Course Specification

Course Title	**Ergonomics Essentials (including manual handling and DSE)**
Code	**W506**
Level	**Foundation** ☐ **Intermediate** ☑ **Advanced** ☐
Pre-requisites	**None**
Course Material	**Course manual available from OH learning.com**
Coordinating Editor	**Alison Bell**
Approval Date	**August 2011**
Review Date	**August 2014**

Aims

This course aims to:

Provide a broad based introduction to ergonomic principles and their application in the design of work, equipment and the workplace. Consideration is given to musculo-skeletal disorders, manual handling, ergonomic aspects of the environment as well as to the social and legal aspects.

Learning Outcomes

On completing this course successfully the student will be able to:

- understand and apply ergonomic principles to the creation of safer, healthier and more efficient and effective activities in the workplace;
- understand ergonomic risk assessments and appropriate control measures;
- understand the causes of upper limb disorders and how to reduce them;
- appreciate workplace layout and equipment design;
- appreciate environmental aspects of good ergonomic design.

Course Format

Normally run as a 5 day taught course [minimum 45 hours including lectures, tutorials, practical/demonstration sessions, guided reading, overnight questions and examination].

There will be a 40 short answer question "open book" examination with an allowed time of 120 minutes.

Content

Topic	Title	Time Allocation (%)
1	Overview of Ergonomics	20%
2	Ergonomics Methods & Techniques	20%
3	Musculo-skeletal Disorders	20%
4	Workplace, Job and Product Design	20%
5	Relevant Physical Factors of the Work Environment	10%
6	Legal and Social Aspects	10%

Note: Reference is made to standards and good practice documentation. This may not be the most up-to-date relevant publications and is intended as guidance for candidates only.

Detailed Course Content

1 Overview of Ergonomics (20%)

Introduction to ergonomics and its scope in relation to work. Outline of the disciplines of anatomy, physiology and psychology, with respect to ergonomics building blocks such as anthropometry and biomechanics.

1.1 General Principles

- 1.1.1 Aims, objectives and benefits of ergonomics
- 1.1.2 Definition and scope of ergonomics and systems of work
- 1.1.3 The role of the ergonomist
- 1.1.4 Fitting the job to the person and the person to the job
- 1.1.5 Human characteristics, capabilities and limitations
- 1.1.6 Human error
- 1.1.7 Teamwork and ageing
- 1.1.8 Interfaces between job, person and environment
- 1.1.9 Human computer interaction

1.2 Biological Ergonomics

- 1.2.1 Body systems - musculo-skeletal and nervous
- 1.2.2 Anatomy, static and dynamic anthropometry
- 1.2.3 Biomechanics
- 1.2.4 Applying work physiology - body metabolism, work capacity and fatigue
- 1.2.5 Static and dynamic postures

1.3 Psychology

- 1.3.1 Perception of risk
- 1.3.2 Motivation and behaviour
- 1.3.3 Memory
- 1.3.4 Signal Detection Theory and vigilance
- 1.3.5 ‘Work 'Stress' - causes, preventative and protective measures
- 1.3.6 Work organisation - shift working and overtime

1.4 Developing an Ergonomics Strategy at Work

- 1.4.1 Culture of an organisation - commitment and decision-making
- 1.4.2 ‘Macro-ergonomics' and participatory ergonomic teams
- 1.4.3 Ergonomics at the design stage
- 1.4.4 Developing ergonomics, professional ergonomists and competence

2 Ergonomics Methods and Techniques (20%)

Observational experimental methods are identified which can be used for investigation, so that work, equipment and planned systems can be improved for human use.

2.1 Work Design

- 2.1.1 Task analysis and allocation of functions
- 2.1.2 User trials
- 2.1.3 Problem solving - scientific method

2.2 Ergonomics Risk Assessment

- 2.2.1 Definitions of hazard and risk
- 2.2.2 Priorities
- 2.2.3 Risk evaluation quantity and quality of risk
- 2.2.4 Assessment systems
- 2.2.5 Overall ergonomics approach
- 2.2.6 Control measures monitoring and feedback

2.3 Measurements and Information Gathering

- 2.3.1 Ergonomics standards
- 2.3.2 Observational techniques
- 2.3.3 Rating scales, questionnaires and check lists
- 2.3.4 Use of models and simulation

3 Musculo-Skeletal Disorder (20%)

The disorders resulting from manual handling and repetitive work must be covered and the causes explained. The methods of assessment and the techniques used to prevent or reduce these disorders must also be covered.

3.1 Manual Handling

- 3.1.1 The nature and causes of manual handling disorders
- 3.1.2 Risk assessment
- 3.1.3 Job design and training
- 3.1.4 Principles of handling and preventative and protective measures

3.2 Work Related Upper Limb Disorders (WRULD)

- 3.2.1 The nature and causes of WRULD/ 'Repetitive Strain Injuries'/Cumulative Disorders
- 3.2.2 Risk assessment
- 3.2.3 Principles of control, preventive and protective measures

4 Workplace, Job and Product Design (20%)

Key features in the design of workplaces, jobs and their results - products and services - are outlined, so that more effective and healthier work can be achieved. Existing data and routes to further sources of information are emphasised.

