Engineering Systems Optimization and Economics
Fall Semester 2013

EGR 305.01(115.01) / ECON 112.01 Tuesdays and Thursdays 8:30 to 9:45
EGR 305.02 (115.02) / ECON 112.02 Tuesdays and Thursdays 10:05 to 11:20

Catalog Course Description:

Introduction to mathematical optimization, engineering economic analysis, and other decision analysis tools used to design and evaluate engineering systems. Application of linear and nonlinear programming, dynamic programming, expert systems, simulation and heuristic methods to engineering systems design problems. Examples addressed in class include: production plant scheduling, water resources planning, vehicle routing, resource allocation, repair and rehabilitation scheduling, and comparison of engineering design alternatives.

Course objectives:

- Comprehend basic concepts in economics to develop and explain a framework(s) for the evaluation of alternative solutions to a range of design problems faced by engineers, including the estimation of market demand and supply for selected markets and determine different criteria for valuing alternative solutions to engineering problems;
- Comprehend techniques in engineering economics to develop and explain models for evaluating mutually exclusive solutions to a range of design problems faced by engineers, including the Calculation of present worth, equivalent annual worth, and internal rate(s) of return for selected alternative solutions to mutually exclusive engineering investment options;
- Comprehend concepts and techniques in engineering systems optimization to develop and explain models for evaluating solutions to systems problems faced by engineers, including analyzing engineering systems in terms of such optimization techniques as linear programming, dynamic programming, and selected nonlinear models; and,
- Synthesize the first three objectives to propose, formulate and suggest solution(s) for a model(s) of one selected engineering systems problem, including the incorporation of economics, engineering economics and systems optimization into the formulation of a model with suggested objective function, controllable and uncontrollable variables, constraints, and optimal solution to one selected engineering systems problem.

Topics covered in class:

- System analysis
- Model building
- Example engineering models
- Economic theories and engineering economics
- Formulation of linear models
- Linear programming
- The simplex algorithm
- Sensitivity analysis
- Nonlinear models
- Dynamic programming
- Decision theory and risk assessment

Textbook:

Civil and Environmental Systems Engineering, second Edition, C. S. Revelle, E. E. Whitlack, and J. R. Wright. Prentice Hall

Course Requirements:

3 examinations, 20@	60
1 individual project	25
2 computer assignments, 5@	10
Class participation	5
TOTAL	100

Contact:

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