

# International Ergonomics Association

## Professional Standards and Education Committee

Version 2, October 2001

### Full version of Core Competencies in Ergonomics: Units, elements, and performance criteria

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#### **Unit 1. Investigates and analyses the demands for ergonomics design to ensure appropriate interaction between work, product and environment, and human capabilities and limitations**

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***Element 1.1 Understands the theoretical bases for ergonomic planning and review of the workplace.***

#### **Performance Criteria**

**1.1a Understands theoretical concepts and principles of physical and biological sciences relevant to ergonomics.**

- i. Demonstrates a working knowledge of physics, chemistry, mathematics, anatomy, functional anatomy, physiology, pathophysiology, exercise physiology and environmental science as they apply to ergonomics practice.
- ii. Can apply knowledge of biomechanics, anthropometry, motor control, energy, forces applied as they relate to stresses and strains produced in the human body.
- iii. Demonstrates an understanding of the pathology relating to environmentally or occupationally generated disorders or causes of human failure.

**1.1b Understands the effects of the environment (acoustic, thermal, visual, vibration) on human health and performance.**

**1.1c Understands theoretical concepts and principles of social and behavioural sciences relevant to ergonomics.**

- i. Demonstrates a working knowledge of sensory, cognitive and behavioural psychology and sociology, and recognises psychological characteristics and responses and how these affect health, human performance and attitudes.
- ii. Can apply knowledge of information intake, information handling and decision making; sensory motor skills, human development and motivation principles as they relate to human performance.
- iii. Understands the principles of group functioning and socio-technical systems.

**1.1d Understands basic engineering concepts, with a focus on design solutions.**

- i) Demonstrates an understanding of design and operation of technologies in which they work.
- ii) Appreciates hardware design problems.
- iii) Understands and can apply the basics of industrial safety

**1.1e Understands and can apply the basics of experimental design and statistics.**

**1.1f Understands the principles of organisational management.**

- i) Demonstrates an understanding of individual and organisational change techniques, including training, work structuring and motivational strategies.

**1.1g** Demonstrates an understanding of the principles of ergonomics and human-machine interface technology.

***Element 1.2 Applies a systems approach to analysis.***

**Performance Criteria**

**1.2a** Demonstrates a knowledge of the principles of systems theory and systems design and their application to ergonomics.

**1.2b** Demonstrates a knowledge of the principles of ergonomics analysis and planning in a variety of contexts, and the scope of information required to ensure quality of life.

**1.2c** Understands the determinants and organisation of a person's activities in the field and plans the analysis according to the organisation's strategy and purposes.

**1.2d** Can explain the scientific or empirical rationale for appraisals selected and has the expertise required to perform them.

**1.2e** Identifies the demands of the situation and accesses sources of appropriate information.

**1.2f** Develops action plans with those involved and identifies the critical factors of the ergonomic analysis.

**1.2g** Carries out a systematic, efficient and goal orientated review of demands appropriate to ergonomics, addressing the needs of the project.

***Element 1.3 Understands the requirements for safety, the concepts of risk, risk assessment and risk management.***

**Performance Criteria**

**1.3a** Recognises the importance of safety principles, guidelines and legislation in risk management

**1.3b** Understands the goals of risk management.

- i) Demonstrates ability to manage change.
- ii) Understands how to gain commitment of management and participation of worker in risk management approaches.

***Element 1.4 Understands and can cope with the diversity of factors influencing human performance and quality of life and their inter-relationships.***

**Performance Criteria**

**1.4a** Understands the organisational, physical, psycho-social and environmental factors which could influence human performance, an activity, a task, or use of a product and knows how to cope with adverse conditions.

**1.4b** Understands the impact of individual factors on other possible factors and the implications for ergonomic assessment.

**1.4c** Recognises those aspects of the environment that are flexible and changeable.

***Element 1.5 Demonstrates an understanding of methods of measurement relevant to ergonomic appraisal and design.***

**1.5a** Understands the type of quantitative and qualitative data required to clarify the basis for ergonomic appraisal and design, and validates the measurements selected for data collection and/or application.

**1.5b** Demonstrates the ability to carry out appropriate surveillance of the nature and magnitude of risks.

**1.5c** Selects the appropriate form of measurement for the particular context.

**1.5d** Applies measurement procedures and uses measurement instruments effectively, or refers appropriately to other ergonomics team members, to quantify load on the person and human characteristics.

**1.5e** Understands the concepts and principles of computer modelling and simulation.

**1.5f** Understands the use of the computer for data acquisition, analysis and design development.

***Element 1.6 Recognises the scope of personal ability for ergonomic analysis***

**1.6a** Appreciates when it is necessary to consult and collaborate with a person with different professional skills to ensure comprehensive measurement taking and analysis.

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## **Unit 2. Analyses and interprets findings of ergonomics investigations**

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***Element 2.1 Evaluates products or work situations in relation to expectations for error-free performance.***

**Performance Criteria**

**2.1a** Determines the demands placed on people by tools, machines, jobs and environments.

**2.1b** Evaluates user needs for safety efficiency, reliability and durability, and ease of use of products and equipment and how these are met.

