I SY E 635, Tools and Environments for Optimization

1. **Credits**: 3   **Contact Hours**: 2.5
2. **Textbook and Materials**: No required texts

- **Other Supplemental Materials**: N/A

**Specific Course Information**:

- **Brief description of the content of the course (Course Catalog Description)**:
  Formulation and modeling of applications from computer sciences, operations research, business, science and engineering involving optimization and equilibrium models. Survey and appropriate usage of software tools for solving such problems, including modeling language use, automatic differentiation, subroutine libraries and web-based optimization tools and environments.

- **Pre-requisites or Co-requisites**: Comp Sci302, Math 340 or equiv

- **This is a Selected Elective course.**

**Specific Goals for the Course**:

- **Course Outcomes**:

  1. The ability to write down an algebraic formulation of an optimization model that captures the main decision elements of practical problems.
  2. The ability to categorize optimization models, and understand the implications of modeling on algorithm performance.
  3. To understand the tradeoff between model accuracy and tractability and to consider the feasibility of alternative design solutions.
  4. The ability to explain, at a non-technical level, how optimization may be applied to
decision problems.
5. To become familiar with the operation of state-of-the-art optimization software, including parameters that may significantly affect software performance.
6. Advanced knowledge of the GAMS Modeling System for building and solving practical optimization problems.

- ABET Student Learning Outcomes:
  
  (a) Ability to apply mathematics, science and engineering principles.
  (b) Ability to design and conduct experiments, analyze and interpret data.
  (c) Ability to design a system, component, or process to meet desired needs.
  (d) Ability to function on multidisciplinary teams.
  (e) Ability to identify, formulate and solve engineering problems.
  (g) Ability to communicate effectively.
  (i) Recognition of the need for and an ability to engage in life-long learning.
  (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- Brief List of Topics to be Covered:
  
  Linear models, network models, discrete models, uncertain models, nonlinear models

- Additional Information: N/A