

North Dakota State University, College of Engineering and Architecture
Department of Industrial and Manufacturing Engineering

Syllabus for
INDUSTRIAL AND MANUFACTURING FACILITY DESIGN

Please Note: All the text materials that are italicized and shown in blue are hyperlinked to their relevant web sites.

COURSE DESCRIPTION

Capstone integration of analysis and design tools to convert product design into production plans and plants. *Prerequisite:* Senior standing and advisor approval.

COURSE OBJECTIVES

The major objective of this course is to help the students to gain practical knowledge that can be used for developing efficient facility layout. Understanding of material handling requirements and equipment and their integration into an efficient layout is also the focal point of the students learning.

Note: The Industrial and Manufacturing Engineering students enrolled in this course are required to concurrently enroll in IME456, Program and Project Management. Collectively, both courses offer the students with the opportunity to learn project management skills while participating in Industrial Engineering and Management related projects working with industry clients.

STUDENT LEARNING OUTCOMES

At the successful completion of this course, the students should be able to:

1. Understand the principles and philosophies of value added manufacturing and how they apply to plant layout and material handling.
 2. Apply various tools for process, flow, and layout analysis and their use in layout development.
 3. Understand the importance of material handling function in manufacturing and warehousing environments and its relationship to physical facilities, plant layout, and safety.
 4. Understand requirements for production systems which possess appropriate degrees of flexibility to cope with changes in design, new products introduction, volume variations, and changing technology.
 5. Understand the various types of layout used in service and manufacturing operations and their suitability for meeting unique customers and production requirements.
 6. Be able to design layouts incorporating product, process, and schedule design.
 7. Be able to perform productivity assessment showing the economic gains from proposed layout designs.
 8. Analyze factors effecting locations of facilities.
 9. Enhance their ability to deal with others, emphasizing functional and project teams, motivation, leadership, integrity, ethics, diversity, and personal growth.
 10. Enhance their communications skills essential to working with others, reporting, and documenting tasks, actions, and other issues relevant to focal point of the projects.
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COURSE MATERIALS AND TEXTBOOK

- All of the lecture presentations are available through the course BlackBoard.
- College-Industry Council on Material Handling Education ([CICMHE](#)) web site will be used extensively. This web site provides extensive materials related to the material handling and warehousing.
- Select chapters from IME480 textbook provide information in support of some of the topics discussed in the classroom.

SUPPLEMENTARY READINGS

Course participants are required to perform independent research on the topics relevant to the course and the projects conducted on behalf of clients.

INSTRUCTOR

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INDUSTRIAL AND MANUFACTURING FACILITY DESIGN

Explanation of Work Expected and Classroom Policies

For a manufacturing firm, facilities planning involve the determination of how the manufacturing facility best supports production. Studying facilities planning includes facilities location, and facilities design. Facilities design, in turn, includes structural design, layout design, and handling system design. The major focus of this course is on layout and handling design. Issues related to facilities location will be addressed. Topics related to non-manufacturing facilities also will be discussed.

In this course, you will have the opportunity to learn about many tools and technologies that can help to improve the productivity of the service and manufacturing facilities. To get the most out of this class, please complete all reading assignments prior to coming to class. Your active and constructive participation is expected and appreciated. I ask for your best efforts.

Topical Course Outline

Textbook and Lecture Topics	Project Related Practices and Topics
<ul style="list-style-type: none">• Plant location analysis• Facilities design procedure and planning• Make-to-stock, make-to-order, and assemble to order manufacturing environments• Material handling principles• Material handling equipment and systems• Just-in-time and lean manufacturing concepts• Warehouse operations and equipment• Assessment and evaluation of layout alternatives• Required plant services and utilities• Waste reduction and disposal• Non-manufacturing layout	<ul style="list-style-type: none">• Project analysis and selection• Team and project leadership• Developing project objective• Developing project deliverables• Negotiation with project clients• Transforming project objectives into work plan• Project scheduling• Managing resources• Managing project milestones• Using Project management software• Project documentation and presentation• Project time and cost estimating

ATTENDANCE: Regular and punctual attendance is **MANDATORY**. Students will be responsible for all lectures and other materials covered, regardless if an absence was excused or not. **For every unexcused class period or project team meeting absence, your final percentage will be dropped by 2%.**

COURSE OUTLINE: Detailed outline for this course and related activities will be developed and posted on the BlackBoard on a continuous basis. Visit the “Course Information” section of the course BlackBoard very often and check the “Activities List” folder.

GRADING: The final grade will be based on the total number of points earned during the semester. The general grading policy for this course is to rate the student's final grade based on a combination of class average and instructor's discretion. Breakdown of grading weights is as follows:

A. In-class Layout Projects ⁽¹⁾	10%
B. Unit Tests	40%
C. Business/Industry Project ⁽²⁾	50%
Total	100%

(1) Teamwork is encouraged

(2) Requires teamwork and in conjunction with IME456/656 Industry Projects

A. IN-CLASS LAYOUT PROJECT ASSIGNMENTS: A maximum of three in-class projects related to this course will be assigned during the semester. Each student will submit a written report per project, and, if needed, an oral presentation will be given to the rest of the class.

B. COURSE UNIT TESTS: The course includes eight learning modules. There will be one test per module. Tests will cover material from the class lecture, videotapes shown in the class, BlackBoard and other supplementary readings, and in-class activities. Each unit test includes only the materials covered during that unit. There is no comprehensive test. Immediately after each test, the answers to the test will be available for your viewing.

*Test Make-up Policy: Students will be allowed to make up tests. In order to qualify for the make-up test, the student **must** notify the instructor **before** the date of the examination, and have the instructor approve the make-up test. If the student fails to take a make-up test as scheduled, he or she will receive a score of zero for that test.*

C. BUSINESS/INDUSTRY PROJECT: Every effort will be made to provide the students with opportunities to participate in BUSINESS/industry projects. Such projects require extensive teamwork and communication with the industry client. When possible, the project will be selected and assigned in conjunction with IME456, Program and Project Management.

Grade Corrections: After getting your tests or homework back, if you believe you have been given insufficient credit, please meet with the instructor in his office. You must request a grade correction within a week after you have received your graded test or assignment. No test or homework will be re-graded after the deadline.

Late Penalties: There is a 25% penalty per day for each assignment not handed in on time. On time means the first minute of the class session in which the homework is due. Late penalties apply immediately after the homework has been collected.

Additional Requirements for Graduate Credits: Students registered for the course at the graduate level will be required to participate in additional activities which can include, but are not limited to, identifying current topics related to the course, performing literature review, documenting their findings in a format similar to published papers, and making presentation to the class.

Getting Help: If you are having difficulty in the course (or even think you are), feel free to consult your instructor. Class schedule and office hours are posted by the instructor's office. If you are unable to visit during posted hours, other visiting hours may be arranged.

Class Attendance and Participation: Class attendance is Mandatory. There are many topics discussed in the class and during team meetings that are not in the textbook. When a class is missed, the student has missed the material covered in that class period. Also, since class participation is an important aspect of the course, all students are also expected to participate in both the class discussion and team discussions.

Students with Disability: If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please inform the instructor at the beginning of the semester. Efforts will be made to accommodate students with disabilities.

Academic Honesty Statement: All work in your courses must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct. For detailed information please visit: <http://www.ndsu.nodak.edu/policy/335.htm>.

Note: The instructor reserves the right to change the grading policy and course outline as needed.