

*North Dakota State University, Department of Industrial and Manufacturing Engineering*  
**Syllabus for**

**INDUSTRIAL AND MANUFACTURING FACILITY DESIGN and MANUFACTURING CAPSTONE**

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*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.

### **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 a manufacturing environment and its relationship to physical facilities, plant layout, safety and risk control.
  4. Understand workplace ergonomics and environmental factors which effect health, safety, and productivity of workers.
  5. Become familiar with auxiliary services required to support production and employees in facilities.
  6. Understand requirements for production systems which possess appropriate degrees of flexibility to cope with future changes in design, new products introduction, volume variations, and changing technology.
  7. Be able to design an appropriate facility and material handling systems for selected product, including the selection of appropriate equipment.
  8. Be able to perform productivity assessment showing the economic gains from their proposed solutions.
  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 various tasks, actions and issues.
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### **COURSE MATERIALS AND TEXTBOOK**

- The course BlackBoard provides the students with some of the required reading materials.
- College-Industry Council on Material Handling Education ([CICMHE](#)) web site will be used extensively. This web site provides materials related to the material handling and warehousing.
- Select chapters from IME480 textbook, *Operations Management: Meeting Customer's Demands*, Edward M. Knod and Richard Schonberger, Seventh Edition, McGraw-Hill/Irwin.

### **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**

[Reza A. Maleki, Ph.D., P.E., C.Mfg.E.](#), Room 202J, Civil and Industrial Engineering Building.  
Phone: (701) 231-8071, FAX (701) 231-7195. E-mail: [Reza.Maleki@ndsu.edu](mailto:Reza.Maleki@ndsu.edu).

### **OFFICE HOURS**

A class schedule and office hour for students' visits is posted by my office and also can be viewed following this [link](#). If you are unable to visit during posted hours, other visiting hours may be arranged.

## EXPLANATION OF WORK EXPECTED AND CLASSROOM POLICIES

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*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. The structural design and related topics such as utility networks required for a facility's operations will be briefly discussed. 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.*

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**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 1%.

**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. **Tentative** Breakdown of grading weights is as follows:

A. Mini Layout Projects	15%
B. Unit Tests	35%
C. Business/Industry Project <sup>(1)</sup>	50%
Total	100%

*(1) Requires teamwork and in conjunction with IME456/656 Industry Project(s)*

**A. MINI LAYOUT PROJECT ASSIGNMENTS:** A maximum of three mini 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:** 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. When possible, the projects will be selected and assigned in conjunction with PROGRAM AND PROJECT MANAGEMENT course.

By design, the business/industry projects in this course require teamwork. Teamwork can greatly contribute to your learning. This will be possible only if you have put real effort into preparation and come to meetings with the intention of helping the team members. Remember, you have a responsibility to the team, the class, and to yourself. "Team Members Performance Appraisal" will be used to assess the performance of team members. Emphasis includes demonstration of collaborative skills, acceptance and sharing of responsibility, participation and interpersonal abilities as seen by peers in their work group.

The "Team Members Performance Appraisal" form is available through the PROGRAM AND PROJECT MANAGEMENT course BlackBoard.

**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.

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**Getting Help:** If you are having difficulty in the course (or even think you are), feel free to consult your instructor. A class schedule and office hour for students' visits is posted by the instructor's office. If you are unable to visit during posted hours, other visiting hours may be arranged if requested.

**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.

**Class Attendance and Participation:** There are many topics discussed in the class that are not in the textbook. When a class is missed, the student has missed the material covered in that class period. 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.

**Veterans and student soldiers** with special circumstances or who are activated are encouraged to notify the instructor in advance.

**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.

**Academic Honesty Statement:** All work in this course must be completed in a manner consistent with the NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct and the College of Engineering and Architecture Honor System ([http://www.ndsu.edu/cea/honor\\_code/](http://www.ndsu.edu/cea/honor_code/)).

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