IE 463 – FACILITIES PLANNING AND MATERIAL HANDLING

Designation as a 'Required' or 'Elective' course
TYPE OF COURSE: Required for BSIE Major

Course (catalog) description
COURSE DESCRIPTION: Facilities design functions, computer-aided plant layout, facility location, warehouse layout, Minimax location, deterministic and probabilistic conveyor models.

Prerequisite(s)
PREREQUISITE(S): IE 471 (Operations Research I), 3 hours

Textbook(s) and/or other required material
SAMPLE SOURCES AND RESOURCE MATERIALS:

Course objectives
COURSE OBJECTIVES: This course introduces students to various aspects of facilities planning process. The objective is to provide the students with basic tools and methodologies used in this process, and to expose the students to the application of such tools. Both quantitative and qualitative tools (methods) are discussed.

Topics covered
MAJOR TOPICS: Hrs
1. Introduction 3 hours
2. Computer-aided plant layout 8 hours
3. Facilities location problems 8 hours
4. Warehouse layout problems 8 hours
5. Minimax layout and location problem 8 hours
6. Deterministic and probabilistic conveyor models 10 hours
Total 45 hours

IE 463 Instruction Notes on Relevant ABET Outcomes:
Outcome A: Ability to apply knowledge of mathematics, science and engineering
   Measurables: 1. Students are able to use mathematical calculations in solving engineering problems.
   2. Students are able to formulate engineering problems based on scientific and engineering principles.
Instruction Notes: Students use operation research techniques to formulate and solve facilities planning problems. For example, they apply Integer Programming to design an optimal layout of a facility.

Outcome C: Ability to design a system, component, or process to meet desired needs
   Measurables: 1. Ability to define and follow an iterative design procedure,
   2. Ability to think creatively
Instruction Notes: Students are supposed to decide and design the right layout and material handling equipment for their projects.

Outcome E: Identify, formulate, and solve engineering problems
   Measurables: 1. Ability to understand what is needed,
   2. Ability to formulate problems mathematically,
   3. Ability to build on fundamental knowledge and apply it to new situations
Instruction Notes: Operations research techniques are taught in the lecture portion of this course. The students select the right technique and interpret the mathematical solution of their model to provide answers for their engineering problem. For example, graph theory is used to investigate the adjacency of production departments of a facility.
Outcome G: Communicate effectively
   Measurables:    1. Effective oral presentation in senior design,
                   2. Effective written laboratory reports,
                   3. Effective written course project reports,
                   4. Effective interview,
                   5. Ability with engineering drawing

Instruction Notes: Students have to present their project results by two oral and two written presentations.

Outcome J: Knowledge of contemporary issues
   Measurables: 1. Knowledge of major technological issues facing society and the world,
                  2. Appreciation for the society’s concerns with security in technology

Instruction Notes: In the feasibility study phase of the term projects, the students are encouraged to select a facility, which is economically, technologically and operationally feasible.

Outcome K: Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
   Measurables: 1. Demonstrate knowledge of computer usage in engineering analysis,
                 2. Demonstrate knowledge of computer usage and technical approaches in engineering experimentation

Instruction Notes: Simulation software, LP packages and other mathematical programming software tools are used to find the optimal design of material handling systems, plant layout and location.

Person(s) who prepared this description and date of preparation
Houshang Darabi, Assistant Professor of Industrial Engineering, March 03, 2003.
Updated by Houshang Darabi, Associate Professor of Industrial Engineering, January 7, 2008.

These outcomes are what students are expected to gain from this course.