



University of Puerto Rico
 Mayagüez Campus
 College of Engineering
 Department of Industrial Engineering
 Program of Bachelor of Science



COURSE SYLLABUS

COURSE TITLE:	FACILITIES LAYOUT AND DESIGN
ALPHA-NUMERIC CODIFICATION:	ININ 4040
NUMBER OF CREDITS-CONTACT HOURS:	Three credit hours. Two hours of lecture and two hours of laboratory per week.
PREREQUISITES, COREQUISITES AND OTHER REQUIREMENTS:	Prerequisites: (ININ 4009 or ININ 4072) and ININ 4155 and INGE 3011 and (ININ 4021 or ININ 4150). Corequisite: ININ 4015.
COURSE DESCRIPTION:	
Spanish: Planificación de despliegue de instalaciones y sistemas de acarreo de materiales, solución analítica y computadorizada de problemas de diseño de instalaciones.	
English: Planning facilities layout and materials handling systems, analytical and computerized solution of problems in the design of physical facilities.	
COURSE OBJECTIVES:	
<p>Upon completion of this course students should be able to:</p> <ul style="list-style-type: none"> • Identify the necessary data and data collection mechanisms to determine production capacity, equipment, and manpower requirements. • Compute the personnel and machine requirements to meet demand considering the products' assembly interaction, and machines' scrap allowance, capacity, and available time. • Estimate space and storage requirements for activity areas. • Design cellular manufacturing layouts in the context of Lean Manufacturing. • Develop objective measures to evaluate alternative layouts by combining quantitative and qualitative information. • Design complex layouts using computerized layout approaches. • Determine the optimal location of a single facility under a weighted distance criterion for Rectangular and Euclidean distance measures. • Physically recognize the more common types of material handling equipment. • Recognize the need of a literature review to support ideas/recommendations/conclusions and be able to evaluate the quality of the information. • Be familiar with sustainable operations and the impact of decisions on a global context 	
TEXT BOOK: Tompkins, J., White, J., Bozer Y., and Tanchoco, Facilities Planning, J. Wiley, 4 th Ed. 2010*	
Course time frame and thematic outline:	
	TIME DISTRIBUTION
Theme	Face-to-Face
Introduction - Facility Design & Plant Layout	
Presentation of design project guidelines, objectives, and requirements	1
The Plant Layout Problem, Basic Layout Types, Layout Planning Models	2
Activity Relationship Analysis	1

Information Gathering on Product and Process Design	2
Schedule Design. Volume - Variety Analysis	1
Using Excel and Access to analyze information	2
Determination of Total Materials Requirement (Scrap Allowance)	3
Estimating Equipment and Manpower Requirements, Throughput, Effective Throughput, and Identifying System Bottleneck	4
Personnel Service Requirements (cafeteria, docks, lockers, parking, etc.)	2
Determination of Space Requirements	1
Flow Analysis	1
Designing Receiving and Shipping Facilities	2
Role of IEs in Sustainability	1
Design and Analysis of Cellular Manufacturing Systems	6
Designing the Layout	4
Computerized Layout Planning	3
Evaluating and Selection of a Facility Layout	1
Development and Presentation of the Detailed Layout	1
Material Handling Aspects	3
Storage and Warehouse Design	3
Planar Single Facility Location Problems	2
Exams	4
Labs	10
Total	60 hours

INSTRUCTIONAL STRATEGIES:

Face-to-Face

- ♦ Conferences
- ♦ Lectures
- ♦ Team work
- ♦ Individual tasks
- ♦ Assessment activities
- ♦ Practice activities
- ♦ Oral presentations
- ♦ Instructional Videos

MINIMUM OR REQUIRED RESOURCES AVAILABLE:

RESOURCE	FACE-TO-FACE
Institutional learning management platform account (Ex. Moodle) (Cuenta en la plataforma institucional de gestión de aprendizaje) (Ej. Moodle)	Institution
Institutional email account	Institution
Computer with high-speed internet access or mobile device with data service	Student
Programs or applications: word processor, spreadsheets, presentation editor	Student
Built-in or external speakers	Not applicable
Webcam or mobile with camera and microphone	Not applicable

EVALUATION STRATEGIES:**FACE to FACE**

Assignments	5 - 10 %
Exams	40-50%
Final Exam	20 - 25 %
Lab Reports	10-20%
Project/oral presentation	10-15%

REASONABLE ACCOMMODATIONS:

The University of Puerto Rico at Mayagüez (RUM) recognizes that each student has an inherited right to request reasonable accommodation according to Law 51: Law for Integral Educational Services for People with Disabilities. Every student has the right to receive reasonable accommodation if he/she presents the necessary evidence to be evaluated by the Office of Services to Students with Disabilities (OSEI-RUM), and the related information can be found at the following link: <https://www.uprm.edu/cms/index.php/page/85>. If your case is approved by OSEI-RUM, you will receive reasonable accommodation in your courses and evaluation, and you must contact each professor for course registered. For additional information contact OSEI-RUM at Sánchez Hidalgo 410 or via telephone 787-832-4040 extension 3107.

ACADEMIC INTEGRITY:

The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Student General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person's answers to the questions of an oral or written exam by taking or having someone else take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure established by the UPR Student General Bylaws.—

To ensure the integrity and security of user data, all hybrid, distance and online courses must be offered through the institutional learning management platform, which uses secure connection and authentication protocols. The system authenticates the identity of the user (student and professor) using the username and password assigned by the institution. The users are responsible for keeping their password safe, protected, and not to share it with other people.

POLICY AGAINST DISCRIMINATION BASED ON SEX, SEXUAL ORIENTATION, AND GENDER IDENTITY:

«The University of Puerto Rico prohibits discrimination based on sex, sexual orientation, and gender identity in any of its forms, including that of sexual harassment. According to the Institutional Policy Against Sexual Harassment at the University of Puerto Rico, Certification 130 (2014-2015) from the Board of Governors, any student subjected to acts constituting sexual harassment, may turn to the Office of the Student Ombudsperson, the Office of the Dean of Students, or the Coordinator of the Office of Compliance with Title IX for an orientation or formal complaint».

GRADING SYSTEM

Quantifiable (letters, A, B, C, D, F) Not Quantifiable

CONTINGENCY PLAN IN CASE OF AN EMERGENCY

In case of an emergency or class interruption, the professor can apply Bylaw 19-85 of the UPRM. This bylaw states that up to 25% of a class can be offered online.

BIBLIOGRAPHY

- Tompkins, J., White, J., Bozer Y., and Tanchoco, Facilities Planning, J. Wiley, 4th Ed. 2010.*
- Francis, R. L., McGinnis, L. F., and White, J. A., Facility Layout and Location: An Analytical Approach, Prentice Hall, 2nd Ed., 1992.*
- Groover, M., Automation, Production Systems, and Computer Aided Manufacturing, Pearson, 4th Ed., 2014.*
- Sule, O.R., Manufacturing Facilities-Location, Planning, and Design, PWS-Kent, 1994.*
- Allegri, T. H., Materials Handling-Principles and Practice, Van Nostrand Reinhold, 1984.*
- Konz, S., Facility Design-Manufacturing Engineering, Publishing Horizons, 1994. *
- Occupational Safety and Health Standards (Standards – 29 CFR, Part 1910), United States Department of Labor-Occupational Safety and Health Administration. <https://www.osha.gov/laws-regs/regulations/standardnumber>.
- Puerto Rico Planning Board, Commonwealth of Puerto Rico, Puerto Rico Zoning Regulations. http://buildprlaw.com/wp-content/uploads/2018/02/2010_11_29-Reg-31-Reglamento-Conjunto.pdf
- Regulations and Permits Administration, Commonwealth of Puerto Rico, Fire code 2018. https://up.codes/viewer/puerto_rico/ifc-2018
- USA Department of Justice, American with Disabilities Act Standards for Accessible Design, 2010. https://www.ada.gov/2010ADASTandards_index.htm

* This book is a classic with no up-to-date editions and remains as the top book in the subject.