Old Dominion University   Instructor= Dr. Duc T. Nguyen+ Dr. Gene Hou
Department of Civil Engineering   Office= 1319 ECSB
Office Hours: T,W; 12:01pm-2:00pm
Spring Semester 2010   Tel= 757-683-3761, Fax= -5354
Date/Time/Room = M: 7:10pm-9:50pm   Email= dnguyen@odu.edu
Room # 219 GORNTO (televised class)

CE715/815 (= ME715/815) : ENGINEERING OPTIMIZATION I

References

(A) Optimization Concepts and Applications In Engineering, 1/e, by Ashok D. Belegundu, and
T.R. Chandruppatla, Prentice Hall (1999),432 pages, ISBN # 0-13-031279-7

(TENTATIVE) Course Outline

Topics	References
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Chapter 1	Preliminary Concept
	Gradients, Hessian
	Homeworks: 1.1-1.2, 1.5-1.6
Chapter 2	1-D Unconstrained Minimization
	Optimality Criterion, Convex Function
	Max. of a Function, Zero of a Function
	Homeworks: 2.1, 2.6, 2.8, 2.14
Chapter 3	Unconstrained Minimization
	Necessary and Sufficient Conditions for Optimality
	Convexity
	Direction Vector and Line Search
	Steepest Descent Method
	Conjugate Gradient Method
	Newton's or Quasi-Newton's Method
	Trust Region Method, or Genetic Algorithms
	(if time is available)
	Homeworks: 3.2(i), 3.3, 3.5, 3.9, 3.13

Chapter 4   Linear Programming

                                    Simplex Method, Duality, Sensitivity Analysis
                                    Big-M Simplex Method

                                    Revised (Matrix) Simplex Method (if time is available)

                                    Homeworks: 4.1, 4.4, 4.12

                           MID-TERM EXAM

Chapter 5   Constrained Minimization

                                    Necessary and Sufficient Conditions for Optimality
                                    KKT Conditions, Lagrange Multipliers
                                    Gradient Projection Method
                                    Feasible Direction Method
                                    Sequential Quadratic Programming
                                    Generalized Reduction Gradient

                                    Homeworks: 5.1-5.4, 5.6

Chapter 6   Penalty Function Method and Duality-Based Methods

                                    Penalty Methods
                                    Duality
                                    Augmented Lagrangian Method

                                    Homeworks: 6.5

Project 1: Use GRG, ZOUTEN, SQP-PD, AUGLAG to solve
1)   Problem 5.14
2)   Problem 5.15

Chapter 7   Optimization with State Equations

Project 2: Design optimization with a set of state equations

Chapter 8-11   Other Topics

FINAL EXAM

Grading Policy:

        1. Late submission of homework/assignment/project will be subjected to 20% penalty,
per 24 hours late

2. The homework/assignment/project which is NOT submitted in the class, will NOT be accepted unless it has a note on the time it is submitted and it is signed by a secretary

Prof. Nguyen's Portions:

Homeworks	= 10%
TEST and/or MID-TERM EXAM	= 30%

Prof. Hou's Portions:

Homeworks	= 10%
Projects	= 20%
FINAL EXAM	= 30%

Due to the requirement of SACS (for accreditation purpose), students registered at the higher level courses (such as CEE-8xx, or MSIM-8xx, or MAE-8xx " = formerly known as ME-8xx, or AE-8xx", ECE-8xx etc….) will be required to do additional work (as comparing to those students registered under lower level courses (such as CEE-7xx, or MSIM-7xx, etc….).