CONVEX ANALYSIS – MATH 580 – TERM 222

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Office Hours **Face-Face:**
Scan code on the right or click HERE
Online: via MS TEAMS (by **appointment**)

Textbook & References:

(TEXTBOOK) *Boris S. Mordukhovich and Nguyen Mau Nam. 2013.* ***An Easy Path to Convex Analysis and Applications*** *(1st. ed.). Morgan & Claypool Publishers.*

(REFERENCE) J.B. Hirriart Urruty and C. Lemar´echal.2001. **Fundamentals of Convex Analysis**. Springer.

(REFERENCE) *Bertsekas, Dimitri.2009.* ***Convex Optimization Theory****. Athena Scientific. ISBN: 9781886529311.*

(REFERENCE) *Rockafellar, R.T., 1970.* ***Convex analysis****. Princeton university press.*

Description:

Convex sets. Relative interior. Separation of convex sets. Convex functions. Examples of convex functions. Characterization of convex functions. Normal cone, tangent cone. Asymptotic cone. Advanced properties of convex sets: Caratheodory, Radon, Helly theorems, Farkas lemma. Continuity and differentiability of convex functions. Subgradients and subdifferential. Convex optimization: Optimality conditions, constraint qualification.

Grading Policy:

- 15%: Term Paper
- 50%: Two Major Exams: first 25%, 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%)

Class Attendance

Graduate students are subject to the same rules governing class attendance, the performance of assigned tasks, and course examinations as undergraduate students at the University. Regular and punctual attendance is both a University regulation and a mark of courtesy to the instructor. A DN grade will be awarded to any student who accumulates more than 9 unexcused absences or more than 15 excused and unexcused absences of lectures and labs.

Missing Exams

In case a student misses an exam (Exam I, Exam II, or the Final Exam) for a legitimate reason (such as medical emergencies), he/she must bring an official excuse from Students Affairs/Graduate Studies. Otherwise, he/she will get zero in the missed exam.

Course Schedule:

Week	Chapter/Topic	Section	Notes
1	Convex Sets and Functions	1.1, 1.2, 1.3	
2		1.4, 1.5	
3	Subdifferential Calculus	2.1	TERM PAPER - PICK UP A TOPIC
4		2.2, 2.3	
5		2.4, 2.5	
6		2.6	**EXAM 1**
7		2.7	
8		2.8	TERM PAPER - PRGRESS REPORT
9		2.9	
10	Remarkable Consequences of Convexity	3.1, 3.2	
11		3.3, 3.4	
12		3.5, 3.6	**EXAM 2**
13	Applications to Optimization and Location Problems	4.1, 4.2	
14		4.3	TERM PAPER - SUBMISSION
15		4.4	

FINAL EXAM – See Registrar website