PROFESSIONAL ERGONOMIST CERTIFICATION BY THE ERGONOMICS SOCIETY OF SOUTH AFRICA

III ESSA ERGONOMIST FORMATION MODEL

From 24 November 2014

III.1 Objectives

III.1.1 To promote mutual recognition among different states in the world regarding ergonomics education and training programmes.

III.1.2 To provide a framework for organising and assessing components of a professional level of qualification for ergonomists.

III.1.3 To facilitate the mobility of ergonomists between various countries.

III.1.4 To ensure and improve the professional image of ergonomics.

III.1.5 In order to comply with international set-ups, the ESSA Ergonomist Formation Model is, unless indicated, consistent, to the "HETPEP model" of CREE and the "Ergonomist Formation Model" from BCPE.

III.2 General structure

III.2.1 Professional Ergonomists must provide knowledge in the three areas of ergonomics, that is physical, cognitive, and organisational ergonomics (see IEA definition for more details).

III.2.2 Professional Ergonomists must provide comprehensive competence to solve ergonomics problems. This requires expertise in

a) the preliminary project definition (e.g. assessing an ergonomics problem, securing co-operation of subjects)

b) the systematic analysis of a system (e.g. task analysis in the work setting, statistical analysis of data),

c) participation in the design or re-design process of a system involving human-machine, human-product, or human-environment interaction, and

d) the evaluation of a system.

Other competencies (e.g. demonstrating application of the breadth of ergonomics, project management) are helpful to support the success of ergonomics intervention.

III.2.3 In order to meet the aforementioned requirements ergonomics training has to consist of the following three components:

1. EDUCATION: Diverse courses (credit units or modules), including laboratory exercises where appropriate.
2. SUPERVISED TRAINING: Learning by doing in applied situations.
3. EXPERIENCE: unsupervised professional practice which demonstrates the ability to work professionally and independently.

III.3 Educational objectives and points of reference

A. ERGONOMICS PRINCIPLES

1. Ergonomics Approach

OBJECTIVE: To recognise the integrated (systems) nature of ergonomics, the centrality of the human being, and how to use its breadth of coverage and the available knowledge base to adapt the environment to people.

POINTS OF REFERENCE: History of work; current paradigms (designing for individuals vs. populations; working in normal vs. extreme circumstances); interaction between society and work.

2. Systems Theory

OBJECTIVE: To recognise the principles of systems theory and how they apply to ergonomics situations.

POINTS OF REFERENCE: Structure and dynamics of systems; the human as a system component; systems analysis and design (e.g. allocation of functions)

B. HUMAN CHARACTERISTICS

To recognise and describe the effects of human factors which contribute to people's physical and psychological well-being and performance at work.

1. Ergonomics: Physiologal and Physical Aspects

OBJECTIVE: To recognise and measure the physical characteristics of people and their physiological responses to their activities and their environments with particular reference to health and performance.

POINTS OF REFERENCE: Anatomy; biomechanics and posture; anthropometry; energy and force production; adjustments (stress and strain); individual, gender-related, developmental, racial and cultural variability; chrono-biology (e.g. circadian rhythms).

2. Ergonomics: Psychological and Cognitive Aspects

OBJECTIVE: To recognise and measure cognitive characteristics of people and their psychological responses to their work situation to understand how these affect human behaviour (including health and performance) and attitudes.

POINTS OF REFERENCE: Psychophysiological and cognitive aspects of information intake, information handling, and decision making; individual motivation; human development.

3. Ergonomics: Social and Organisational Aspects

OBJECTIVE: To recognise the social dimensions of ergonomics and organisations and to specify systems structures suitable to achieve a good quality of working life and of performance.

POINTS OF REFERENCE: Motivation and attitudes related to the needs of individuals and to working in groups; individual and group functioning; socio-technical systems.

4. Physical Environment

OBJECTIVE: To understand the human sensory systems and to be able to recognise, measure and specify the appropriate levels and characteristics of the physical environment such that sensory input is suitable for human performance and well-being.

POINTS OF REFERENCE: Climatic environment; visual environment; acoustic environment; vibration; human senses.

C. WORK ANALYSIS AND MEASUREMENT

To be able to understand, select and utilise the appropriate methods for investigating ergonomics problems and for presenting data to evaluate design solutions to these problems.

1. Statistics and Experimental Design

OBJECTIVE: To be able to collect, aggregate, manipulate and evaluate data in a reliable and valid manner.

POINTS OF REFERENCE: Descriptive statistics; probability theory; correlation techniques; estimation and sampling; experimental design; non-parametric statistics.

2. Computation and Information Technology

OBJECTIVE: To be able to use computers, particularly to utilise standard packages, for the effective handling of ergonomics investigations.

POINTS OF REFERENCE: Data collection software; computation software; storage systems.

3. Instrumentation

OBJECTIVE: To be able to use the major measuring instruments, sensors, etc. required by the ergonomist to gather data for investigations, design or evaluation of workplaces, work procedures, or work equipment.

POINTS OF REFERENCE: Simple and complex equipment; their potentials and their limitations.

4. Methods of Measurement and Investigation

OBJECTIVE: To be competent in the major methods and procedures of measurement used in ergonomics investigations, and to know when to use them and how to interpret the results.

POINTS OF REFERENCE: Simulations (dynamic and static); methods for observing activity and performance; interviews and questionnaires; epidemiological approach; sampling procedures; checklists.

