GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3723119
Semester – II
Subject Name: Ergonomics

Type of course: Elective

Prerequisite: Physiology and Anatomy, Biomechanics

Rationale: Ergonomics deals with the interaction between the user and his or her physical environment. It provides a broad based introduction to ergonomic principles and their application in the design of equipment and the workplace. When the ergonomic design is done in a sociotechnical systems context, outcomes tend to boost all three dimensions of sustainability namely economic, environmental, and social.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Introduction of ergonomics, Ergonomics/ human Factors fundamentals, work physiology, stress, Human body- structure and function, Basic anatomy & muscle physiology , biomechanics	8
2	Anthropometrics, Anthropometry: body growth and somatotypes, Static and dynamic anthropometry, Stand Posture, Anthropometry landmark: Sitting postures, Anthropometric measuring techniques	10
3	Communication and cognitive issues, Psycho-social behaviour aspects, behaviour and stereotype, Information processing and perception, Cognitive aspects and mental workload	8
4	Ergonomics design methodology, Ergonomics criteria/check while designing, Design process involving ergonomics check, Application of anthropometry in design, Effectiveness and cost-effectivness	8
5	Determination of work content, Workstation design, Work design, times required for various occupational jobs/tasks, Fundamentals of physical working environment, Worksurface design, Visual display units, Guide lines for the design of static work,	8

	Effectiveness and cost-effectivness	

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
15	**15**	**20**	**15**	**15**	**20**

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

- Ergonomics for Beginners- A Quick Reference for Beginners, 3rd Edition. Jan Dul and Bernard Weerdmeester. 2008
- Bridger, RS: Introduction to Ergonomics, 2nd Edition, Taylor &Francis, 2003.
- Handbook of Human Factors and Ergonomics Methods. Neville Stanton, Alan Hedge, Karel Brookhuis, Eduardo Salas, Hal Hendrick. 2005
- Green, W.S. and Jordan,P .W, Human Factors in Product Design, Taylor & rancis, 1999
- Kroemer, K.H.E., Fitting the Human: Introduction to Ergonomics, CRC Press
- D. Chakrabarti, Indian Anthropometric Dimensions for ergonomic design practice, National Institute of Design,Ahmedabad, 1997

Course Outcomes:

Sr. No.	**CO statement**	**Marks % weightage**
CO-1	Apply basic knowledge of physical ergonomics such as physical load, anthropometry, biological variation and biomechanics	**20**
CO-2	Illustrate proper application of anthropometric measurements for analysis and design	**25**
CO-3	Analyse the psychosocial aspects of work such as perception, memory, information processing, attention, learning, decision-making, stress and mental workload	**15**
CO-4	Apply design methodology of ergonomics and obtain the results of	**20**

	product system and draw conclusion	
CO-5	Design and redesign tasks and workstations using ergonomic knowledge	**20**

List of Experiments:

1. Study of human factors and design for the disabled or elderly
2. Study of concept of Anthropometry and its application
3. To understand the concept of system design
4. Ergonomic assessment of the anaesthiologists work space and equipment
5. Evaluation of risk factors for surgeons performing laproscopic surgery
6. To study and to find the load per worker in a factory
7. Problem identification of any work station and recommendations to solve those problems

Major Equipment: None

List of Open Source Software/learning website:

https://ergoweb.com/ergonomics-concepts
https://nptel.ac.in
https://ehs.unc.edu/workplace-safety/ergonomics