Mechanical Engineering Dept. Department

Syllabus
ME 486: Optimization/Mechanical System (3-0-3)

Course Catalog Description:

ME 486 Optimization of Mechanical Systems (3-0-3): Formulation and simulation of mechanical engineering systems involving dynamics, kinematics, and machine design and thermo-fluid systems; The concept of optimization; Analytical and numerical methods such as unconstrained and constrained optimization, Lagrange multipliers, linear programming for optimum design of mechanical systems. Lab demonstration sessions involve formulation and solution of optimization problems using computers and existing software packages during the design process.

Course Pre-requisites:

- ME 301: Machine Design I
- ME 315: Heat Transfer

Course Objectives:

1. Student will lean the formulation and simulation of mechanical engineering systems involving dynamics, kinematics, and machine design and thermo-fluid systems.
2. Student will learn the basic and practical concept of optimization.
3. Student will learn the analytical and numerical methods such as unconstrained and constrained optimization, Lagrange multipliers, linear programming for optimum design of mechanical systems.
4. Student will apply such optimization knowledge to real life applications to solve specific engineering problems.

Course Learning Outcomes:

CLO1. Student will lean the formulation and simulation of mechanical engineering systems involving dynamics, kinematics, and machine design and thermo-fluid systems.

CLO2. Student will learn the basic and practical concept of optimization.

CLO3. Student will learn the analytical and numerical methods such as unconstrained and constrained optimization, Lagrange multipliers, linear programming for optimum design of mechanical systems.

CLO4. Student will apply such optimization knowledge to real life applications to solve specific engineering problems.

Learning Resources:

- Course content can be created, organized by the instructor, and shared with students. Multiple references can be used for such a course.

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Report	10	15.0%
Project	15	25.0%
Poster Presentation (Major II)	15	10.0%
Laboratory Demo	15	20.0%
Defense Presentation (Major I)	2	15.0%
Oral/Written Examination	9	15.0%

Lecture Weekly Schedule:

Week#	Topics
1	Formulation of mechanical engineering systems.
2	Simulation of mechanical engineering systems.
3	Formulation and simulation involving dynamics.
4	Formulation and simulation involving kinematics.
	Formulation and simulation involving machine design.
5	Formulation and simulation involving machine design. (Continue)
	Formulation and simulation involving thermo-fluid systems.
6	The concept of optimization.
7	The concept of optimization. (Continue)
8	Analytical and numerical methods.
9	Analytical and numerical methods. (Continue)
10	Constrained optimization.
11	Constrained optimization. (Continue)
12	Unconstrainted optimization.
13	Lagrange multipliers.
14	linear programming for optimum design of mechanical systems.
15	Lab demonstration sessions involve formulation and solution of optimization problems.