COURSE NUMBER: IE 5531, 4 credits	**COURSE TITLE:** Engineering Optimization I
TERMS OFFERED: Fall	**PREREQUISITES:** IT or Grad Student
TEXTBOOKS/REQUIRED MATERIAL: Optimization in Operations Research by Rardin	**PREPARED BY:** Professor Bharath Rangarajan **DATE OF PREPARATION:** May 23, 2007
COURSE LEADER(S): Professor Bharath Rangarajan	**CLASS/LABORATORY SCHEDULE:** Two 120 minute lectures **CONTRIBUTION OF COURSE TO MEETING PROFESSIONAL OBJECTIVES:** 100% Engineering Topics
CATALOG DESCRIPTION: Basic concepts in optimization. Linear models, simplex method, sensitivity analysis, duality theory, transportation simples, network optimization, dynamic programming, and introduction to non-linear programming. Examples will be drawn from a variety of engineering applications including manufacturing, staff scheduling, and transportation. Students will learn to formulate models and solve them using OPL Studio, Excel Spreadsheets, and other software packages.	**COURSE TOPICS:** 1. Formulating linear programming models 2. Introduction to Simplex 3. Algebra and theory of Simplex 4. Duality 5. Sensitivity analysis 6. Transportation and assignment problems 7. Network optimization 8. Dynamic programming 9. Introduction to non-linear optimization

COURSE OBJECTIVES	1. Introduction to engineering optimization through a series of successful, hands-on creative problem solving experiences. 2. Learn to recognize problem types, and formulate them as mathematical models. 3. Understand when to apply various types of optimization techniques. 4. Understand the relationship of an engineering model, to actual complex situations. 5. Understand how answers provided by models should be used in advising decisions. 6. Become proficient with common software optimization packages for solving optimization problems.
COURSE OUTCOMES	**(Letters shown in brackets are linked to program outcomes a-k)** 1. Students learn the mathematics for formulating optimization of engineering problems [a]. 2. Students learn to use sensitivity analysis to analyze the impact of various parameters on an optimization problem, and to conduct experiments assessing the impact of changing the model parameters [b]. 3. Students learn how to use optimization techniques to assess the feasibility that a system can meet specifications [c]. 4. Students learn how integrate information from management and manufacturing [d]. 5. Students learn how to identify, formulate, and solve various classes of optimization problems [e]. 6. Students learn how to professionally and ethically apply techniques learned through real cases studies demonstrating impact of techniques on engineering systems [f]. 7. Through written assignments, and in-class discussions, student learn to communicate effectively in both written, visual (graphs) and oral forms [g]. 8. Students learn contemporary issues necessary to understand the impact of engineering solutions in the societal context through real world application examples [h, j]. 9. Students learn to use the techniques, skills, and modern engineering tools necessary for engineering practice, through modeling exercises and use of standard software tools [k].
ASSESSMENT TOOLS:	1. Graded homework problems. 2. Quizzes and exams.

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Nature of Changes

The course leader is now Bharath Rangarajan, and the syllabus was updated to reflect the change in faculty. No other changes were made.