IMSE 449 - Design of Dynamic Materials Systems

Number of credit hours: 3

Description: Application of industrial engineering theory and practice to selection of material systems and equipment including efficient handling of materials from first movement of raw materials to final movement of finished product. Present quantitative design techniques.

Prerequisite: IMSE 220 or consent


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Course Goals:
1. To provide students with the basic concepts related to the interactions between the manufacturing system parameters and their impact on materials handling systems design.
2. To provide students with methods for the generation of plant layouts.
3. To provide students with information on materials handling systems design for various aspects of the manufacturing and service industry.

Student Learning Objectives:
Upon completing the course, the student will be able to:

a) Describe and determine the effect of product, process, and schedule design parameters on plant layout and materials handling systems design.

b) Identify the characteristics of product and process layouts and their needs in terms of materials handling.

c) Develop and analyze plant layouts using manual and computer aided software methodologies.

d) Identify and select various types of material handling equipment.

e) Design material handling systems for a variety of scenarios pertaining to manufacturing and service industry.

Course Topics:
Introduction to facilities planning and materials handling (1 week)
Product, process, and schedule design impacts on materials handling (1 week)
Materials handling in product/process layouts (3 weeks)
Plant layout generation including computer aided layout to reduce material handling costs (2 weeks)
Materials handling equipment selection (2 weeks)
Material handling systems design concepts (2 weeks)
Material handling systems design for warehousing operations (2 weeks)
Advanced techniques in materials handling (2 weeks)

Course Contribution to Professional Component:
Engineering topics 100%. This course has a significant design content.

Course Relationship to Program Educational Outcomes:
The course relates strongly to the following program educational outcomes.

1. The course enables the students to acquire the ability to use modern and classical industrial engineering methodologies pertaining to materials handling systems design (Outcome 1). The key abilities the students will acquire are as below.
   a) Facilities design methodologies
   b) Material handling system design

2. The course enables the students to acquire the ability to shape materials handling system design recommendations so that results will be achieved and communicate findings effectively (Outcome 3). The key abilities the students will acquire are as below.
   a) Analyze and interpret system data
   b) Develop recommendations that are specific, practical, and cost effective
   c) Conduct an analysis of different alternatives and make appropriate recommendations
   d) Make oral presentation
   e) Gather information from a variety of sources including publications, the internet, and reference materials

3. The course enables the students to acquire the ability to work individually and on teams to identify, formulate and solve problems in materials handling systems design (Outcome 4). The key abilities the students will acquire are as below.
   a) Work in a project team of industrial engineers to solve an engineering problem
   b) Formulate and solve problems to satisfy system criteria
   c) Communicate the results of the analysis in an engineering report

4. The course enables the students to acquire the ability to design integrated material handling systems that include people, materials, information, equipment, and energy (Outcome 5). The key abilities the students will acquire are as below.
   a) Develop material flow requirements for a production system
   b) Develop integrated space requirements for a production system
   c) Select material handling equipment and design system for production
   d) Apply activity relationships in developing and improving plant layouts and material handling systems
Grading:
Exam I - 20 %
Exam II - 20 %
Final Exam – 20 %
Projects - 20 %, Quizzes (can be given unannounced in any class period) - 15 %
Special topic oral presentation – 5 %

Statement on Attendance:
Student attendance is mandatory unless excused by the instructor. The basis for an excused absence will follow University and IMSE policy. Students who are absent from class for any reason are responsible for all missed work. Students who miss a quiz or an exam will not be allowed to make it up, except in the case of a family or other legitimate emergency. Any exception will be allowed at the discretion of the instructor.

Statement on Social Justice:
West Virginia University is committed to social justice. I concur with that commitment. I expect to foster a nurturing learning environment that is based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, you must make appropriate arrangements through Disability Services (293-6700). They will identify the nature of the accommodation your disability requires.

Prepared By : B. Gopalakrishnan, IMSE, CEMR