

EIN 4XXXX Facility Planning and Work Design

1) **Catalog Description:** This course introduces fundamental concepts in several main areas of industrial engineering such as facility planning, material handling systems, work analysis and design. Topics such as analysis and design of work space and flow, facility location and layout, material handling systems, motion and time studies and work sampling are covered. (4 Credit Hours)

2) **Pre-requisites:**

- A grade of C or better in EIN 3101C Introduction to Industrial and Systems Engineering
- A grade of C or better in ENC 3250 Professional Communication or ENC 3254 Professional Communication for Engineering
- A grade of C or better in EML 2023 Computer Aided Graphics and Design or equivalent
- A grade of C or better in STA 4321 Introduction to Probability

Co-requisites:

- STA 4322 Introduction to Statistics
- EIN 4354 Engineering Economy

3) **Course Objectives:**

- To gain an understanding and appreciation of the principles and methodologies relevant to the planning and design of “production oriented” facilities.
- To learn productivity management and measurement methods. Students will get hands on experience in setting up and creating time studies, work sampling, and motion studies.
- To learn about ergonomic considerations needed for designing effective and productive workstations.
- To gain experience with real life projects by identifying a project in an industrial or other business setting and by formulating, analyzing and solving a relevant professional problem with the help of a sponsor.
- To learn to work effectively in teams and to gain an improved ability to make effective presentations.

4) **Contribution of course to meeting the professional component:** Students will enhance their preparation for professional careers in Industrial and Systems Engineering by learning to take a comprehensive view of complex decision systems. Students will develop skills in system modeling and improvement, analytic problem solving, process improvement, and economic analysis. They will learn how to use multiple software tools and will practice communicating their engineering knowledge in a non-technical manner.

5) **Relationship of course to program outcomes:** Students will be able to do the following:

- Design a system, component, or process to meet desired needs.
- Function on multi-disciplinary teams.

- Identify, formulate and solve engineering problems.
- Communicate effectively.
- Understand the impact of engineering solutions in a global, economic, environmental, and societal context
- Appreciate and understand contemporary issues.
- Use the techniques, skills, and modern engineering tools necessary for engineering practice.

6) **Instructor:** Dr. Sherman Bai

Office location: 478 Weil Hall

Telephone: 392-1464

E-mail address: Bai@ise.ufl.edu

Class Web site: <https://lss.at.ufl.edu/>

Office hours: Monday: 1 – 2 PM, Wednesday: 1 – 2 PM

7) **Teaching Assistant:** Z. Melis Teksan

Office location: 202 Weil Hall

Telephone: 392-1464

E-mail address: zmteksan@ufl.edu

Office hours: Tuesday: 2 – 3 PM, Thursday: 2 – 3 PM

8) **Meeting Times:** Monday: 11:45 – 1:40 PM, Wednesday: 11:45 – 1:40 PM

9) **Class/laboratory schedule:** Two meetings, each for 100 minutes.

10) **Meeting Location:** To be announced.

11) **Material and Supply Fees:** None

12) **Textbooks and Software Required**

- **Title:** Facility Planning
Author: James A. Tompkins et al.
Publication date and edition: 2010, 4th Edition
ISBN number: 9780470444047
- **Title:** Work Design: Occupational Ergonomics
Author: Johnson Konz
Publication date and edition: 2008, 7th Edition
ISBN number: 1890871796

13) **Recommended Reading:** None

14) **Course Outline:**

Flow, Space, and Activity Relationships

Week 1: Departmental Planning, Activity Relationships

Week 2: Flow Patterns, Flow Planning, Measuring Flow

Week 3: Space Requirements

Material Handling

Week 4: Material Handling Principles, Designing Material Handling Systems

Week 5: Unit Load Design, Material Handling Equipment, Estimating Material Handling Costs

Layout Planning Models and Design Algorithms

Week 6: Basic Layout Types, Layout Procedures

Week 7: Algorithmic Approaches, Department Shapes and Main Aisles

Warehouse Operations

Week 8: Missions of a Warehouse, Functions in the Warehouse

Week 9: Receiving and Shipping Operations, Dock Locations, Storage Operations, Order Picking Operations

Quantitative Facilities Planning Models

Week 10: Facility Location Models, Special Facility Layout Models

Week 11: Machine Layout Models, Conventional Storage Models, Automated Storage and Retrieval Systems, Order Picking Systems, Fixed-Path Material Handling Models

Work Design Process

Week 12: Criteria, Engineering Design, Search for Solutions

Week 13: Operations Analysis, Occurrence Sampling

Ergonomic Guidelines

Week 14: Macro Ergonomics, Organization of Workstations, Office Ergonomics, Workstation Design, Manual Handling, Hand tools

Week 15: Controls, Displays, Error reduction, Safety

Work Measurement

Week 16: Determining Time per Job, Time Study, Predetermined Time Systems

15) **Attendance and Expectations:**

- Attendance required.
- Cell phones must be turned off during class.
- Every homework assignment, report and case study must be submitted at the beginning of class on its due date. There is 10% grade penalty per day for late submissions.

16) **Grading:** Exam 1: 20%, Exam 2: 20%, Case Study: 10%, Project: 30%, Assignments: 10%, Lab Reports: 10%.

17) **Grading Scale:**

A : 100 - 96
A-: 95 – 91
B+: 90 – 86
B : 85 – 81
B-: 80 – 76
C+: 75 – 71
C : 70 – 66
C-: 65 – 61
D+ : 60 – 57
D: 56 – 53
D- : 52 – 51
E : 50 – 0

“A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

18) Requirements for class attendance and make-up exams, assignments, and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

19) **Honesty Policy:** All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Note that failure to comply with this commitment will result in disciplinary action compliant with the UF Student Honor Code Procedures.

See <http://www.dso.ufl.edu/sccr/procedures/honorcode.php>

20) **Accommodation for Students with Disabilities:** Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

21) **UF Counseling Services:** Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.

22) **Software Use:** All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator.

Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.