Forman Christian College, Lahore
(A Chartered University)
Department of Mathematics
Spring 2023

Instructor Information:

Dr. Ashar Ghulam
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Course Information:

Course Title: Multivariate Calculus
Course Code: CSCS201
Credit hours: 3
Prerequisite: MATH 111
Room # S-317
Section: B
Timing: Tue., Thur.: 09:30 am -- 10:45 am

Resources:
Notes and recorded lectures will be provided on Moodle.
Recommended Text:
Calculus Early Transcendentals, James Stewart, 7th edition, Thomson Learning Inc. U.S.A.

Calculus Early Transcendentals, Anton, Biven, Davis, 10th edition, John Wiley & Sons Inc. U.S.A.

Reference Text:
Calculus and Analytic Geometry, Thomson and Finney, Addison-Wesley
publishing Company. U.S.A.
Mode of teaching: On campus

Course Contents:

This is a mandatory course for 4-year Baccalaureate degree in Computer Science. This course will deal with multivariable Calculus. Topics include multivariable functions, limit, continuity, partial

derivatives, chain rules for partial derivative, multiple integrals with application, vector valued functions, line integrals, Green's, Stoke's and Gauss's theorem.

Course Objectives

The objectives of this course for students are to know the machinery of multivariable Calculus. They will be able to apply these concepts to analyze and interpret information in their specific field. It will improve understanding of students about properties like limit, continuity, partial derivatives and multiple integrals etc. of multivariable functions, and ability to independently increase their own understanding of multi-variable Calculus. It will provide students with an opportunity to appreciate the wide range use of multi-variable Calculus in different fields. Students successfully completing the course should be reasonably proficient in solving problems involving multivariable functions and related properties.

Course Expectations

❏ Students must arrive at class on time, should remain in class for the entire class period and mobile phones should be switched off. All students whose attendance is less than 70% (on campus attendance) won't be allowed to take the final exam. Note that there are **05 marks for attendance and in class participation.** If a student arrives more than 10 minutes late or leaves class during lecture or uses mobile phone in class, he/she will be marked absent. Habitual late comers will not be allowed to enter the class after 10 minutes. In case a late comer with **genuine reason** is not allowed to enter the class, he or she can see the professor in office hours for briefing about the lecture.

❏ Course assessment will be through quizzes, midterm, assignments, attendance & in class participation and final exam. There will be one bonus question in the final term examination. **If needed, students may be asked to explain the submitted work**. All assignments are to be completed by the date mentioned on the assignment paper**. Late submission of assignment will result in deduction of points for the assignment**. There is no make up for missed quizzes but best 3 out of 4 will be counted. In extreme cases average marks for the missed quizzes might be given provided students should submit strong evidence **within 3 days** after missing the quiz. Make up for midterm and final exam. is possible only under extremes cases if student provides strong documentary evidence within **3 days after missing the Mid/Final exam.** In case of make up examination, there will be a 0-20% deduction in marks depending upon case to case. Medical certificate will be acceptable if it is verified by the medical officer of FCCU.

❏ **Academic dishonesty or cheating** will result in zero points (grade F) and will be referred to AIC (Academic Integrity Committee) at FCCU for necessary action. (Page number 20 of 4-year Baccalaureate degree Program Catalog 2018-2019)

❏ **Note: All the quizzes, midterm and final term examination will be conducted in class while all the assignments will be conducted through Moodle.**

Learning Outcomes

Students will be able to:

- develop and strengthen skills in dealing with multivariable functions and their properties.
- differentiate the vector valued functions and use them in practical problems.
- find multiple integrals of the vector valued functions and their applications.
- analyze, model and interpret problems involving multivariable functions in their respective field.
- use Green's, Stoke's and Gauss's theorem to evaluate surface and line integrals.

Course Evaluation

Grading will be based on following criteria:

Attendance & in class performance including behavior	05 %
Assignments (2)	10 %
Quizzes (3 out of 4)	15 %
Mid Term	30 %
Final Exam	40 %

Grades	Quality Points	Numerical Value	Meaning
A	4.00	93-100	Superior
A-	3.70	90-92	
B+	3.30	87-89	
B	3.00	83-86	Good
B-	2.70	80-82	Fair
C+	2.30	77-79	
C	2.00	73-76	Satisfactory
C-	1.70	70-72	
D+	1.30	67-69	
D	1.00	60-66	Passing
F	0.00	59 or below	Failing

Course Outline

Week	Topics	Assessments
1	Discussion of course plan: Course introduction, Policies, Requirements and grading criteria. Review of function of one variable, Functions of two and three variables	
2	Limit of a multi-variable function.	
3	Problems related to limit of a multivariable function.	Assignment-1
4	Continuity of a function of two variables.	
5	Continuity of a function of three variables, and some problems related to continuity of a multivariable function.	Quiz-1
6	Partial derivatives, chain rules.	
7	Directional derivative, gradient of a multivariable function.	Quiz-2
8	Maximum value of directional derivative, Double integrals over general regions.	

9	Double integrals over general regions (continue),	**Mid-Term 14th April**
10	Double integrals in polar co-ordinates and applications	
11	Triple integrals and their applications.	**Quiz-3**
12	Problems involving multiple integrals.	
13	Vector and scalar fields and line integrals	
14	Line integrals of scalar fields and related problems	**Quiz-4**
15	Green's theorem and its applications	**Assignment-2**
16	Stoke's theorem, Divergence theorem of Gauss	
	Final examination period is from 12th June 2023 – 21st June 2023. Final examination will be taken from the whole syllabus.	