Department of Mathematics
Faculty of Mathematics & Computer Science
M.Sc. (Applied Mathematics), 2nd Semester

Course Code	AM 201
Course Name	Optimization
Course Credits	04

Course objectives:

The course is an introduction to linear optimization and nonlinear optimization. The objectives of the course are to present the basic theory of optimization, concentrating on results that are useful for practical applications.

Minimum pre-requisites:

working knowledge of algebra and linear algebra.

Course structure:

Introduction to Optimization: Introduction, Historical Development, Statement of an Optimization Problem, Classification of Optimization Problems.

Linear Programming Problem: Formulation of LPP, Geometry of LPP and Graphical Solution of LPP, Simplex Method,Big - M Method, Two-Phase Method, Special Cases in Simple Applications**,** Revised Simplex Method, Duality in Linear Programming, Post Optimality Analysis, Transportation Problem, Assignment Problem

Integer Programming: Integer Linear Programming, Gomory's Cutting Plane Method.

Nonlinear Optimization:

Single Variable Optimization: Optimality Criteria, Bracketing Methods, Region Elimination Methods, Point Estimation Methods, Gradient Based Methods.

Multivariable Optimization: Optimiality Criteria, Unidirectional Search, Direct Search Methods, Gradient Based Methods.
Constrained Optimization: Kuhn-Tucker Conditions, Lagrangian Duality Theory, Pernalty Function Method, Multipliers Method.

Reading suggestions:

- Rao, S. S., & Rao, S. S. (2009). Engineering optimization: theory and practice. John Wiley & Sons.
- Taha, H. A. (2004). Operations Research: An Introduction, Pearson Education India.
- Deb, K. (2012). Optimization for engineering design: Algorithms and examples. PHI Learning Pvt. Ltd..
- Bazaraa, M. S., Sherali, H. D., & Shetty, C. M. (2013). Nonlinear programming: theory and algorithms. John Wiley & Sons.
- Hillier, F. S. (2012). Introduction to operations research. Tata McGraw-Hill Education.

Evaluation and weightage:

- Assignment /quiz / Class performance: 30%
- Midterm Evaluation: 30%
- Final Examination: 40%