***Element 2.2 Appreciates the effect of factors influencing health and human performance.***

**Performance Criteria**

**2.2a** Has a basic understanding of the mechanisms by which work or prolonged exposure to environmental hazards may affect human performance or be manifested in injury, disorder or disease.

**2.2b** Defines efficiency, safety, health and comfort criteria.

**2.2c** Specifies the indicators of poor match between people and their tools, machines, jobs and environments.

***Element 2.3 Consults appropriately regarding analysis and interpretation of research data.***

***Element 2.4*** *Analyses current Guidelines, Standards and legislation, regarding the variables influencing the activity.*

**Performance Criteria**

**2.4a** Refers to and applies relevant scientific literature and national and international recommendations and standards appropriate to the project.

**2.4b** Matches measurements against identified Standards.

***Element 2.5*** *Makes justifiable decisions regarding relevant criteria which would influence a new design or a solution to a specified problem.*

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**Unit 3. Documents ergonomic findings appropriately.**

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***Element 3.1 Provides a succinct report in terms understandable by the client and appropriate to the project or problem.***

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**Unit 4. Determines the compatibility of human capacity and planned or existing demands.**

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***Element 4.1 Appreciates the extent of human variability influencing design.***  
**Performance Criteria**

**4.1a Understands the influence of such factors as a user's body size, skill, cognitive abilities, age, sensory capacity, general health and experience on design features.**

***Element 4.2 Determines the match and the interaction between a person's characteristics, abilities, capacities and motivations, and the organisation, the planned or existing environment, the products used, equipment, work systems, machines and tasks.***

***Element 4.3 Identifies potential or existing high risk areas and high risk tasks.***

***Element 4.4 Determines whether the source of a problem is amenable to ergonomic intervention.***

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**Unit 5. Develops a plan for ergonomic design or intervention.**

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***Element 5.1 Adopts a holistic view of ergonomics in developing solutions***

**Performance Criteria**

**5.1a Identifies the relative contribution of organisational, social, cognitive, perceptual, environmental, musculoskeletal or industrial factors to the total problem and develops solutions accordingly.**

**5.1b Considers the impact of legislation, codes of practice, Government Standards and industry-based standards on defined problems and possible solutions.**

***Element 5.2 Incorporates approaches which would improve quality of life in the working environment***

**Performance Criteria**

**5.2a Provides opportunities for self development.**

**5.2b Considers factors influencing the person's sense of satisfaction with the workplace.**

***Element 5.3 Develops strategies to introduce a new design to achieve a healthy and safe work place.***

**Performance Criteria**

**5.2a Understands the iterative nature of design development.**

**5.2b Recognises the practicalities and limitations of applying ergonomics, including the introduction of change.**

5.2c Prepares a design specification report based on the systematic analysis to meet the objectives of the project, for use by industrial designers, engineers, computer scientists, systems analysts, architects or other professionals.

*Element 5.4 Considers alternatives for optimisation of the match between the person and the product, the task or the environment and to achieve a good performance*

**Performance Criteria**

5.3a Establishes appropriate short and long term goals relevant to the defined problems, in consultation with the client.

5.3b Considers the options available and the balance of approaches to be applied, relevant to the objectives.

5.3d Considers the potential benefits and costs of each form of ergonomic solution.

*Element 5.5 Develops a balanced plan for risk control*

**Performance Criteria**

5.4a Appreciates the background information required for effective risk management.

5.4b Understands how to control adverse physical and chemical conditions and major pollutants.

5.4c Establishes priorities in relation to level of risks identified, and to their consequences for health safety.

5.4d Selects appropriate forms of risk control, based on theoretical knowledge and ergonomics practice and develops a comprehensive, integrated and prioritised approach for realistic risk control.

5.4e Identifies where assistive devices and aids could enhance compatibility between the person and the environment.

5.4f Considers the needs of special groups (eg. ageing or disabled).

*Element 5.6 Communicates effectively with the client and professional colleagues.*

**Performance Criteria**

5.5a Discusses with the client, users and management the design or intervention strategies available, their rationale, realistic expectations of outcome, limitations to achieving outcome, and the costs of the proposed ergonomics plan.

5.5b Establishes effective relationships and collaborates effectively with professional colleagues in other disciplines in the development of ergonomic design solutions.

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**Unit 6. Makes appropriate recommendations for ergonomic design or intervention.**

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*Element 6.1 Understands the hierarchies of control systems*

6.1a Recognises the safety hierarchy, application of primary and secondary controls and the order of introducing controls.

