

6th Semester		Human Engineering & Safety in Agriculture	L-T-P 3-0-0	3 CREDITS
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Module I

(9 hr)

Basic Introduction-Importance of the human factors. How it is beneficial for the farm machinery design; Human factors in system development - Human factors defined, focus of human factors, manual, mechanical; Objectives of human factors its approach, history, system (human-machine system); Automated system. Information storage, information processing. Action function; Human Performance - Concept on information and displaying information; Information input process- Types of information, presented by display; Classification, visual display (four major types); Auditory display, speech communication.

Module II

(10 hr)

Biomechanical of motion - Definition, lever system in the body, active forces (muscles), passive forces; Biomechanical in the workplace, (neck, shoulder, back) niosh citing guides, Types of body movements - Joints, classification of joints, structural, functional classification of movement, glidings, angular movement; Range of movements, strength and endurance, speed and accuracy, Human Control of System - Muscles physiology, work physiology, heart rate; Measures of physiological strain, o₂ uptake, maximum aerobic power; Energy consumption, grades of works. Subjective rating scale; Human motor activities, control, tools, and related devices, Anthropometry - Ergonomics and anthropometry, Use of anthropometry data, percentile value, Arrangement and utilization of work space.

Module III

(9 hr)

Atmospheric conditions - Atmospheric conditions, thermo-regulation in human, thermal comfort; Heat exchange process, avenue of heat exchanges; Heat exchange equations, environment factors influencing heat exchange; Effect of clothing on heat exchange, Effective temperature, wet bulb globe temperature; Heat stress-Physiological effects on heat stress, Cardio-vascular response sweating, heat illness, individual difference and heat stress; Acclimatization to heat stress, heat stress index, heat index .

Module IV

(8 hr)

Safety - Dangerous machine regulation rule, Odisha dangerous machine regulation rule 2008, Compensation to accident victims; Safety aspects of tractor and trailers with driver; Safety aspects chaff cutters, Safety in spraying operation and use of safety gadgets; Safety aspects of threshing, spraying operation.

Module V

(9 hr)

Calibration of the subject using bi-cycle ergo-meter and mechanical tread mill, Use of respiration gas meter from human energy point of view and use of heart rate monitor in different farm operations, Use of different subject rating scales, Optimum work space layout and locations of controls for different tractors, noise and vibration equipment, safety gadgets for various power driven equipment, drudgery of farm women in manual drawn equipment

Books:

1. Astrand P. and Rodhal K. 1977. Textbook of Work Physiology. Mc Hill Corporation, New York.
2. Mathews J. and Knight A.A. 1971. Ergonomics in Agricultural Equipment Design. National Institute of Agricultural Engineering
3. Dul J. and Weerdmeester B. 1993. Ergonomics for Beginner. A Quick Reference Guide. Taylor and Francis, London.
4. Chapanis, , A.1996. Human Factors in System Engineering, John Wiley & Sons, New York.
5. Mark S. Sanders and Ernest James McCormick. 1993. Human Factors in Engineering and Design. Mc Hill Corporation, New York.
6. Keegan J J, Radke AO. 1964. Designing Vehicle seats for greater comfort. SAE Journal; 72: 50-5.
7. Yadav R. Tewari V.K., 1998. Tractor operator workspace design – a review. Journal of Terra mechanics 35 : 41-53.

Digital Learning Resources:

1. www.manareresults.co.in/syllabus-jntuk.php?subcode=...
2. www.sciencedirect.com/science/article/abs/pii/S..