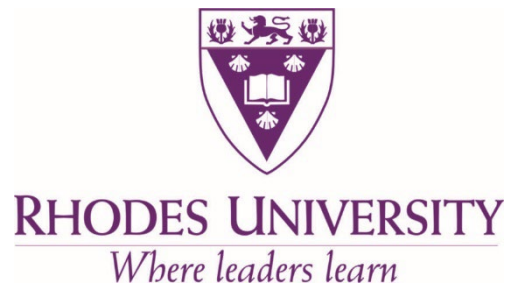


# HUMAN KINETICS AND ERGONOMICS

2024 Ergonomics Training Series



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## Background

The Human Kinetics and Ergonomics (HKE) Department at Rhodes University is currently the sole provider of undergraduate and postgraduate Human Factors and Ergonomics education in South Africa. Furthermore, the academic staff of the HKE department are intrinsically involved in ergonomics within both the South African and the international ergonomics community. Therefore, the Department believes it plays an important role in providing suitable ergonomics training to practitioners who, as part of their duties, must ensure company compliance with the Ergonomics Regulations.

Since 2015, the HKE Department has trained numerous practising individuals in ergonomics in the “Certificate in Ergonomics” short course, including inspectors from the Department of Employment and Labour, The Gauteng Department of Health, fellow academics, and practitioners from a variety of industries. Since the announcement of the promulgation of the Ergonomics Regulations in December 2019, interest in ergonomics training has increased considerably. This has prompted the HKE Department to re-evaluate its “Certificate in Ergonomics” course, to a) be responsive to the Ergonomics Regulations, and b) be more accessible in terms of time and money available for a broader range of industries (i.e., SMME’s to large corporations), and c) offer flexibility in its curriculum. As a result, the former “Certificate in Ergonomics” course was restructured into several smaller short courses. In doing so, it was important that these short courses on offer fulfil the university’s policy requirements for short courses, and that the content of the reworked ergonomics courses remain aligned with the educational knowledge required by the Professional Affairs Board (PAB) of the Ergonomics Society of South Africa (ESSA) and its certification criteria. In short, the reworked version of the “Certificate in Ergonomics” covers the same content as the course offered previously, but in a different format, to offer greater accessibility and flexibility for course participants. These new individual courses were presented for the first time starting at the end of 2021 and throughout 2022. 2024 will see a further iteration of these five courses, depending on interest.

## Overview of Ergonomics Short Courses offered by the HKE Department

The HKE Department has developed four stand-alone short courses that cover the principles of ergonomics in a variety of situations ranging from offices to a variety of industries in the South African context (Table I). Furthermore, the Department offers the opportunity to perform self-directed project work under the guidance of an HKE-appointed facilitator to gain practical experience (reflected as “Course 5” in Table I). Together, these courses provide a framework of knowledge covering the breadth of ergonomics theory, ergonomics programmes, and ergonomics risk assessments, as well as applied projects, and will provide

a suitable level of education for participants intending to register as Certified Ergonomics Associate (CEA) with the Professional Affairs Board of the Ergonomics Society of South Africa. As such, participants who successfully complete all elementary short courses will have the following capabilities that are aligned with the requirements for a CEA:

*“A Certified Ergonomics Associate (CEA) is an interventionist who applies a general breadth of knowledge to the analysis and evaluation of currently operating work systems. The scope of practice of a CEA is limited to the use of commonly accepted tools and techniques for the analysis and enhancement of human performance in existing systems. A CEA may, for example, be responsible for the co-ordination of an Ergonomics Facilitation team within their industry to create an awareness of Ergonomics, to identify problems, to implement basic solutions and to recognise when to consult a CPE”* (Professional Affairs Board Charter, 2014).

Table 1: Overview of the 2024 ergonomics training courses offered by the HKE Department

