

COURSE SYLLABUS

Sultan Qaboos University

College of Science

Department of Mathematics and Statistics

MATH 3110

Calculus III

Course Coordinator: Ziyad Al-Sharawi (Office 0224)

Fall 2014

Course Instructors: Ziyad Al-Sharawi and Mohamed Boudellioua

Credit Hours: 4

Pre-requisite: Calculus II (Math 2108)

Contact Hours: 5 per week

Format: 3 hours Lecture and 2 hours Tutorial.

Textbook: R. Smith, & R. Minton, Calculus: Early Transcendental Functions, Third Edition, McGraw - Hill, New York, 2007.

Office Hours: Office hours will be announced separately. Instructors will have their office hours posted outside their offices. Students are advised to visit their instructors during their office hours or by appointment.

Brief Description: This is the third course in a sequence of courses covering standard topics in calculus. It deals with vectors, lines, planes and surfaces, vector-valued functions, curvature, partial derivatives, Lagrange multipliers, multiple integrals in various coordinate systems, change of variables, Jacobians, vector calculus, line and surface integrals, Green's Theorem, Stokes's Theorem and the Divergence Theorem.

Course Objectives: Upon completion of this course, students are expected to be familiar with the use of rectangular coordinates in three dimensions, the analytic geometry of lines, planes and surfaces, vector-valued functions, partial differentiation and multiple integrals. Students are expected to get a grasp of vector calculus and its basic theorems. After this course, students are expected to be prepared for further study in mathematical physics, applied mathematics, complex analysis, differential geometry, statistics and other fields.

Assessment: The course will be graded A to F, and grades will be assigned based on the following weighted components:

Component	Week	Date	Day & Time	MARKS
Quiz 1	4	October 13, 2014	Monday (Class Time)	5%
Quiz 2	6	October 27, 2014	Monday (Class Time)	5%
Quiz 3	10	November 24, 2014	Monday (Class Time)	5%
Homework	12	December 8, 2014	Monday (Class Time)	5%
Test I	8	November 12, 2014	(Wed. 06:15-07:15)	20%
Test II	13	December 17, 2014	(Wed. 06:15-07:15)	20%
Final Exam	18		As advertised by A & R	40%
Total				100%

Remarks about the assessment components: (i) If a student misses an exam or a quiz without a valid excuse, the mark in that test will be zero. Absentees with genuine reasons will be treated separately. An official letter (the form is available in moodle) supported by proper documents must be submitted to the instructor within one week from return to class. However, there will be no make-up quizzes or tests. Any assigned grade will be based on the performance

on the remaining part of that assessment components. (ii) The instructor may assign some points for attempting the tutorial assignments, and those points will be considered part of the ones allocated for the graded homework.

Course Contents & Weekly Schedule:

Week	Sec.	Remarks	Title
1 Sept. 21	10.1 10.2		Vectors in the plane Vectors in space
2 Sept. 28	10.3 10.4		The dot product The cross product
3 Oct. 05	10.5 10.6 11.1	Eid Holiday	Lines and planes in space Surfaces in space Vector-valued functions
4 Oct. 12	11.2 11.3 11.4	Quiz 1	The calculus of vector valued functions Motion in space Curvature
5 Oct. 19	11.5 11.6 12.1		Tangent and normal vectors Parametric surfaces Functions of several variables
6 Oct. 26	12.2 12.3	Quiz 2	Limits and continuity Partial derivatives
7 Nov. 02	12.4 12.5 12.6		Tangent planes The chain rule The gradient and directional derivatives
8 Nov. 09	12.7 12.8	Test I	Extrema of functions of several variables Constrained optimization and Lagrange multipliers
9 Nov. 16	13.1 13.2 13.3		Double integrals Area, volume and center of mass Double integrals in polar coordinates
10 Nov. 23	13.4 13.5	Quiz 3	Surface area Triple integrals
11 Nov. 30	13.6 13.7 13.8	Homework	Cylindrical coordinates Spherical coordinates Change of variable in multiple integrals
12 Dec. 7	14.1 14.2		Vector fields Line integrals
13 Dec. 14	14.3 14.4	Test II	Independence of path and conservative vector fields Greens theorem
14 Dec. 21	14.5 14.6		Curl and divergence Surface integrals
15 Dec. 28	14.7 14.8		The divergence theorem Stokes theorem
16 Jan. 04		Wrapping up	
17		Final Exams	

Remark: The covered sections in the weekly schedule may be adjusted slightly during the semester to accommodate holidays.

