ADVANCED CALCULUS II – MATH 441 – TERM 232

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Office Hours **Face-Face:** Sunday and Tuesday 11:00-11:50AM **Online:** by **appointment** through TEAMS
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Textbook:

Moskowitz, M. & Paliogiannis, F. **Functions of Several Real Variables**. World Scientific, Singapore, 2011

References:

R1) Laczkovich, M. & Sós, V. **Real Analysis: Series, Functions of Several Variables, and Applications.** Springer, 2017

Description:

- Theory of sequences and series of functions.
- 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.

Student Learning Outcomes:

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

- Recall basic geometry and topology of Euclidean space.
- Discuss notion of limit of a function of several variables to state directional, partial and Fréchet derivatives.
- Discuss Inverse and Implicit function theorems.
- Determine nature of critical points using Hessian matrix.
- Apply method of Lagrange multipliers to extremum problems with constraints.
- Use Fubini's theorem to compute multiple integrals.
- Discuss convergence of improper integrals.

Grading Policy:

- 20%: Quizzes (3 quizzes)
- 45%: Two Major Exams: first 20%, second 25%
- 35%: Final comprehensive exam

Evaluation:

Final grade is according to the scale.

GRADE	RANGE
A+	[90%, 100%]
A	[80%, 90%)
B+	[75%, 80%)
B	[70%, 75%)
C+	[65%, 70%)
C	[55%, 65%)
D+	[50%, 55%)
D	[45%, 50%)
F	[0%, 45%)

Course Schedule:

Week	Topic	Section	HW (DO NOT HAND-IN)
1	Basic Features of Euclidean Space, R^n	1.1, 1.2, & 1.3	Page 23: 1, 4 & Page 37: 14
2 & 3		1.4, 1.5 & 1.6	Page 42: 1,3,7 & Page 60: 1.8.24, 1.8.17
4	Functions on Euclidean Spaces	2.1, 2.2 & 2.3	2(c, e), 4, 7b 3,8,9, 10, 11, 12
5		2.4 & 2.5	Sec 2.7: 9, 10, 13, 15 **EXAM I – Week 5 or 6**
6	Differential Calculus in Several Variables	2.6 3.1	6, 7, 10, 13, 20
7		3.2 & 3.3 & 3.4	1, 3b
8		3.5 & 3.6	4, 20
9		3.7 & 3.8	1, 2, 15
10		3.9	2, 7 **EXAM II – Week 10 or 11**
11	Integral Calculus in Several Variables	4.1	5, 6
12		4.2 & 4.3	2, 4
13	Change of Variables Formula, Improper Multiple Integrals	5.1	9, 11
14		5.2 & 5.3	
15	Revision		

FINAL EXAM – See Registrar website.