

SEEM3024: ERGONOMICS IN WORKPLACE DESIGN

Effective Term

Summer Term 2023

Part I Course Overview

Course Title

Ergonomics in Workplace Design

Subject Code

SEEM - Systems Engineering and Engineering Management

Course Number

3024

Academic Unit

Systems Engineering (SYE)

College/School

College of Engineering (EG)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

MEEM3024/MBE3024 Ergonomics in Workplace Design or ADSE3026 Contemporary Human Factors for Industry 4.0

Exclusive Courses

Nil

Part II Course Details

Abstract

The aims of the course are to provide students with an overview of various basic ergonomic factors in a workplace and/or working environment, and to develop an understanding of related ergonomic principles fundamental to the workplace and environmental analysis and design like industrial noise, thermal stress, industrial lighting, anthropometry, and biomechanics problems. Students will be able to identify the critical ergonomic factors in a work system, and apply the related principles to design a better workplace and working environment.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	describe the basic ergonomics factors and related problems in a workplace	x	x	x
2	diagnose the problems of given workplaces and workspaces		x	x
3	apply relevant ergonomics principles and factors to the solutions of given workplaces		x	x
4	present analyses and results of experiments and miniprojects in an appropriate written report format		x	x
5	work effectively as a team member in the miniproject and laboratory activities	x		x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Large Class Activities		1, 2, 3, 4, 5	2 hours/week
2	Laboratory Work	<p>Students are provided with learning tasks of laboratory activities and miniprojects. Selected laboratory activities in industrial lighting and inspection, manual dexterity, and workplace anthropometry, etc. are offered. On miniprojects, brief information of possible work topics, effective team working, and report format and requirements will be given. They could choose any cases of workplace ergonomics like industrial noise survey and manual material handling for investigation, diagnosis, and solving of real life problems in the context of ergonomics. They need to form groups of four to five members, and are required to submit a final group project report at the end of semester. Each member should explicitly state in the project report about his/her effort and contribution to the overall project achievement, and how effectively he/she works effectively as a team member. Similar information on team working and requirements for laboratory work will also be provided in laboratory sessions.</p>	1, 2, 3, 4, 5	12 hours/semester

3	Consultation Hours	Consultation hours will be used to facilitate discussions of various issues related to the lecture materials, mini-projects, and tutorial questions.	1, 2, 3, 4, 5	1 hour/week/25 students
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Additional Information for TLAs

Students are provided with learning tasks of laboratory activities and miniprojects. Selected laboratory activities in industrial lighting and inspection, manual dexterity, and workplace anthropometry, etc. are offered. On miniprojects, brief information of possible work topics, effective team working, and report format and requirements will be given. They could choose any cases of workplace ergonomics like industrial noise survey and manual material handling for investigation, diagnosis, and solving of real life problems in the context of ergonomics. They need to form groups of four to five members, and are required to submit a final group project report at the end of semester. Each member should explicitly state in the project report about his/her effort and contribution to the overall project achievement, and how effectively he/she works effectively as a team member. Similar information on team working and requirements for laboratory work will also be provided in laboratory sessions.

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quiz Scores A mid-term quiz is arranged for testing the basic concepts and principles. It comprises of multiple choice questions and short question.	1, 2, 3	10	
2	Laboratory Work Three laboratory activities will be well designed to develop students' understanding and interests of the course materials in improving the design of work system.	1, 2, 3, 4, 5	20	
3	One Mini-project Report Students need to form working groups of three to four members for the mini project. They may choose any topics related to the course syllabus. Advices will be given on the feasibility, approach, methodology, and expected deliverables of the mini project. An oral presentation will be given.	1, 2, 3, 4, 5	20	

Continuous Assessment (%)

Examination (%)

50

Examination Duration (Hours)

2

Additional Information for ATs

With the above assessment task and activities, the contributions of examination and coursework are 50% each for the overall assessment. Both the laboratory work and miniproject carry equal weighting in the coursework component. Assessment of the work will be based on: appropriateness and rationale of selection of project, appropriateness of methodology, originality and quality of work, individual and group effort, self motivation and initiatives, skills of applying human factors techniques, and the report presentation.

For a student to pass the course, at least 30% of the maximum mark for the examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

Laboratory Work

Criterion

ABILITY to CONDUCT experiments and EXPLAIN the methodology and procedure, and PREPARE technical reports.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Miniproject

Criterion

CAPACITY for SELF-DIRECTED ACTION LEARNING to understand and apply the principles of ergonomics.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

Examination

Criterion

ABILITY to DIAGNOSE and GIVE SOLUTIONS to workplace ergonomics problems.

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information**Keyword Syllabus**

- Applied Anthropometry. Work-Space Design. Seating Design.
- Visual Environment. Lighting Effects on Human Performance.
- Industrial Noise. Noise Control Methods. Effects of Noise on Human Performance.
- Design of Manual Handling Task. Biomechanics. The NIOSH Approach to the Design and Evaluation of Lifting Tasks.
- Vibration and Acceleration. Thermal Environment. Other Environmental Factors.

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	C,D. Wickens, J.D. Lee, Y. Liu, S.E.G. Becker, "An Introduction to Human Factors Engineering" . Pearson Education International, second edition, 2004.
2	Mark S. Sanders and Ernest J. McCormick, "Human Factors in Engineering and Design". McGraw-Hill Book Company, seventh edition, 1992
3	B. Mustafa Pulat, "Fundamentals of Industrial Ergonomics", Prentice Hall, 1992

4	Jack A. Adams, "Human Factors Engineering". Macmillan Publishing Company, 1989
5	David C. Alexander and Babur Mustafa Pulat, "Industrial Ergonomics - A practitioner's Guide". Industrial Engineering & Management Press, Institute of Industrial Engineers, 1985
6	P. Tillman and B. Tillman, "Human Factors Essentials", McGraw Hill, 1991.
7	W.B. Werther and K. Davis, "Human Resources and Personnel Management", 1993.
8	Asian Journal of Ergonomics
9	International Journal of Industrial Ergonomics
10	Journal of Human Factors
11	Journal of Human Factors and Ergonomics in Manufacturing
12	Journal of Applied Ergonomics
13	Journal of Safety Research
14	Journal of Ergonomics