	Short Course	Nature of Module	Requirements	Duration	Total Hours
1	Introduction to Ergonomics and Ergonomics Programmes	Online	<ul style="list-style-type: none"> <li>• 60 hrs Theory</li> <li>• 20 hrs Project</li> </ul>	2 Months <ul style="list-style-type: none"> <li>• Expectation of 10hrs per week</li> </ul>	80
2	Level 1 Ergonomics Assessment and Controls	Blended Learning *	<ul style="list-style-type: none"> <li>• 20 hrs Theory</li> <li>• 20 hrs Practicals</li> <li>• 20 hrs Project</li> </ul>	3 Weeks <ul style="list-style-type: none"> <li>• 2 weeks Online</li> <li>• 1 week Face-to-Face</li> </ul>	60
3	Level 2 Assessment of Physical Work	Blended Learning *	<ul style="list-style-type: none"> <li>• 30 hrs Theory</li> <li>• 20 hrs Practicals</li> <li>• 30 hrs Project</li> </ul>	1 Month <ul style="list-style-type: none"> <li>• 3 weeks Online</li> <li>• 1 week Face-to-Face</li> </ul>	80
4	Level 2 Assessment of Cognitive Work	Blended Learning *	<ul style="list-style-type: none"> <li>• 30 hrs Theory</li> <li>• 20 hrs Practicals</li> <li>• 30 hrs Project</li> </ul>	1 Month <ul style="list-style-type: none"> <li>• 1 week Face-to-Face</li> <li>• 3 weeks Online</li> </ul>	80
5	Project	Online	<ul style="list-style-type: none"> <li>• 60 hrs Project</li> </ul>	2 Months <ul style="list-style-type: none"> <li>• Self-directed work under supervision</li> </ul>	60

\* Blended learning refers to a combination of online and face-to-face activities

## Course Principles

The ergonomics training courses listed above make use of an active and experiential learning approach and are based on the principles of applied learning and reflective learning. Understanding theoretical concepts is pointless if participants cannot apply the knowledge to their own contexts. The applied learning components make use of in situ examples such as fieldtrips and practical hands-on activities that participants must perform at their place of work. Reflective learning is based on Deming’s Plan-Do-Check-Act cycle and allows participants to take ownership of their learning process. Reflection on the practical activities and assignments enhances theoretical understanding and promotes practical competence.

## Course Structures

The ergonomics short courses are designed in a manner that comply with the guidelines outlined in the Professional Affairs Board constitution of the Ergonomics Society of South Africa for recognition as a Certified Ergonomics Associate (Table II). The number of hours invested in each of the courses are achieved via seminars, online discussions, readings, self-directed learning activities, assignments, and project work. An outline of each course structure, and instructions on how to navigate the online learning management system, are provided to the participants ahead of time. All courses will have an e-learning component, but some courses will require additional face-to-face interactions. These contact sessions will require participants to meet at a specified venue, either Rhodes University in the Human Kinetics and Ergonomics Department or another location in South Africa. The Department also offers a course by project-work only under the supervision of the course facilitator. The specific course outlines contain details in this regard.

Table II: Areas of knowledge covered for each of the ergonomics short courses

Course	Topics
Introduction to Ergonomics & Ergonomics Programmes (80 hours)	General Principles of Ergonomics <ul style="list-style-type: none"> <li>History of work and the discipline of Human Factors and Ergonomics</li> <li>Overview of Ergonomics: definition, scope, aims, objectives, and benefits of ergonomics.</li> <li>Outcomes of poor ergonomics (ergonomics risks)</li> </ul>
	Ergonomics in South Africa <ul style="list-style-type: none"> <li>Industrially advanced vs. industrially developing countries</li> <li>Considerations of Ergonomics in the South African context</li> </ul>
	Systems of work <ul style="list-style-type: none"> <li>Introduction to systems theory</li> <li>Interfaces between work, humans, and the environment</li> </ul>
	Human Characteristics <ul style="list-style-type: none"> <li>Human variability</li> <li>The global and South African-specific workforce – considerations of work capabilities, health, and wellness</li> <li>How to assess worker capabilities</li> <li>Fitting the task to the human operator</li> <li>Physical, physiological, psychological, and cognitive characteristics</li> <li>Considerations of the physical environment and its impact on work</li> </ul>
	Ergonomics Advocacy <ul style="list-style-type: none"> <li>“Selling Ergonomics”</li> <li>Legislative Considerations</li> <li>Engagement with Ergonomics Regulations</li> <li>Cost-Benefit Analysis</li> </ul>
	Ergonomics Programmes <ul style="list-style-type: none"> <li>Developing an Ergonomics Programme</li> <li>Participatory Ergonomics</li> <li>Needs Analysis</li> <li>Ergonomics Training and ILO Ergonomics Checkpoints</li> </ul>

