IE 6441: Advanced Facilities Design and Logistics (2 Credits)

Description: This course explores the quantitative approaches for making facility location, facility layout, vehicle routings, and possibly inventory management decisions. Greater emphasis is placed on the development of a mathematically rigorous understanding of how, why, and the extent to which existing algorithms for these problems are applicable. Application of the various advanced algorithms to real world applications will be emphasized and illustrated with case studies.

Course Objectives: After completing the course, students should be able to:
- Apply analytical and computer simulation techniques for solving facilities design and planning problems
- Develop facility configurations using optimization techniques
- Understand and apply a range of optimization and other methods to deal with facilities location issues
- Write clearly and using graphics effectively to justify solutions to production facility design and location problems

Instructor: Dr. Leslie Monplaisir
Classroom: To be announced
Class Hours: To be announced
Office Hours: To be announced
Contact Info: e-mail: Leslie.Monplaisir@wayne.edu; Tel: 313-577-1645; Fax: 313-577-8833
Office Location: Room 2162, 4815 Fourth Street, MEB, Detroit, MI 48202
Course Website: http://blackboard.wayne.edu

Prerequisites: IE 6440: Introduction to Facility Design and Materials Flow and IE 6560 Deterministic Optimization


References: Other Supplementary Books of Interest:

Grading: Grading will be “tentatively” based upon a maximum attainable point total of 350 points.
Midterm Exam @ 100 x 1 100 pts
Final Exam @ 100 x 1 100 pts
Homework* @ 15 x 8 120 pts
Quiz (unannounced, (5 given, 4 accepted)) @ 20 x 4 80 pts
Case Studies @ 25 x 2 50 pts
Total 350 pts

Individual exams, home works, and term paper might be curved at the discretion of the instructor. The actual number of home works assigned might vary depending on class composition and prerequisite knowledge. Make-up examinations will not be offered unless excused by instructor due to the most extenuating circumstances such as personal illness, and documentation may be required.

Guidelines for assigning grades: A = 95%+, A− = 90%+, B+ = 87%+, B = 83%+, B− = 80%+, C+ = 77%+, C = 73%+, C− = 70%+, D+ = 65%+, D = 60%+, D− = 55%+, E = less than 55%

Homework Policy: Homework assignments will be posted on course website and announced in class. Homework will be due at the beginning of the class period. Homework submitted late by one class will be evaluated at 50% credit and late by

* Depending on the size of the class and length of the homework, individual homework grades could be based on randomly sampled problems.
2 (or more) classes will not receive any credit. Homework should be submitted on clean sheets and will be evaluated based on completeness. Depending on the size of the class and length of the homework, individual homework grades could be based on randomly sampled problems. When feasible, solutions for homework problems will be posted on the course website.

**Review Paper:** Each team of 4 students (to be formed by the instructor) is required to identify a topic for the "review" paper and submit a one page abstract for approval by e-mail to the instructor by ________. It is advised that the students review the following journals for selecting a topic:

- *Journal of Operations Management*
- *International Journal of Operations and Production Management*
- *International Journal of Production Research*
- *Production and Inventory Management Journal*
- *European Journal of Operations Research*
- *INFORMS*

It is expected that the group will review "recently" published literature on the topic of interest (using technical literature search databases such as Axiom and ScienceDirect available through the Science and Engineering Library homepage at http://www.lib.wayne.edu/sel/) and report their findings in the form of methods employed, trends, recent applications, success stories, failure stories, and challenges ahead. Absolutely no plagiarism will be tolerated.

The paper will be evaluated based on technical content (40%), quality of documented references (20%), and quality of technical writing (40%). The term paper has to be typed and submitted for evaluation by April 19th. Detailed guidelines for authoring & formatting the paper are available on the course website. Individuals that fail to make good contribution will receive no credit. Participation will be evaluated by peer group members. Groups that utilize the services of The Writing Center at 2310 Admany Undergraduate Library (Tel: 7-2544 for appointment) will receive 10 bonus points. The Writing Center normally does not give appointments during the last two weeks of the semester.

**Case Studies:** The case studies are prepared to be open-ended problems and should be treated as such. The report has to be typed and submitted for evaluation by the dead-lines announced in class. You are expected to work together in teams (will be formed by the instructor). Each team member is expected to contribute equally toward the total effort. Only the names of the contributors should be placed on the report. Individuals who fail to make an appropriate contribution will receive no credit.

**General Policy:**

**Student Conduct:** It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Thus, a student should not falsely claim the work of another as his/her own, or misrepresent him/herself so that the measures of his/her academic performance do not reflect his/her own work or personal knowledge. In this regard, cheating will not be tolerated. Cheating includes (but is not limited to) any communication (written or oral) during examinations and sharing of work, such as using the same models or computer programs or copying work. All homework and projects must be an individual effort unless specifically noted. **STUDENTS WHO CHEAT ON ANY ASSIGNMENT OR DURING ANY EXAMINATION WILL BE ASSIGNED A FAILING GRADE FOR THE COURSE.** Therefore, avoid all appearance of improper behavior! Students who witness cheating should report the incident to the instructor as soon as possible. Students are also welcome to discuss any concerns related to cheating with the Chair of Industrial & Manufacturing Engineering.

**Educational Accessibility Services:** If you feel that you may need an accommodation based on the impact of a disability, please feel free to contact me privately to discuss your specific needs. Additionally, the Office of Educational Accessibility Services (EAS) coordinates reasonable accommodations for students with documented disabilities. The office is located in the Student Center Building, Room 583, Phone: 313-577-1851 (Voice)/577-3365(TTY).

**Policy on Classroom Attendance:** All students are expected to attend all lectures, quizzes, and examinations with enthusiasm. Although classroom attendance does not mathematically contribute to the final course grade, active class participation is expected of all students and may help to boost up the course grade in those “borderline” cases between failing and passing.
Course Outline/Schedule:

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<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction To Location Theory and Models</td>
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<tr>
<td>2</td>
<td>Review of Linear Programming Problem</td>
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<td>3,4</td>
<td>Location Models – Planer Location Models</td>
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<td>5,6</td>
<td>Location Models – Network and Discrete Models</td>
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<td>7,8</td>
<td>Routing Models</td>
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<td></td>
<td>Mid-Term Exam</td>
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<tr>
<td>9,10</td>
<td>Facility Layout Problems: Genetic, Simulated Annealing, and QAP Algorithms</td>
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<td>11</td>
<td>Deterministic Inventory Models</td>
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<td>12</td>
<td>Storage Facility Layout Design</td>
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<td>13</td>
<td>Term Project Presentations</td>
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<tr>
<td>14</td>
<td>Final Exam is scheduled on _____ from _____ to _____</td>
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