


HUMAN FACTORS ENGINEERING

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INTENDED AUDIENCE : Students belonging to disciplines like Industrial Engineering and Management, Agricultural Engineering Production Engineering, Manufacturing Science and Engineering, Mechanical Engineering and allied disciplines

INDUSTRY SUPPORT : Tata Steel, Tata Motors, L&T, Linde and similar such manufacturing organizations complying Industry 4.0 standards.

COURSE OUTLINE :

To introduce the basic concepts and the important issues (related to theory and application) inergonomics and human factors engineering for worksystem performance and product design improvement, and the use of these concepts and technologies to select jobs and situations in industries. The knowledge in the topics as mentioned in the course outline is essential to achieve these objectives. The course is intended to be designed for creating a knowledge-base of the state-of-the-art ergonomic/human factors-based worksystem in manufacturing and service organizations. The course is designed to teach the basic concepts and tools and techniques and methods employed in the broad area of human factors engineering focusing on anthropometric principles in the worksystem design, work capacity and fitness for work, work posture and body mechanics, design of physical environment, design of manual material handling tools and hand tools, and ergonomic performance of different kinds of worksystems.

ABOUT INSTRUCTOR :

Prof. Pradip Kumar Ray is presently a Professor in the Department of Industrial and Systems Engineering, Indian Institute of Technology (IIT), Kharagpur, India. He served as the Head of the Department during September, 2006 to August, 2009. A mechanical engineering graduate (IIEST, Shibpur) with MTech degree and PhD in industrial engineering (IIT Kharagpur), Professor Ray has about more than thirty-six years of diversified experience - eight years in industry and more than twenty-eight years of teaching and research experience at IIT Kharagpur. He has served as a visiting professor at several institutions abroad and is trained in Japan on Production Management/JIT-based Manufacturing. He has published one text book titled 'Product and Process Design for Quality Economy and Reliability', thirteen book chapters, six lecture packages, and 162 papers in international and national journals of repute and conferences in the areas of quality design and control/TQM, healthcare systems management, productivity engineering, process optimization, ergonomics/human factors engineering, safety engineering and management and other related topics. His areas of interest and research include productivity modelling, quality engineering, ergonomics, healthcare quality management, engineering asset management and JIT-based/lean engineering and operations management. He has secured substantial number (27 till date) of industry and research grants. He has supervised 17 PhD scholars till date with 6 research scholars currently working under him. He has supervised more than 119 MTech and 74 B-Tech projects till date. He has coordinated several outreach training programmes and courses (more than 45) for industries and academic institutions on several topics, such as MHRD-sponsored four GIAN courses on Engineering Asset Management, Ergonomics and Human Factors Engineering, Production and Operations Management, and Quality Engineering in Products and Processes, and other courses on SPC, TQM, Six Sigma, JIT/Lean Engineering, Materials Management, Environment Management, Workplace Stress Management and Ergonomics including long-duration training programme on Industrial Safety Engineering and Safety Competence Building (SCB) in Material Handling for Tata Steel. Currently, he acted as an investigator in two-year duration UKIERI-sponsored project on 'Climate Change Issues and Environmental Performance of SMEs in India and the UK' in collaboration with Aston Business School, Aston University, Birmingham, UK. Currently, he has acted as Chief Expert guiding APO-sponsored project on 'Research on Institutions Offering Productivity Courses' for six Asian countries, and as the Principal Investigator in MHRD and OFB-sponsored IMPRINT project on manufacture of shells for field guns with improved design and performance. He organized the International Conference, MESH-2016 in December,2016 at IIT Kharagpur as its convener. He has attended several international conferences/congresses as a keynote speaker and a session chair.

Professor Ray is a certified Lead Assessor for ISO-9001 registration, and is a member of several professional bodies, such as INFORMS and IIMM, and a Fellow of World Academy of Productivity Sciences and a Fellow of Institution of Engineers (India).

Prof. V.K. Tewari, B.Tech.(Hons.), M.Tech. (FMP) and Ph.D(Engg.) has been in the IIT system as a student and faculty. He has been teaching Farm Machinery Design, Farm Power, Engineering Ergonomics, Precision Agriculture at UG/PG levels in IIT, Kharagpur for the last 35 yrs. He was IIT JEE Chairman (2003-2006) He has served as Head of the Agricultural & Food Engineering Department and Rural Development Centre IIT, Kharagpur. He is a long standing member of American Society of Agricultural and Biological Engineers, USA.

COURSE PLAN:

Week 1: Introduction to Human Factors and Ergonomics
Week 2: Anthropometry in Workstation Design
Week 3: Physiology, Workload, and Physical Work Capacity
Week 4: Design of Manual Material Handling Tasks
Week 5: Ergonomic Design of Computer Workstations
Week 6: Industrial Application: Work Posture for Tasks, Hand Tool Design
Week 7: Measurement and Evaluation of Physical Environment: Visual Environment
Week 8: Measurement and Evaluation of Physical Environment: Thermal Environment and Vibratory Environment
Week 9: Measurement and Evaluation of Physical Environment: Auditory Environment
Week 10: Ergonomic Design for Manufacturing and Assembly
Week 11: Human Factors Principles and Design of Shift Work
Week 12: Ergonomic Performance of Worksystems