4.1 Workplace Layout and Equipment Design

- 4.1.1 Principles of workstation and system design
- 4.1.2 Space and workstation design principles
- 4.1.3 Risks to health:
  - Musculoskeletal problems
  - Visual fatigue
  - Mental stress
  - Requirements for eye tests
- 4.1.4 Design considerations for Visual Display Unit (VDU) Stations:
  - Ergonomic factors
  - Work stations
  - Design of work and practice
  - Carrying out assessments of risk at VDU workstations

4.2 Controls, Displays and Information

- 4.2.1 Visual, auditory and other displays
- 4.2.2 Quantitative and qualitative information
- 4.2.3 Compatibility and population stereotypes
- 4.2.4 Warnings, signs and labels
- 4.2.5 Sources and selection of data
- 4.2.6 Principles of software ergonomics

5 Relevant Physical Factors of the Work Environment (10%)

Physical factors of the working environment must include the way the eye, ear and clothed body respond qualitatively to light, sound heat etc., so that human performance can be predicted and improved. This part of the syllabus should be regarded as an overview and thus technical and quantitative detail should be minimised.

5.1 Lighting

- 5.1.1 Visual acuity and colour vision
- 5.1.2 Lighting levels, contrast and glare
- 5.1.3 Reflections and flicker fusion

5.2 Noise

- 5.2.1 Noise induced hearing loss
- 5.2.2 Distraction, annoyance and emergency signals

5.3 Thermal Environment

- 5.3.1 Body temperature regulation and acclimatisation
- 5.3.2 Subjective assessments - thermal comfort and discomfort

5.4 Other Considerations

5.4.1 Smell, taste and tactile senses

5.4.2 Vibration - effects and subjective assessment

5.5 Clothing and Protective Equipment

5.5.1 Objective and subjective effects

5.5.2 Risk perception, and wearability

5.5.3 Design, style and fit

6 Standards and Social Aspects (10%)

Consideration should be given to sources of standards covering ergonomics, social aspects and training, instruction and supervision requirements.

6.1 Standards

6.1.1 ISO standards

6.1.2 Sources of other standards

6.2 Selection and Training

6.2.1 Training Needs Analysis

6.2.2 Testing and interview techniques

6.3 Instruction and Supervision

6.3.1 Health information, legal requirements

6.3.2 Supervision and records

6.3.3 Measuring health and illness

Learning and Teaching Activities

Learning Time

Scheduled contact hours: (Note these timings are indicative only)	Lectures	16
	Seminars	2
	Practical Sessions	8
	Tutorials	8
	Examinations (including preparation)	3
	Other Scheduled Time	
Guided independent study Note: include in guided independent study preparation for scheduled sessions, follow up work, wider reading or practice, revision	Independent Coursework	8
	Independent Laboratory Work	
	Other Non-scheduled Time	
Total Hours		**45**

Assessment Details:

Methods of Assessment	Practical Assessment	Written Examination
Grading Mode	Formative	Summative
Weighting %	NA	100
Pass Mark	NA	Set by examining body
Outline Details	All candidates must participate in the practical studies and demonstrate the required skills. The studies should be designed by the course tutor(s) to test the basic skill and knowledge of each of the candidates in the techniques in making ergonomic risk assessments and the performance of control measures. The exercise must, therefore, involve two separate studies of workplace situations which may be presented as a series of photographs for the candidate to evaluate and report on their findings. Full details of the practical requirements and the individual candidate reporting forms etc. are available in document JF.2 Practical Evaluation Report which is available from www.bohs.org and www.ohlearning.com	40 short answer questions to be answered in 120 minutes. The questions require candidates to write short answers which will require no more than the box provided but may include multiple answers. Some questions may require calculations. Students can only refer to the W506 student manual during the examination.

Is the student required to pass ALL elements of assessment in order to pass the course? Yes

Indicative Course Materials and Reading:

ISBN Number	Author	Date	Title	Publisher
			W506 Ergonomics Essentials Student Manual Downloadable for free from www.ohlearning.com	OH learning
	Dul & Weerdmeester	2003	Ergonomics for Beginners	Taylor & Francis
	McKeown & Twiss	2001	Workplace Ergonomics: A Practical Guide	IOSH services
	R.S.Bridger	2003	Introduction to Ergonomics	Taylor & Francis
	Wilson & Corlett	2005	Evaluation of Human Work	Macmillan
	Corlett & Clark	1995	The Ergonomics of Workspaces & Machines	Taylor & Francis
	Pheasant & Haslegrave	2006	Bodyspace: Anthropometry Ergonomics and Design	Taylor & Francis
		1999	HSG 48: Reducing Error and Influencing Behaviour	HSE
	Kroemer & Grandjean	1997	Fitting the Task to the Human – a text book of Occupational Ergonomics	Taylor & Francis
	Reason	1990	Human Error	Cambridge University Press
			ISO 11228-1:2003 Ergonomics -- Manual Handling -- Part 1: Lifting and Carrying	
			ISO 11228 –2:2007 Ergonomics -- Manual Handling -- Part 2: Pushing and Pulling	
			ISO 11228-3:2007 Ergonomics -- Manual Handling -- Part 3: Handling of Low Loads at High Frequency	

			ISO/TS 20646-1:2004 Ergonomic Procedures for the Improvement of Local Muscular Workloads -- Part 1: Guidelines for Reducing Local Muscular Workloads	
			ISO 6385: 2004 Ergonomic Principles in the Design of Work Systems	
			ISO/TR 16982:2002 Ergonomics of Human-System Interaction -- Usability Methods Supporting Human-Centred Design	