King Fahd University of Petroleum & Minerals
Department of Mathematics and Statistics

Math.441-182

Course Syllabus

Course Instructor: Dr. Adel Khalfallah

Text Book. Functions of several variables by W. Fleming.

Recommended New Text: "Functions of Several Real Variables" by M. Moskowitz and F. Paliogiannis, World Scientific, Singapore, 2011

Topics to be Covered: Real functions of several real variables: limit, continuity, differentiability. Taylor's theorem. Maxima and minima, Lagrange multipliers rule. Elementary notion of integration on R^n . Change of variables in multiple integrals, Fubini's theorem. Implicit and inverse function theorems. Convergence and divergence of improper integrals- Differentiation under the integral sign**.**

Course Objectives: This course is designed to provide a rigorous mathematical basis for the analysis of "Functions of several variables".

Students Learning Outcome: After completion of the course, the students should be able to

- Gain familiarity with functions of several variables
- Be able to understand and write proofs of theorems
- Apply the results to solve exercises, mostly theoretical in nature
- Prepare the students for higher level analysis courses

Grading Policity

HW	15%
Exam I	25%
Exam II	25%
Final	35%

Weekly Coverage of Course Material

Wk	Sections	Material	HW
1	1.1-1.3	The Euclidean space R^n.	p.23: 1, 4 p:37 : 14
2	1.4-1.5	R^n as a metric space. Sequences and series in R^n	1,3,7 p:60: 1.8.24, 1.8.17
3		Series in R^n	
4	2.1-2.2-2.3	Functions on R^n. Limit and Continuity.	2(c,e), 4, 7b 3,8,9, 10, 11, 12
5	2.4-2.5	Linear transformations-Continuous Functions on compact sets	Sec 2.7: 9, 10, 13, 15
6	3.1	Differentiable Functions.	6, 7, 10, 13, 20
7	3.5	The mean value theorem. Taylor's Theorem.	1, 3b
8	3.6-3.7	Minima, Maxima.	4, 20
9	3.8	The Inverse and Implicit Function Theorems.	1, 2, 15
10	3.9	Lagrange multiplier-Applications	2, 7
11	4.1	Integral in R^n - Integrals over bounded sets	5, 6
12	4.2-4.3	Properties of multiple integrals. Iterated integrals- Fubini's theorem	2, 4
13	5.1	Change of variables	9, 11
14	5.2-5.3.1	Convergence and divergence of improper integrals -Differentiation under the integral sign	
15		REVIEWS	