** (Concordia University Undergraduate Calendar Section 16.3.13). Any suspected violation of the Code will be turned over to a University Committee for investigation. No cheating in any way is tolerated. Penalties can be as severe as dismissal from the University.

CEAB Graduate Attributes:

Graduate Attribute	Indicator	Level of Knowledge
A knowledge base for engineering *Demonstrated competence in university-level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.*	Knowledge-base for specific engineering field	INTRODUCTORY
Problem analysis *An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.*	Problem identification and formulation Modelling Problem solving	INTRODUCTORY INTERMEDIATE INTERMEDIATE
Life-long learning *An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge.*	Continuous improvement and self-learning	INTRODUCTORY