

ME611 Design and Optimization of Thermal Systems

Credit: 3-0-0-3

Prerequisites: Thermodynamics, Fluid Mechanics, Heat Transfer

Students intended for: MS/PhD

Elective or Core: Elective

Semester: Odd/Even

Course objective: Most of the systems we encounter in our life have energy transfer in various forms. One needs to design these equipments/devices to consume minimum output. There are other factors such as cost and reliability that also need to be considered. Optimization helps to design the equipments by taking all these parameters into account. The objective of this course is to perform analysis of all the parameters and their effect on the performance of equipments and select the optimum conditions.

Course content:

- Introduction to system design – Regression analysis and curve fitting – modeling of thermal equipment – system simulation (successive substitution – Newton – Raphson method) – examples – economic analysis – optimization – Lagrange multipliers, search methods, linear programming, geometric programming – New generation optimization techniques – simulated annealing, Genetic Algorithms, Bayesian statistics.
- Examples applied to heat transfer problems and energy systems such as gas and steam power plants, refrigeration systems, heat pumps and so on.

References:

Design and optimization of thermal systems, Y.Jaluria, McGraw Hill, 1998.

Thermal Design and Optimization, Adrian Bejan, George Tsatsaronis, Michael Moran, John Wiley and Sons, 1995.

Elements of thermal fluid system design, L.C. Burmeister, Prentice Hall, 1998.

Design of thermal systems, W.F.Stoecker, McGraw Hill, 1989.