

Department: Mathematics and Computer Sciences

Division: Applied Mathematics

Level and Major: Graduate

Course Title: Mathematical Modeling

Number of Credits: 3

Prerequisite:

Lecturer:

Course Description:

Course Goals and Objectives:

Course Topics:

- Value of mathematical models, Steps of modeling, different types of variables, constraints and objective functions
- Classification of mathematical models, Multi-objective models, Models with interval coefficients, Bilevel models
- Propositions and binary variables, Introduction to GAMS,
- Constraints and indicators, Either-or constraints, Not-equal constraint, If-then constraints
- Variables multiplication, McCormick relaxation
- Multi-parametric disaggregation technique, Piecewise linear functions
- Separable programming, An application to portfolio optimization problem
- Maximin and Minimax functions, Absolute value function, Fractional programming, Constraint aggregation
- Qualitative comparison of models, Considering a real-world application
- Ideal formulation, totally unimodular models, considering a real-world application
- Reformulation and linearization technique
- Improving formulations, Constraint logic programming, Considering a real-world application
- Debugging
- Real-world applications (Social network problem, Water resource management problem)
- Real-world applications (Cutting stock problem, Petroleum pipeline scheduling problem)

Reading Resources:

Evaluation: