



COURSE SYLLABUS

COURSE TITLE:	Ergonomics and Human Factors in Work Systems Design
ALPHA-NUMERIC CODIFICATION:	ININ 4071
NUMBER OF CREDITS-CONTACT HOURS:	3 credits, 2 hours of lecture, 2 hours of laboratory every other week, and 2 hours of discussion/workshop every other week
PREREQUISITES, COREQUISITES AND OTHER REQUIREMENTS:	ININ 4010 - Probability and Statistics for Engineers

COURSE DESCRIPTION:

Spanish: Introducción a la ergonomía y los factores humanos en el diseño de sistemas de trabajo. Este curso prepara a los estudiantes en el diseño de sistemas donde el ser humano juega un papel importante. Abarca herramientas y técnicas para evaluación ergonómica en la identificación de factores de riesgo laboral y propuesta de diseños alternativos para abordarlos.

English: An introduction to ergonomics and human factors in work systems design. This course prepares students to design systems where people play a significant role. It covers tools and techniques to perform ergonomic assessment for the identification of occupational risk factors and proposal of alternative designs to address them.

COURSE OBJECTIVES:

After completing the course, the student should be able to:

- Understand the value of ergonomics and human factors in work systems design.
- Evaluate, improve and design products, workstations, job requirements, and work systems by applying ergonomics and human factors design principles.
- Assess the requirements of physical work considering recommended activity levels and propose alternative design solutions when job requirements exceed recommended levels.
- Perform ergonomic assessment for the identification of occupational risk factors.
- Evaluate, improve and/or design manual material handling tasks, workstations, industrial chairs, VDT workstations, hand tools and equipment, controls and displays per ergonomic principles.
- Evaluate, improve and/or design environmental conditions through noise, temperature, and illumination studies.

TEXTBOOK: Groover, M.P., 2017, Work Systems: The Methods, Measurement & Management of Work, Pearson.

Course time frame and thematic outline:

Theme	TIME DISTRIBUTION		
	Face-to-Face	Hybrid	Online
Introduction to Ergonomics and Human Factors Engineering	2		
- Definitions and Historical Background			

- Ergonomics and Human Factors in Industry			
- Productivity (Work Labor, Materials, Machinery, and Equipment).			
Anthropometry	6		
- Methods for Anthropometric Measurements			
- Use of Anthropometric Tables			
- Anthropometry in Design			
Laboratory 1: Anthropometry	2		
Work Physiology	5		
- Cardiovascular and Metabolic Systems			
- Analysis of Physical Activities design and schedule of rest periods			
Cumulative Trauma Disorders	4		
Manual Material Handling	6		
- Material handling and Manual Material Handling Tools			
- Lifting (NIOSH Lifting Equation)			
- Push/Pull and Bending			
Laboratory 2: Work Physiology and Material Handling	2		
Biomechanics	3		
Risk Assessment Tools and Checklists (e.g. RULA, REBA, Nordric)	4		
Laboratory 3: Risk Assessment Tools	2		
Vibration and Hand Tool Design	4		
- Guidelines for the Correct Design and Use of Hand Tools			
- Effects of Hand Tool Vibrations and Whole-Body Vibration			
Laboratory 4: Hand Tools Design	2		
Environmental Factors in Workplace Design	8		
- Noise Units of Measurement and Control			
- Illumination units of Measurement and Control			
- Temperature			
Laboratory 5: Noise and Illumination	2		
Design of Video Display Terminal (VDT) Workstations	2		
Controls and Displays	2		
- Deficiency of Visual Displays in Industry			
- Reaction Time			
- Design of Characters and Symbols Arrangement			
Ergonomic Risk Factors and Case Studies	2		
Exams	2		
Total	60 hours	0 hours	0 hours

INSTRUCTIONAL STRATEGIES:

Face-to-Face	Hybrid	Online
<ul style="list-style-type: none"> ♦ Conferences ♦ Lectures ♦ Team work ♦ Hands-on laboratories and practice activities ♦ Individual tasks ♦ Assessment activities ♦ Oral presentations ♦ Project 		

MINIMUM OR REQUIRED RESOURCES AVAILABLE:

RESOURCE	FACE-TO-FACE	HYBRID	ONLINE
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	HYBRID	ONLINE																		
<table border="0"> <tr> <td>Strategy</td> <td>Quantity</td> <td>Percentage</td> </tr> <tr> <td>Exams</td> <td>(2-4)</td> <td>: 60% – 75%</td> </tr> <tr> <td>Hands-on laboratories and practice activities</td> <td>(5-10)</td> <td>: 10% – 20%</td> </tr> <tr> <td>Assignments</td> <td>(0-10)</td> <td>: 0% – 10%</td> </tr> <tr> <td>Oral presentations</td> <td>(0-3)</td> <td>: 0% – 10%</td> </tr> <tr> <td>Group project</td> <td>(0-1)</td> <td>: 0% – 15%</td> </tr> </table>	Strategy	Quantity	Percentage	Exams	(2-4)	: 60% – 75%	Hands-on laboratories and practice activities	(5-10)	: 10% – 20%	Assignments	(0-10)	: 0% – 10%	Oral presentations	(0-3)	: 0% – 10%	Group project	(0-1)	: 0% – 15%		
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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

R1 - Lee, J.D., Wickens, C.D., Liu, Y., Boyle, L. NG., 2017, "Designing for People: An introduction to Human Factors Engineering", CreateSpace, 3rd edition.

R2 - Konz, S., and Johnson, S., 2008, Work Design: Occupational Ergonomics, CRC Press., 7th. Ed.*

R3 - Eastman Kodak Company, 2004, Ergonomic Design for People at Work, 2nd ed. Chengalur, S. N., Rodgers, S.H. and Bernard, T.E.*

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