***Element 6.2 Outlines appropriate recommendations for design or intervention***

**Performance Criteria**

**6.2a Utilises the systems approach to human-workplace integrated design for new or modified systems and understands design methodology and its use in systems development.**

**6.2b Applies correct design principles to design of products, job aids, controls, displays, instrumentation and other aspects of the workplace, work and activities and considers human factors in the design of any utility.**

**6.2c Drafts systems concepts for a functional interaction of tasks/technological variants, work means/tools, work objects/materials, work places/work stations and the work environment.**

**6.2d Develops appropriate simulations to optimise and validate recommendations.**

**6.2e Outlines details of the appropriate concept and develops specific solutions for testing under realistic conditions.**

**6.2f Provides design specifications and guidelines for technological, organisational and ergonomic design or redesign of the work process, the activity and the environment which match the findings of ergonomic analysis.**

**6.2g Is able to justify recommendations.**

***Element 6.3 Outlines appropriate recommendations for organisational management***

**Performance Criteria**

**6.3a Understands the principles of total quality management.**

**6.3b Recognises the need to design organisations for effective and efficient performance and good quality of work place.**

**6.3c Recommends changes to the organisational design appropriate to the problem identified.**

**6.3d Considers issues such as participation, role analysis, career development, autonomy, feedback and task redesign as appropriate to the client and defined problem.**

***Element 6.4 Makes recommendations regarding personnel selection***

**Performance Criteria**

**6.4a Recommends personnel selection where appropriate as part of a balanced solution to the defined problem.**

**6.4a Applies appropriate criteria for personnel selection, where relevant, according to the nature of the demands.**

***Element 6.5 Develops appropriate recommendations for education and training in relation to ergonomic principles.***

**Performance Criteria**

**6.5a Understands current concepts of education and training relevant to application of ergonomic principles, including encouragement of learning.**

6.5b Implements effective education programs relevant to understanding the introduction of ergonomic measures or to the control of potential risks in the workplace, home, public or leisure environments, and to achieve safe and comfortable and successful performance and productive output in new and/or changed activities.

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**Unit 7. Implements recommendations to optimise human performance.**

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*Element 7.1 Relates effectively to clients at all levels of personnel.*

**Performance Criteria**

7.1a Communicates with the users, management and other professional colleagues in relation to method of implementation of the new design or risk control measures.

7.1b Uses appropriate processes to motivate the client to participate in the recommended ergonomics program and to take responsibility for achieving defined goals.

7.1c Where appropriate, provides individual guidelines for personnel in a form understandable to the client.

*Element 7.2 Supervises the application of the ergonomic plan.*

**Performance Criteria**

7.2a Implements appropriate design or modifications.

7.2b Facilitates the adaptation to new approaches to activity.

7.2c Provides appropriate feedback on progress to client.

7.2d Incorporates methods to allow continuous improvement.

*Element 7.3 Manages change effectively*

**Performance Criteria**

7.3a In a work environment, where necessary, overcomes resistance of workers, managers and labour unions to change, and gains their co-operation for implementing new approaches.

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**Unit 8. Evaluates outcome of implementing ergonomic recommendations.**

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*Element 8.1 Monitors effectively the results of ergonomic design or intervention.*

**Performance Criteria**

8.1a Selects appropriate criteria for evaluation.

8.1b Assesses level of acceptance of and satisfaction with implemented ergonomic measures.

8.1c Produces clear, concise, accurate and meaningful records and reports.

*Element 8.2 Carries out evaluative research relevant to ergonomics*

**Performance Criteria**



8.2a Demonstrates rational, critical, logical and conceptual thinking.

8.2b Critically evaluates new concepts and findings.

8.2c Demonstrates a knowledge of basic research methodology for ergonomics research in an area relevant to individual ergonomic expertise.

*Element 8.3 Makes sound judgements on the quality and effectiveness of ergonomics design or intervention.*

Performance Criteria

8.3a Considers the cost effectiveness of the program in terms of financial implication, improvement in productivity, product useability and human requirements for the enhancement of comfort and safety.

*Element 8.4 Modifies the program in accordance with results of evaluation, where necessary.*

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## Unit 9. Demonstrates professional behaviour.

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*Element 9.1 Shows a commitment to ethical practice and high standards of performance and acts in accordance with legal requirements.*

Performance Criteria

9.1a Behaves in a manner consistent with accepted codes and standards of professional behaviour.

*Element 9.2 Recognises personal and professional strengths and limitations and acknowledges the abilities of others.*

Performance Criteria

9.2a Recognises extent of own knowledge in ergonomics, appreciates areas where knowledge and skill are lacking and knows what to do and whom to contact to access missing expertise.

9.2b Demonstrates a desire for life long learning, regularly reviews and updates knowledge and skills relevant to current practice of ergonomics, to ensure appropriate breadth and depth of understanding.

9.2c Recognises those areas of ergonomics where knowledge is limited and consults appropriately with professional colleagues to ensure application of relevant expertise to particular problems.

9.2d Recognises the value of team work between multidisciplinary experts.

*Element 9.3 Maintains up -to- date knowledge of national strategies relevant to ergonomics practice.*

Performance Criteria

9.3a Demonstrates knowledge of government legislation relating to occupational health, control of environmental hazards and other areas relevant to ergonomics practice.

**9.3b Understands the industrial, legal and liability issues that impact upon professional ergonomics practice, and takes appropriate action regarding them.**

***Element 9.4 Recognises the impact of ergonomics on peoples' lives.***

**Performance Criteria**

**9.4a Appreciates the social and psychological impact of ergonomics investigations.**

**9.4b Appreciates professional responsibilities and requirements.**