

BOĞAZIÇI UNIVERSITY
DEPARTMENT OF INDUSTRIAL ENGINEERING
Fall 2009 - 2010

IE 303 OPERATIONS RESEARCH II

Day and Time	: M 9:00 – 10:00	W 9:00 – 11:00
Classroom	: M 3100	M 3100
Instructor	: İ. Kuban Altınel	
Office/Phone	: Old Engineering Building, M 4042 / Ext. 6407	
Office Hours	: T 11:00 – 13:00	Th 9:00 – 11:00
Teaching Assistant	: Ezgi Karabulut	
Office	: TBA	
Office Hours	: TBA	

Grading

Quizzes	: 20% (6 quizzes. The lowest grade will be dropped)
Programs	: 10% (6 programs. The lowest grade will be dropped)
Midterm	: 20% (NO MAKEUP. ABSENCE WILL BE GIVEN 0 WHATEVER THE REASON IS!)
Final	: 50% (Only those whose name appears on the makeup examination list will be given a makeup exam.)

Textbook: There is no textbook.

References:

1. Practical Methods of Optimization, R. Fletcher
2. Linear and Nonlinear Programming, 2nd edition, D. Luenberger
3. Past Exams and their solutions

THEY ARE ALL AVAILABLE ON RESERVE AT THE LIBRARY.

IE 303 TENTATIVE PLAN

1. NONLINEAR OPTIMIZATION IN ONE DIRECTION

Analytical optimization, iterative optimization, search methods (binary, Fibonacci, golden section), approximation methods (Newton's method, secant method, cubic fit), speed of convergence (linear, super linear and quadratic convergence)

2. CONVEXITY

Convex functions, convex sets.

3. NONLINEAR UNCONSTRAINED OPTIMIZATION IN MANY DIRECTIONS

Basic concepts (gradient, Hessian, Taylor series, quadratic forms, positive definiteness, Cholesky factorization), necessary and sufficient conditions, search methods (coordinate search, pattern search, simplex search), descent directions and steepest descent method (Kantarovich lemma, Rosenbrough's curved valley function), Newton's method, conjugate direction method, Davidon-Fletcher-Powell and Broyden-Fletcher-Goldfarb-Shanno methods.

4. CONSTRAINED NONLINEAR OPTIMIZATION

Necessary and sufficient conditions, saddle point problem and its relation with convex programs, reduced gradient and generalized reduced gradient methods.

5. DETERMINISTIC DYNAMIC PROGRAMMING

Shortest path problem, Resource allocation problems, Equipment replacement problem.

6. METAHEURISTICS

Supervised learning and back propagation algorithm, Unsupervised learning and self-organizing maps

IE 303 TENTATIVE PROGRAM

<u>WEEK</u>	<u>MONTH</u>	<u>DAY</u>	<u>TENTATIVE DAILY OUTLINE</u>
1	September	28M	Nonlinear model examples
		30W	"
2	October	05M	Nonlinear optimization in one variable
		07W	"
3		12M	"
		14W	"
4		19M	Convexity
		21W	"
5		26M	Unconstrained nonlinear optimization in many variables
		28W	"
6	November	02M	"
		04W	"
7		09M	Constrained nonlinear optimization in many variables
		11W	"
8		16M	"
		18W	"
9		23M	"
		25W	"
10		30M	HOLIDAY
	December	02W	Constrained nonlinear optimization in many variables
11		07M	Dynamic Programming
		09W	"
12		14M	"
		16W	"
13		21M	Metaheuristics
		23W	"
14		28M	"
		30W	"