Course Code	**EM 502**
Course Title	**Optimization**
No. of Credits	**3**
Pre-requisites	**None**
Compulsory/Optional	**Optional**

Aim(s): To introduce nonlinear programming methods and their application to solveengineering and real life problems.

Intended Learning Outcomes:
On successful completion of the course, the students should be able to;

- Apply and analyzeoptimization methods for functions of single variable.
- Apply and analyzeoptimization methods for functions of many variables with or without constraints.
- Formulate engineering problems as optimization problems and solve them adopting appropriate optimization algorithms.

Time Allocation (Hours): Lectures 30 Tutorials 05 Practical 14 Assignments6

Course content/Course description:

- **Overview of Optimization.**
- **Theory of Optimization:**Single variable, multivariable unconstrained and constrained, Lagrange multipliers, KKT conditions.
- **Numerical Optimization;**
  Single variable Optimization**:**Elimination methods, bracketing methods, interpolation methods,root finding methods.
  Multivariable Optimization (Unconstrained):Directsearch methods, indirect search (descent) methods.
  Constrained Optimization: Direct search methods, indirect methods,penaltymethods, transformationmethods, linearized methods.
- **Non-conventional Optimization Algorithms:**Introduction to genetic algorithms, simulated annealing,swarm algorithm, and ant algorithm.
- **Applications of Optimization:** Mathematical modelling and design of, engineering and real life systems, nonlinear curve fitting.

Recommended Texts:

- Singiresu S. Rao, Engineering Optimization, 4thedition,(2009), John Wiley & Sons Inc., NJ.
- KalyanamoyDebb,Optimization for Engineering Design,(2005), Prentice Hall of India.

Assessment	**Percentage Mark**
In-course	
Tutorials	10
Assignments/Labs	20
Mid Semester Examination	20
End-semester	50