CHE 561 Process Optimization

Spring Term – 072

Instructor:	**Dr. Naim M. Faqir**
Lectures:	**UT 5:00-6:15 PM**
Office:	**16-236**
Office Hours:	**4:00 to 4:50 PM, Sun., Tue.**
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Textbook: Optimization of Chemical Processes, by T. F. Edgar, D. M. Himmelblau, and Duncan A. ML. S. Lasdon, McGraw-Hill, 2001 2nd Edition.

Ref. Books: Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, by C. A. Floudas, Oxford, 1995.

Engineering Opimization: Methods and Applications, by A. Ravindran, K.M. Ragsdel, and G. V. Reklaitis, Wiley, 2006 2nd Edition.

Operations Research: An Introduction, by H. A. Taha, Prentice Hall, 1997 6th Edition.

Course Objectives

Objectives

1. Provide students with the basic mathematical concepts of optimization.
2. Provide students with the modeling skills necessary to describe and formulate optimization problems.
3. Provide students with the skills necessary to solve and interpret optimization problems in engineering.
4. Enhance students' skills related to optimization in chemical engineering, open-ended problem solving, critical thinking and life-long learning.

Outcomes

Upon successful completion of this course, you will be able to:

1. Apply knowledge of optimization to formulate and solve engineering problems.
2. Understand the different methods of optimization and be able to suggest a technique for a specific problem.
3. Understand how optimization can be used to solve industrial problems of relevance to the chemical and oil industries.

Grading System:		
	Major Examination	30%
	Term Paper	15%
	Homeworks	8%
	Quizes & Class Participation	7%
	Final Examination	40%
	Total:	100%

Course Outline	**Lectures**
Introduction to Optimization	
• Introduction to Concepts of Optimization	1
• Nature and Structure of Optimization Prolblems	2
• Formulation of Optimization Problems	3
• Basic Mathematical Concepts	3
Non-Linear Unconstrained Optimization	
• Basic Mathematical Concepts of Single Variable Functions	3
• One Dimensional Optimization	3
• Basic Mathematical Concepts of Multivariable Functions	3
• Multivariable Derivative-free and Derivative-Based methods	4
Linear Programming	
• Formulation of Linear Programming Problems	1
• Baisc Principles	2
• Simplex Method	4
• Sensitivity Analysis	2
Non-Linear Constrained Optimization	
• Basic Mathematical Concepts	3
• Equality, Inequality and Kuhn-Tucker Conditions	3
• Transformation Methods	2
• Successive Linear Programming	3
• The Generalized Reduced Gradient Method	3