Tutorial Problems and Homework Exercises: Please read the examples given in your book, then do/attempt the suggested exercises at home, and come to the tutorial to discuss the difficulties you have faced in the attempted exercises. The instructor's job is not to solve the homework for you, but rather to assist or guide you so you can overcome the difficulties in your homework. The instructor may assign some additional problems. In addition, students are encouraged to do other relevant exercises from the textbook. Also, the instructor may give some marks for doing the suggested exercises before the tutorial.

Sec.	Tutorial Problems and Homework Exercises
10.1	1, 4, 9, 13, 18, 21, 24, 28
10.2	2, 6, 10, 13, 17, 20, 25, 29, 43, 46, 50, 56, 60, 62
10.3	1, 3, 6, 8, 10, 14, 15, 17, 19, 21, 24, 31, 33, 35, 38, 39 - 42
10.4	4, 5, 7, 10, 12, 15, 17, 21, 23, 41-44, 47-58, 60, 63, 66
10.5	1-9 odd, 10, 12, 15, 18, 20-21, 23, 27, 30, 33, 36, 40, 42, 50, 51, 53, 63, 66
10.6	1, 3, 5, 7, 11, 14, 17, 19, 23, 25, 27, 29, 34, 36, 39, 44, 47, 50, 52
11.1	1, 3, 6, 7, 9, 14, 18
11.2	1, 3, 5, 7, 9, 11, 14, 16, 18-19, 21-22, 25, 28, 30, 32-33, 36, 38, 40, 42, 45, 47, 48
11.3	4, 6, 7, 11, 14
11.4	3, 4, 6, 8, 10, 16, 18, 20, 22, 26, 28, 30, 32, 38
11.5	3, 6, 8, 16, 19, 21, 23, 25-28
11.6	1, 4, 14, 16, 18, 20, 22, 27, 30, 32, 39, 44, 46, 49, 50, 54
12.1	1, 3, 4, 6, 8, 10, 12, 17, 20, 37, 40, 42, 47, 49
12.2	1, 4-12 even, 15, 19, 22, 24, 26, 28, 30, 35-36, 38, 41-42, 44, 47-50, 53, 56, 58
12.3	1, 3, 7, 9, 13, 16, 61, 62
12.4	1, 2, 5, 8, 10, 12, 24, 26, 28, 30, 32, 43
12.5	1, 3, 5, 8, 10, 17, 19, 21, 24, 26
12.6	1, 4, 6, 8, 10, 12, 15, 19, 23, 25, 29, 31, 34, 36, 41, 44, 66
12.7	3, 6, 8, 35, 37, 51-54, 65, 66
12.8	1,3, 6, 8, 10, 12, 14, 16, 18, 20, 32, 43, 46, 48
13.1	1, 4, 6, 7, 9, 17, 20, 22-23, 26, 28, 31-33, 36, 38, 40, 42, 46, 58
13.2	1, 3, 5, 6, 8, 10, 11, 14, 16, 18, 44
13.3	1, 5, 9, 10, 13, 14, 16, 19, 20, 21, 23, 25, 28, 30, 32
13.4	1, 3, 5, 6, 7, 12
13.5	2, 6, 7, 9, 11, 14, 16, 19, 21, 24, 26, 37-42
13.6	3, 5, 9, 14, 18, 22, 24, 26, 31, 32, 35, 37, 46
13.7	4, 6, 11, 14, 17, 22-23, 25, 28-46 even, 49, 52, 54, 56
13.8	1, 4, 5, 6, 9, 12, 14, 16, 19, 20, 24, 26, 28, 30
14.1	11, 12, , 23, 27, 31, 36, 38, 39, 42
14.2	2, 4, 6, 8, 10, 11, 15, 17, 18, 22, 24, 26, 28, 32
14.3	2, 4, 7, 10, 11, 12, 14, 16, 18, 20, 22, 27, 30, 37, 40, 41-44
14.4	2, 4, 6, 8, 11, 17, 20, 21, 26, 27, 30, 31, 34, 37, 39
14.5	1, 4, 8, 10, 12, 13, 16, 18, 19, 22, 26, 27-30, 37-39, 65
14.6	1-8, 10, 12, 14, 17, 19, 22, 24, 27, 29-30, 32, 36, 38, 40, 44, 48, 53-55, 58, 67, 69
14.7	2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 27, 28
14.8	2, 4, 6, 10, 13, 14, 16, 20, 24, 26, 33, 34