	<p>Evaluation of an Ergonomics Programme</p> <ul style="list-style-type: none"> <li>• Continuous Improvement</li> <li>• Outcome Assessment</li> <li>• Ergonomics Maturity Ladder</li> <li>• Professional Issues and Ethical Conduct</li> <li>• Professional Bodies</li> </ul>
	<p>Project</p> <ul style="list-style-type: none"> <li>• Examples from various industrial sectors</li> <li>• Applied Project</li> </ul>
<p>Level 1 Ergonomics Assessment &amp; Controls (60hrs)</p>	<p>Introduction to Risk Assessment</p> <ul style="list-style-type: none"> <li>• Principles of hazard and risk identification</li> <li>• Risk assessment cycle &amp; levels of assessment</li> <li>• Balance theory</li> <li>• Understanding the work system (task analysis and work domain analysis)</li> <li>• Ergonomics checklists for Level 1 risk assessment</li> <li>• Documenting and reporting of assessment findings</li> </ul>
	<p>Ergonomics Controls</p> <ul style="list-style-type: none"> <li>• Types of controls &amp; hierarchy of controls</li> <li>• System structures</li> <li>• Planning &amp; implementing controls</li> </ul>
	<p>Applied Project</p>
<p>Level 2 Ergonomics Assessment of Physical Work (80hrs)</p>	<p>Human characteristics relating to physical work &amp; work design</p> <ul style="list-style-type: none"> <li>• Anthropometry and design</li> <li>• Reach and clearance</li> <li>• Body posture</li> <li>• Seated operators</li> <li>• Visual fields</li> <li>• Computer workstations</li> </ul>
	<p>Work Related Risk Factors</p> <ul style="list-style-type: none"> <li>• Physical &amp; physiological risk factors</li> <li>• Psychosocial considerations</li> </ul>
	<p>Risk Screening</p> <ul style="list-style-type: none"> <li>• Systems description</li> <li>• Process analysis</li> <li>• Task identification and description</li> <li>• Introduction to risk screening tools</li> </ul>
	<p>Assessment of Manual Materials Handling</p> <ul style="list-style-type: none"> <li>• Liberty tables for lifting tasks, carrying tasks, pushing, and pulling tasks</li> </ul>
	<p>Assessment of working postures</p> <ul style="list-style-type: none"> <li>• Tools for assessing whole body movement</li> <li>• Tools for assessing upper extremity work</li> <li>• Tools for assessing seated work</li> <li>• Tools for assessing office workstations</li> </ul>
	<p>Assessment of Hand-intensive Tasks</p> <ul style="list-style-type: none"> <li>• Tools for assessing highly repetitive tasks of the wrists and hands</li> </ul>
	<p>Report Writing</p> <ul style="list-style-type: none"> <li>• Documenting the process, analysis, and outcomes of an ergonomics investigation</li> </ul>
	<p>Applied Project</p>

Level 2 Ergonomics Assessment of Cognitive Work (80hrs)	Human characteristics relating to cognitive work <ul style="list-style-type: none"> <li>• Background to human information processing</li> <li>• Overview of cognitive ergonomics</li> <li>• Cognition and human performance</li> <li>• Cognitive constructs</li> <li>• Factors affecting human cognition</li> <li>• Consequences associated with cognitive risks (human reliability &amp; error)</li> </ul>
	Performance Factors – Focus on Fatigue <ul style="list-style-type: none"> <li>• Individual variability</li> <li>• Chronobiology</li> <li>• Task related factors</li> </ul>
	Assessment of Cognition <ul style="list-style-type: none"> <li>• Workload assessments (NASA-TLX &amp; HRF variability)</li> <li>• Fatigue assessment</li> <li>• Error frameworks &amp; classifications</li> </ul>
	Workspace Design <ul style="list-style-type: none"> <li>• Workstation analysis</li> <li>• Environmental factors</li> <li>• Organizational factors</li> </ul>
	Applied Project
Ergonomics Projects (60hrs)	Basic principles of scientific study approaches Applied Project

## Modes of Delivery

The mode of delivery for the courses will vary depending on the intended outcomes of each course. Teaching and learning strategies include, but are not limited to, lectures, discussions (online or face-to-face), practical exercises, self-directed learning, and reflective journaling. Each course will have its own unique delivery characteristics depending on the intended outcomes of that particular course. The “Introduction to Ergonomics and Ergonomics Programmes” is purely e-learning based, using online interactions and facilitation. The courses covering Ergonomics Assessments at a “Level 1” and “Level 2” make use of blended learning, meaning there will be an e-learning component, but also face-to-face interactions. The “Ergonomics Projects” course will be self-directed and under the supervision of the course facilitator.

## Costs of Courses

It is important to the HKE Department that the ergonomics courses are accessible to a large variety of practitioners. As such, we are trying to keep our course costs as low as possible. Given the various delivery modes of courses, costs will also vary.

