ABET Course Syllabi for IND E 410: Linear and Network Programming

1. Course number and name: IND E 410: Linear and Network Programming

2. Credits and contact hours: 4 credit hours, 5 hours per week (3 hrs lecture, 2 hrs lab)

3. Instructor’s names: Zelda B. Zabinsky, Archis Ghate

4. Text book, title, author, and year

5. Specific course information
   5a. Brief description of the content of the course (catalog description):
       Modeling and optimization of linear network problems. Topics include:
       optimization of linear systems, mathematical model design, simplex method,
       primal-dual algorithms, parametric programming, goal programming, network
       problems and algorithms, and PERT/CPM.
   5b. Prerequisites or co-requisites:
       either MATH 136 or MATH 308; CSE 142
   5c. Required, elective, or selected elective (as per Table 5-1) course in the program:
       Required

6. Specific goals for the course
   The goals of the course are to introduce students to Operations Research, and the
   concept of mathematical modeling for optimization, with specific focus on linear and
   network programming.

6a. Specific outcomes of instruction
   • Students will be able to formulate a simple LP (set up decision variables,
     constraints and objective functions).
   • Students will be able to interpret results (feasible/infeasible, unique/multiple
     optima, shadow prices).
   • Students will recognize some basic theory underpinning linear programming and
     the simplex method.
   • Students will be able to solve a simple LP from the very beginning of
     formulation through the interpretation of results.
   • Students will be comfortable with extensions to topics in networks, such as the
     transportation problem, and PERT/CPM
   • Students will be exposed to goal programming and other topics, as time allows.

6b. explicitly indicate which of the student outcomes listed in Criterion 3 or any
    other outcomes are addressed by the course.
    (a) an ability to apply knowledge of mathematics, science and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs
(e) an ability to identify, formulate, and solve engineering problems
(i) a recognition of the need for, and ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
(l) an understanding of the integrated nature of the discipline

7. Brief list of topics to be covered:

- Introduction and Examples
- Assumptions & Examples
- Simplex Method
- Excel Solver & Sensitivity Lab
- Other Forms, Postoptimality
- Shadow Prices
- Foundations of the Simplex Method
- Revised Simplex Method
- Fundamental Insight
- Duality Theory
- Duality/Sensitivity Analysis
- Sensitivity Analysis and Parametric
- Goal Programming
- Transportation Problems
- Assignment Problems
- Network Problems
- PERT/CPM