OPTIMIZATION IN CHEMICAL ENGINEERING

PROF. DEBASIS SARKAR
Department of Chemical Engineering
IIT Kharagpur

TYPE OF COURSE : Rerun | Elective | UG
COURSE DURATION : 12 weeks (24 Jan' 22 - 15 Apr' 22)
EXAM DATE : 23 Apr 2022

INTENDED AUDIENCE : Chemical Engineering, Biochemical Engineering, Agriculture Engineering

INDUSTRIES APPLICABLE TO : This course may be of general interest to many chemical process industries such as: (1) Indian Oil Corporation Ltd. (2) Hindustan Petroleum Corporation Ltd. (3) Haldia Petrochemicals Ltd.

COURSE OUTLINE :
The objective of this course is to introduce optimization techniques to engineering students, with an emphasis on problems arising in Chemical Engineering applications. The course includes both linear and nonlinear programming problems.The first portion of the course introduces the basic concepts in optimization and how to obtain a mathematical representation of the optimization problem. The second portion of the course describes different solution techniques that can be used to actually solve such problems. Finally, a set of software tools for solution of optimization problems are also discussed.Upon successful completion of this course, the student will be able to understand the basic theoretical principles in optimization, formulate the optimization problem, and choose appropriate method/solver for solution of the optimization problem.

ABOUT INSTRUCTOR :
Prof. Debasis Sarkar is currently an Associate Professor at Chemical Engineering Department of Indian Institute of Technology Kharagpur. He received his BTech from Calcutta University, Master of Engineering from Indian Institute of Science, Bangalore, and PhD from Indian Institute of Science, Bangalore, all in Chemical Engineering. He was a Postdoctoral Fellow at University of Western Ontario, Canada. Prior to joining IIT Kharagpur, he worked with ICES Singapore and HBTI Kanpur. His current research interests are in applications of process systems engineering approaches for crystallization engineering and biosystems engineering. His teaching interests include, among others, optimization techniques, instrumentation and process control, advanced heat transfer.

COURSE PLAN :

Week 1**:** Introduction to Optimization

Week 2**:** Optimization Problem Formulation

Week 3**:** Basic Concepts of Optimization – I

Week 4**:** Basic Concepts of Optimization – II

Week 5**:** Unconstrained Single Variable Optimization: Methods and Applications

Week 6**:** Unconstrained Multivariable Optimization: Direct Search Methods

Week 7**:** Unconstrained Multivariable Optimization: Gradient Based Methods

Week 8**:** Introduction to Linear Programming

Week 9**:** Linear Programming: The Simplex Method

Week 10**:** Constrained Nonlinear Programming

Week 11**:** Applications of Optimization

Week 12**:** Software Tools for Optimization