

MIE 373: Facility Planning and Simulation Modelling

Purpose and Organization:

The Facility Planning and Simulation Modelling Laboratory serves to introduce students to the dynamic tools of simulation and facility layout and location. Through the MIE 373 course, the students learn the basics of discrete-event simulation modelling as well as the principles of facility layout and location. The laboratory will be used by both undergraduates and graduate students working on facility layout and simulation modelling projects and course work and related dynamic traffic flow modelling activities.

MIE 373 Catalog Data:

To provide an integrated lecture and laboratory course for teaching the important concepts of facility layout and location and the dynamic evaluation concepts of discrete event digital simulation.

Laboratory Objectives:

To examine the fundamental relationships between the organization of the workplace, the flow of people, materials, parts and information, and the optimal performance of these system components. Manufacturing and service organizations require that undergraduates of the Industrial Engineering curriculum be grounded in the fundamental concepts, tools, and techniques for planning, design, and analysis of the physical configuration of systems along with the ability to evaluate the dynamic interchange which interrelates the system components.

In addition to the general nature of the problem of facilities planning and design and simulation modelling and analysis, the following special topics are covered:

- *Systems Simulation Modelling*
- *Material Handling Systems Design and Analysis*
- *Systematic Layout Planning Methodology*
- *Quadratic Assignment Models (Algorithms/Heuristics)*
- *Work Cell design and Cellular Manufacturing*
- *Warehouse Layout and Design*
- *Assembly Line design and analysis*
- *Location Modelling (Rectilinear and Euclidean)*

Software Products:

Various software packages that run on PCs and Workstations are utilized in the laboratory. ARENA and AUTOMOD are the principal simulation tools which run on the PCs and workstations respectively. In addition, layout and location algorithms that run on both the PCs and the workstations are utilized throughout. Some of these software tools have been developed here at the University whereas others are available commercially and academically.

Laboratory Assignments:

A number of laboratory assignments designed to illustrate the concepts tools and techniques are included. There is a 2-hour laboratory along with lectures twice a week.

Prerequisites: Undergraduate standing along with an introductory course in *Probability and Statistics* such as MIE 273, Stat 515 or equivalent.

Evaluation: Students will be evaluated in their performance via the following breakdown:

- Homeworks 25%
- Laboratory Reports 25%
- Midterm 25%
- Final Laboratory Project and Presentation 25%

Textbooks: 1. **Facilities Planning and Design** by Garcia-Diaz and Smith, Prentice-Hall, 2008.

2. **Simulation with ARENA** by Kelton, Sadowski and Sturrock, McGraw Hill, 2006.