## Requirements for Course Participation

*Prior learning:* To register for participation in any of the ergonomics short courses, participants must have a diploma or an undergraduate degree from a recognised institution in a cognate discipline; for example, medicine, biokinetics, physiotherapy, engineering, industrial design, health and safety, etc. Furthermore, while efforts have been made to design the courses to be independent of one another, some courses require prior learning from preceding courses. For example, participants must complete the “Introduction to Ergonomics and Ergonomics Programmes” course before commencing with any other ergonomics course in this series. Furthermore, participants should also be capable of conducting a “Level 1” ergonomics assessment before participating in any of the courses covering “Level 2” ergonomics assessments. Details of such prior learning are specified in the individual course documents. Participation in other ergonomics training courses that meet the requirement for prior learning will be considered with proof of a training certificate and a corresponding course outline.

*Language competence:* Participants must have a solid grasp of the English language (verbal and in writing) since this is the language of tuition for all courses.

*Computer competence and internet access:* All courses have either a partial or a full e-learning component, hence it is essential that participants are proficient with computer use and have daily access to the internet so they can engage in online discussions and activities. Access to the online teaching management system will be provided prior to the start of each course.

*Travel:* Courses that make use of blended learning (i.e., those that have contact sessions) will require participants to travel to participate in face-to-face activities.

## Course Durations and Time Investments

Each course differs in duration, as well as the daily / weekly time investments required by participants. For example, the e-learning components are more spread out, hence resulting in a longer overall duration, while face-to-face interactions are of shorter durations, but with more intense learning activities.



Table III: Time investment required per course

Course	Duration	Total Hours
1. Introduction to Ergonomics and Ergonomics Programmes	8 weeks - Online only (Expectation: 10hrs per week; i.e. 2hrs per work day)	80 hrs
2. Level 1 Ergonomics Assessment	3 Weeks <ul style="list-style-type: none"> <li>• 2 weeks Online (2hrs per day)</li> <li>• 1 week Face-to-Face (4 full days)</li> <li>• Assignments</li> </ul>	20 hrs 30 hrs 10hrs
3. Level 2 Ergonomics Assessment of Physical Work	1 Month <ul style="list-style-type: none"> <li>• 3 weeks Online (2hrs per day)</li> <li>• 1 week Face-to-Face (4 full days)</li> <li>• Assignments</li> </ul>	30 hrs 30 hrs 20 hrs
4. Level 2 Ergonomics Assessment of Cognitive Work	1 Month <ul style="list-style-type: none"> <li>• 1 week Face-to-Face (4 full days)</li> <li>• 3 weeks Online (2hrs per day)</li> <li>• Assignments</li> </ul>	30 hrs 30 hrs 20 hrs
5. Projects	2 months – self-directed under supervision (Expectation: 8hrs per week, i.e. 2hrs per work day)	60 hrs
<b>TOTAL TIME INVESTED</b>		<b>360 hrs</b>

*\* Note: Each course consists of time dedicated to teaching and learning activities. "Preparation", as well as "consolidation" weeks may be added prior to the start or end of a course.*

While participants can select which course to participate in, depending on interest and need, completing all courses including the "Projects" course will make up the 360 hours of educational time required by the Professional Affairs Board (PAB) of the Ergonomics Society of South Africa (ESSA) for certification as a Certified Ergonomics Associate (Table III). The hours invested in the course are met through the following activities: participating in interactive activities, self-directed learning, reading, and researching tasks, assignments, as well as self-directed project work.

### Minimum Requirements & Assessment of Competence

For the short course qualification to be recognised by Rhodes University and by the Professional Affairs Board of the Ergonomics Society of South Africa, it is not only necessary for candidates to have participated in the course, but also to have demonstrated competence through the submission of a variety of assignments.

Participants are required to complete a minimum of 75% of online learning activities, as well as attend at least 75% of face-to-face activities. The intended learning outcomes (stated within each of the course guidelines) are assessed via mandatory assignments. To pass each course participants must obtain a minimum average mark of 50% for these assignments. Assessment types can range from completing quizzes, writing tests, writing essays or reports, presentations on given topics, just to name a few. Assessments are aligned with the intended course outcomes and will therefore differ from course to course.

Furthermore, to fulfil the number of hours of the “Applications” category required by the ESSA-PAB, participants must complete a self-directed project under the supervision of the course facilitator.

### Generic Learning Outcomes

Each course has specific learning outcomes that participants need to demonstrate. However, there are also generic learning outcomes to the training series as a whole, which transcend the individual courses. These are referred to as “critical cross-field outcomes” (CCFOs) and include:

- Mastery of concepts and development of core information in disciplines not previously studied
- Time management
- Computing skills
- Access and retrieval of information
- Basic data analysis techniques
- Communication skills – verbal and written

### Course Evaluations

To improve on future courses, participants are encouraged to provide regular feedback to the course coordinator and/or facilitators. Course evaluations can be managed formally by means of online questionnaire, or informally in a forum discussion, for example.