Course: IE360 – Facilities Planning and Design

Instructor: Avinash Gupta
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TA(s):   Samiran Kawtikwar, Raunak Sengupta
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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:
Recommended reference text: Facility Layout and Location – An Analytical Approach.
Francis, McGinnis & White. 2nd edition, Prentice Hall. ISBN: 978-0132992312
Facilities Design. Heragu, Sunderesh S. 3rd edition, CRC Press

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: **2 hrs**
      a. Scope of facilities planning function
      b. Relationship with product, process and schedule design
2. Layout design problems: **22 hrs**
      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: **14 hrs**
      a. Median location problems (Euclidean and rectilinear norms)
      b. Center location problems (Euclidean and rectilinear norms)
4. Storage and warehousing: **4 hrs**
      a. Zoned vs. random storage
      b. Storage and retrieval systems
5. Simulation Modeling for Uncertainty: **2 hrs**
                                        44 hrs (total)

Grading

Homework and Labs (assigned regularly)	40%
Mid Term	25%
Final Exam	25%
Quiz	6%
Classroom Participation Quiz (attend any 4 out of 6 or 7)	4%

Tentative Dates

Quiz 1	Oct 4
Quiz 2	Nov 22
Mid Term	Oct 18
Final	Dec 14, 8:30 am

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