

Introduction to Engineering Optimization

Course No. ENGR 01 411/511, Fall 2014

5:00pm-6:15pm 6:30pm to 7:45pm Thursday ROW 304

Instructor: Dr. Tirupathi R. Chandrupatla, P.E., CMfgE
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Course Content: This course covers the formulation and modeling aspects of engineering optimization problems. These steps involve setting up of the objective function to be minimized and the resource and system constraints to be satisfied. Solution techniques using gradient based methods, zero order methods, and penalty techniques are discussed. Formulation and solution of linear programming, non-linear programming, integer and discrete programming problems in engineering are covered. Algorithms are implemented in computer programs for problem solution.

Homework assigned is due at the beginning of the class on the day announced by the instructor. Any reading assignments are to be completed by the next class meeting. Homework must be carried out on engineering paper and neatly stapled. Each student must prepare a portfolio file for the course. The course will also include other *assignments*, and a *project* that involves computer usage.

Exams: There will be two tests. There will be a final project. A report is to be prepared.

Grading Policy:

Home Work and Projects	30
Test 1	35
Test 2	35
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Total	100
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Regular attendance is required.

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T.R.Chandrupatla

Text: A. D. BELEGUNDU and T.R. CHANDRUPATLA, *Optimization Concepts and Applications in Engineering*, Second Edition, Cambridge University Press, New York, 2011.

Week	Topics	Remarks
1 Sept 8	Preliminary concepts, Mathematical fundamentals Excel VBA, MATLAB, Mathcad	Ch. 1
2 Sept 15	One dimensional unconstrained minimization	Ch. 2
3 Sept 22	Unconstrained optimization, Steepest descent method	Ch. 3
4 Sept 29	Unconstrained optimization, Newton based methods	Ch. 3
5 Oct 6	Linear Programming	Ch. 4
6 Oct 13	Constrained minimization	Ch. 5
7 Oct 20	TEST 1 Term Projects	
8 Oct 27	Constrained minimization Penalty function methods	Ch 5 Ch. 6
9 Nov 3	Direct search methods	Ch. 7
10 Nov 10	Direct search methods Multi-objective optimization	Ch. 7 Ch. 8
11 Nov 17	Integer and discrete programming	Ch. 9
12 Nov 24	Dynamic Programming Applications to transportation, assignment, networks	Ch. 10 Ch. 11
13 Dec 1	Finite element based optimization	Ch. 12
14 Dec 8	TEST 2	
15 Finals Week	Presentations	