5. Work Analysis

OBJECTIVE: To be able to describe and understand the determinants and organisation of workers' activities in the field.

POINTS OF REFERENCE: Activity analysis; task analysis; function analysis; task interdependency, communication and co-operation; the importance of strategies in task execution.

D. PEOPLE AND TECHNOLOGY

To be familiar with an area for the application of ergonomics expertise, with some important

models and concepts related to applying ergonomics, and with at least one form of ergonomics design.

1. Technology

   OBJECTIVE: To understand the factors in at least one chosen area of application that are relevant to the creation of ergonomic work, in particular to recognise those aspects of the technology that are flexible/changeable.

   APPLICATION AREAS, Examples: consumer products; manufacturing; office work; transport; process industry; health care; automation; recreation, arts and leisure activities (see also E. "Applications").

   POINTS OF REFERENCE: Functionality, operation, and construction of the technology.

2. Human Reliability

   OBJECTIVE: To be able to design and evaluate work situations using "best practice" in working towards error-free performance.

   POINTS OF REFERENCE: Accident models; attention, effort and vigilance; error taxonomies.

3. Health, Safety and Well-Being

   OBJECTIVE: To be able to design and evaluate work situations to achieve healthy and safe work, as well as contribute to the quality of working life.

   POINTS OF REFERENCE: Safety management; occupational injuries and work-related disorders; safety technology; legislation; characteristics of a good quality of working life.

4. Training and Instruction

   OBJECTIVE: To understand the fundamentals of learning, of training programmes and of instruction, and to specify the requirements of such programmes to achieve successful performance of new or changed work activities.

   POINTS OF REFERENCE: Learning skills; learning knowledge; assessing job requirements and worker capabilities; designing training programmes to bring workers to the level of requirements; designing manuals.

5. Occupational Hygiene

   OBJECTIVE: To be able to recognise, measure, and cope with the presence of adverse physical and chemical conditions and other major pollutants.

   POINTS OF REFERENCE: National and international recommendations and requirements; their variations and limitations; measurement, protection, control, and monitoring.

6. Workplace Design

   OBJECTIVE: To be able to investigate and design workplaces to match the physical and psychological dimensions of their users, and to measure workplace effects on ergonomically relevant dimensions.

   POINTS OF REFERENCE: Measurement of activities and performance; workspace layout; use of mock-ups/simulations to improve designs; evaluation; compatibility between workplace requirements and human capabilities.

7. Information Design

OBJECTIVE: To be able to investigate and design the major modes of information transfer to the human for effective and efficient performance of the system.

POINTS OF REFERENCE: Signal detection; information processing and attention; display characteristics; information overload; stimulus-response compatibility.

8. Work Organisation Design

OBJECTIVE: To be able to investigate, design and implement work organisation systems for effective and efficient performance and good quality of working life.

POINTS OF REFERENCE: Co-operative analysis and design of new work systems; basics and applications of work-rest schedules; introduction of change.

E. APPLICATIONS

OBJECTIVE: To understand the integrative nature of applying ergonomics, the need for and structure of a job specification, the interactive and iterative nature of work in an applied research or design group, and to recognise the practicalities and limitations of applying ergonomics, including the introduction of change.

POINTS OF REFERENCE:

1. Laboratory Exercises: should complement theoretical education by hands-on experience. Should be organised in conjunction with lectures and courses.
2. Applied research/design process: This should be done as a project undertaken in a chosen area such as: consumer products; manufacturing; office work; transport; process industry; health care; automation; architecture; recreation, arts and leisure activities; it may also involve a study of intervention techniques.

F. PROFESSIONAL ISSUES

OBJECTIVES: To recognise the impact of ergonomics on people's lives, the costs and benefits accruing from ergonomics activities, the social and psychological impact of ergonomics investigations, and the professional responsibilities and requirements of the ergonomics practitioner.

POINTS OF REFERENCE: Legislation; economics; the ergonomist in the organisation; ergonomics and society; role of the ergonomist in social settings with different interest groups; ethics; development and marketing of the ergonomics profession.

III.4 Application skills and practice

III.4.1 In order to provide sufficient competencies for ergonomic intervention Professional Ergonomists must demonstrate competency and experience in the following skills:

a) Investigate and analyse the demands from ergonomics design to ensure appropriate interaction between work, product or environment and human capabilities and limitations,

b) Analyse and interpret findings of ergonomics investigations,

c) Document ergonomics finding appropriately,
d) Determine the compatibility of human capacity with planned or existing demands,
e) Develop a plan for ergonomics design or intervention,
f) Make appropriate recommendations for ergonomics change,
g) Implement recommendations to improve human and system performance,
h) Evaluate outcome of implementing ergonomics recommendations, and
i) Demonstrate professional behaviour.

III.5 Cognate subjects related to ergonomics

III.5.1 Ergonomics is, per definition, an eclectic science that makes use of knowledge from various different disciplines. Thus, knowledge about related disciplines is compulsory for any activity in ergonomics, although the wide range prevents a comprehensive knowledge of all cognate disciplines from each individual ergonomist.

III.5.2 The following subjects are being considered as cognate subjects to ergonomics

- Mathematics / Statistics
- Social sciences
- Anatomy, Physiology, Biology, Medicine
- Sociology, Anthropology,
- Political sciences, Law (only basic courses or work life related courses)
- Physics, Mechanics
- Psychology
- Economics basics , Management
- Design, Industrial Design, Architecture