Moodle: Information about the course, advertisements and aiding material will be posted for students in moodle. Therefore, students are requested to visit moodle frequently and follow up the updated information. The code for moodle is “m3110”.

The Graded Homework: A homework will be posted in moodle in week 9. The main objective of the homework is to improve students skills in handling mathematical problems and writing mathematical solutions. The solution of the homework will not be collected, but rather a quiz out of the homework (exactly out of the homework) will be given in Week 11 (Monday, Tutorial Time). This quiz is called “Homework-Quiz.” Certainly, good understanding of the homework and good practice in writing the solution will improve your performance in the “Homework-Quiz.” Students are required to practice writing the complete, mathematically correct and neatly written solution for each question. Missing the “Homework-Quiz” will result in a zero grade in this component.

Instructors: Calculus III (Spring 2014) is taught by the following instructors.

Instructor	Ziyad Al-Sharawi	Mohamed Boudellioua
Section	10	20
Office	0224	0237
Class	D08-D05	D08
Days	Sun-Mon-Tue	Sun-Mon-Tue

Assistance: Feel free to visit your instructors during his or her office hours. If the assigned office hours are not suitable for you, feel free to ask your instructor for an appointment.

Attendance: Attendance is compulsory. Any student who misses 5% (4 contact hours) of the total course hours will be sent a warning notice, and who misses 15% (12 contact hours) or more of the total course hours will be barred from taking the Final Examination according to the University Regulations. Also, if a student misses a class, then he/she is responsible for all the information given or announced in class.

Punctuality: You are required to attend your class on time. Late attendance is not acceptable, the instructor has the right to close the door and not welcome anyone who is late.

Sharing Material: You are not allowed to share calculators or any other material during exams or quizzes.

Cellular Phones: Turn off your cellular phone or put it on silent mode before entering the class. Also, cellular phones are not allowed to be used as calculators or for any other purpose during class or exam time.

Academic Dishonesty: All forms of academic dishonesty are prohibited and penalties are decided depending on the department/university rules and regulations. Academic dishonesty includes (but not limited to) cheating, plagiarism, copying, collusion, falsification, signing for someone’s else, . . . etc. For more details, please see pages 36 and 37 of SQU Undergraduate Academic Regulations, Third Edition, 2005.

Other Remarks: The following remarks are worth stressing.

- Topics for the quizzes, the tests and the final will be announced well in advance.
- Information and announcements related to the course will be posted in Moodle.
- Students must check their emails and visit Moodle regularly for new postings.

- Student's involvement in class through answering questions or seeking clarifications is highly encouraged.
- If there is an idea that needs more clarity, the student must ask the instructor for further explanation either during the class or during his office hours.
- By the end of each week, students should be done with all readings, problem solving as assigned for that week. Don't procrastinate, procrastination is the thief of time.
- All requests for a review of the answer scripts must be made to the instructor during the class on the same time tests are returned.

Learning Outcomes:

- Explain and apply the notions of limit and continuity to vector-valued functions and to scalar functions of two or three variables.
- Apply each of Green's Theorem, Stokes' Theorem and the Divergence Theorem.
- To change the order of integration and variables in double and triple integral.
- Perform manipulations with vectors including addition, subtraction, scalar multiplication, the dot and cross products.
- Calculate arc-lengths, the unit tangent vector, unit normal vector, binormal vector, and curvature of a parametric line.
- Sketch or describe curves and surfaces given by parametric equations.
- Test a given function of two or three variables for continuity and differentiability.
- Find extreme values of functions of two or three variables, and find the equations of the tangent plane and normal vector to a surface.
- Use Lagrange multipliers to find extreme values of a function of two or three variables under a constraint.

Best Wishes!