Course: IE360 – Facilities Planning and Design

Instructor: Avinash Gupta
avinashg@illinois.edu

TA(s): Samiran Kawtikwar, Raunak Sengupta
Samiran2@illinois.edu, raunaks2@illinois.edu

Credit and contact hours: 3 credit hours, 2 lecture hours and 2 lab hours /week

Time: Lecture 10:00 - 10:50am MW, Location: 217 Noyes Laboratory
Lab 4:00 – 5:50pm Wed 406 B1 Engineering Hall
Lab 4:00 – 5:50pm Thurs 406 B1 Engineering Hall
Lab 1:00 – 2:50pm Fri 406 B1 Engineering Hall

Instructor Office Hour: Mondays, 1 – 2 PM, Room 1206, Health Care Engineering Systems Center, 1206 W Clark St and Online

TA Office Hours: Friday, 2-2:50 PM, 406B1 E-hall and online
Wed, Thursday, 5-5:50 PM, 406B1 E-hall and online

Textbook(s) and/or other required material:

Course description:
Facility planning, plant layout design, and materials handling analysis; determination of facilities requirements, site selection, materials flow, use of analytical and computerized techniques including simulation, and applications to areas such as manufacturing, warehousing, and office planning.

Prerequisite(s): IE 310
Course outcomes (program outcomes in brackets):
After successfully completing the course, students will be able to:
1. Design layouts within facilities, i.e., organize processes, departments and products within a facility using mathematical models, algorithms and heuristics
2. Use models, algorithms and heuristics to find locations for new facilities in a supply chain
3. Model inventory, storage and warehousing
4. Use optimization packages like Gurobi with Python to model and solve formulations
5. Build simulation frameworks for realistic modeling and prediction

List of topics:
1. **Introduction:**
   a. Scope of facilities planning function
   b. Relationship with product, process and schedule design
2. **Layout design problems:**
   a. Introduction to designing layout
   b. Group layout
   c. Assembly line balancing
   d. Process-based and block layout
   e. General layout problems
3. **Location design problems:**
   a. Median location problems (Euclidean and rectilinear norms)
   b. Center location problems (Euclidean and rectilinear norms)
4. **Storage and warehousing:**
   a. Zoned vs. random storage
   b. Storage and retrieval systems
5. **Simulation Modeling for Uncertainty:**

Grading

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework and Labs (assigned regularly)</td>
<td>40%</td>
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<tr>
<td>Mid Term</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Quiz</td>
<td>6%</td>
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<tr>
<td>Classroom Participation Quiz (attend any 4 out of 6 or 7)</td>
<td>4%</td>
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Tentative Dates

<table>
<thead>
<tr>
<th>Component</th>
<th>Date</th>
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<tbody>
<tr>
<td>Quiz 1</td>
<td>Oct 4</td>
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<tr>
<td>Quiz 2</td>
<td>Nov 22</td>
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<tr>
<td>Mid Term</td>
<td>Oct 18</td>
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<tr>
<td>Final</td>
<td>Dec 14, 8:30 am</td>
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**Honor Code**

It is assumed that the students follow UIUC Student code at all times i.e during homework, labs and exams. And you need to specify on homework the number of collaborators you worked with during the homework solving.

**Lab Policy**

- Labs every week (~2 hours).
- Total 13 lab sessions (tentative)
- Lab recording will be provided on producing legitimate excuse for not being able to attend in-person/online.

**Homework Policy**

- Homework due every Monday of the next week. (First due date 9/11)
- Late homework policy **(2 late submissions allowed)**
  - Due the following Monday after the original deadline
- Recommend starting homework (at least reading the problems) before the lab
- Submission format: (On canvas)
  - pdf with code snippets and all answers.
  - Attach all program files separately in zip.
  - No code-snippets = no-grade.
- Solutions released after the late submission deadline