
SYLLABUS

Date/ Revision 26 January 2017 / 01

Faculty Engineering

Approval

SUBJECT :

1. Identification of Subject:

Name of Subject : Ergonomics and Human Factors Engineering
Code of Subject : EHFE-2000
SKS : 3
Semester : 3
Study Program : Industrial Engineering
Lecturer : Ir. Erwan Saiful MKKK

2. Competency

After having the course, students are expected to:

- a) Understand the principles and applications of ergonomics and human factors.
- b) Understand ergonomic risk factors and ergonomic risk factor modifiers, and assess the impact they have on the development of cumulative trauma disorders.
- c) Recognize the presence and types of psychosocial ergonomic risk factors, and recommend actions that can be taken to reduce their negative impact on employee safety and work efficiency.
- d) Effectively understand engineering and management interventions, and recommend such interventions to reduce the presence and magnitude of ergonomic risk factors.
- e) Effectively understand the relevance of ergonomics and human factors in the practice of engineering through human-machine/equipment interaction.
- f) Recognize the importance of written ergonomic and medical management programs, and how to successfully develop and implement such programs.

3. Description of Subject:

The Ergonomics and human factors course is concerned with the achievement of optimal relationships between humans and their work environment (human factors design). Topics include the capabilities and limitations of humans and machines, principles of the anthropometrics, musculoskeletal system, principles of symbolic and pictorial displays (cognitive), static and dynamic forces on the human body, responses to environmental stress, injuries from poorly designed workplaces, and repetitive motion with emphasis on prevention, psychophysics, work physiology, and engineering safety applied to common problems faced by engineers in industry.

4. Learning Approach

Approach : Combination of Expository - inquiry and collaborative
Method : Discussion, question answer, sample problem, group work
Student Task : Home work, presentation

Media : LCD projector, film

5. Evaluation

a) Absence maximum	: 25%
b) Participation in discussion	: 10 points
c) Homework, Classwork	: 10 points
d) Presentation, Simulation	: 10 points
e) Daily Quiz	: 10 points
f) Final Examination	: 60 points
Total	: 100 points

6. Contents/ Topics of Lecturing:

Week	Topics	Content	Remark
1	Introduction to Ergonomics	The focus of ergonomics, Ergonomics and its areas of application in the work system, A brief history of ergonomics, Attempts to 'humanise' work, Modern ergonomics	R.S. Bridger (Chapter 1)
2	Human Body	Some basic body mechanics, Musculoskeletal, Respiratory, Circulatory and Nervous Systems, Postural stability and postural adaptation, Risk factors for musculoskeletal disorders in the workplace, Behavioural aspects of posture.	ILO (Part 1) R.S. Bridger (Chapter 2)
3	Anthropometric principles in workspace and equipment design	Designing for a population of users and source of human variability, Anthropometry and its uses in ergonomics, Principles of applied anthropometry in ergonomics, Application of anthropometry in design	R.S. Bridger (Chapter 3)
4	Static work: Design for standing and seated workers	Fundamental aspects of standing and sitting, An ergonomic approach to workstation design, Design for standing and seated workers, Work surface design, Visual display units, Guidelines for the design of static work	R.S. Bridger (Chapter 4)
5	Design of repetitive tasks	Introduction to work-related musculoskeletal disorders, Injuries at work, Ergonomic interventions, Trends in work-related musculoskeletal disorders	R.S. Bridger (Chapter 5)
6	Design of manual handling tasks	Anatomy and biomechanics of manual handling, Prevention of manual handling injuries in the workplace, Design of manual handling tasks and carrying.	R.S. Bridger (Chapter 6)
7	Design of the physical environment 1: temperature, lighting and illumination, noise	Fundamentals of human thermo-regulation, Measuring the thermal environment, Effects of thermal conditions on performance, Lighting design considerations, Visual fatigue, eyestrain and near work, Psychological aspects of lightings	ILO (Part VI) R.S. Bridger (Chapter 10, Chapter 11)
8	Design of the physical environment 2: work space and surface, vibration, height, mechanical movements, vibration, pressure, electrical, chemical, biological	Falls hazards, Hazards of mechanical injury, Vibration hazards and cumulative trauma disorders, Pressure hazards, Electrical, Burn (fire, radiation), hazards of toxic materials	ILO (Part VI)
9	Work capacity, stress and fatigue, Industrial physiology	Stress and fatigue, Muscles, structure, function and capacity, Physical work capacity, Applied physiology in the workplace	R.S. Bridger (Chapter 7, 8)

Week	Topics	Content	Remark
10	Human information processing	Cognitive systems	R.S. Bridger (Chapter 12)
11	Displays, controls and virtual environments	Principles for the design of visual and audio displays, Design of controls, Combining displays and controls	R.S. Bridger (Chapter 13)
12	Human-machine interaction, human error and safety	Human error and equipment design, Mental workload in human machine interaction, Psychological aspects of human error	R.S. Bridger (Chapter 15)
13	System design: organisational and social aspects	Systems design methods for ergonomics, Organizational aspects, Psychosocial factors	ILO (Part V) R.S. Bridger (Chapter 16)
14	Environmental Design	Microenvironments (offices, homes), Macroenvironments (building and facility complexes, navigation through Facilities)	Stephen J. Guastello, Chapter 14
15	Final Examination		

7. Book Reference:

- a) ILO Encyclopaedia of Occupational Health and Safety, 4th Edition, web base reference, [<http://www.ilocis.org/en/contilo.html>]
- b) R. S. Bridger, "Introduction to Ergonomics", Second Edition.
- c) Stephen J. Guastello, "Human Factors Engineering and Ergonomics", Second Edition.
- d) Mark Lehto, Steven J. Landry, "Introduction to Human Factors and Ergonomics for Engineers", Second Edition.