

# HUMAN KINETICS AND ERGONOMICS

2021 Ergonomics Training Series



**RHODES UNIVERSITY**  
*Where leaders learn*

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### Background

The Human Kinetics and Ergonomics (HKE) Department at Rhodes University is currently the sole provider of undergraduate and postgraduate 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 may, as part of their duties, have to ensure company compliance with the newly promulgated 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, 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 has been restructured into several smaller short courses. In doing so, it was important that these short courses 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, in order to offer greater accessibility and flexibility for course participants.

### 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 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 supervisor 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 2021 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 (April & May) <ul style="list-style-type: none"> <li>• Expectation of 10hrs per week</li> </ul>	80
2	Level 1: Ergonomics Risk 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 (July) <ul style="list-style-type: none"> <li>• 1 week Face-to-Face</li> <li>• 2 weeks Online</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 (September) <ul style="list-style-type: none"> <li>• 1 week Face-to-Face</li> <li>• 3 weeks Online</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 (November) <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 (TBA) <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 are 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 have to 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 also 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 an HKE staff member. 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>• Definitions, aims, objectives and benefits of ergonomics</li> <li>• History of work and the discipline of Human Factors and 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 / 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>
	Evaluation of Ergonomics Programme <ul style="list-style-type: none"> <li>• Continuous Improvement</li> <li>• Outcome Assessment</li> </ul>

	<ul style="list-style-type: none"> <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>
Level 1 Ergonomics Assessment & Controls (60hrs)	<p>Introduction to Risk Assessment</p> <ul style="list-style-type: none"> <li>• Understanding “Risk”</li> <li>• General Ergonomics Aims</li> <li>• Balance Theory</li> <li>• Human Resources</li> <li>• Risk Assessment Cycle</li> <li>• Task Analysis</li> </ul>
	<p>Introduction to the assessment of physical work</p>
	<p>Introduction to the assessment of cognitive work</p>
	<p>Ergonomics Interventions</p> <ul style="list-style-type: none"> <li>• Types of Controls</li> <li>• Hierarchy of Controls</li> <li>• System Structures</li> </ul>
	<p>Applied Project</p>
Level 2 Ergonomics Assessment – Physical considerations (80hrs)	<p>Human characteristics relating to physical work</p>
	<p>Work Related Risk Factors</p> <ul style="list-style-type: none"> <li>• Definitions and Explanations</li> <li>• Documenting Process, analysis and outcomes</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>• NIOSH Lifting equation</li> <li>• Liberty tables for lifting tasks, carrying tasks, pushing and pulling tasks</li> </ul>
	<p>Assessment of body postures</p> <ul style="list-style-type: none"> <li>• Tools for assessing whole body movement</li> <li>• Tools for assessing upper extremity work</li> </ul>
	<p>Applied Project</p>
Level 2 Ergonomics Assessment – Cognitive considerations (80hrs)	<p>Human characteristics relating to cognitive work</p> <ul style="list-style-type: none"> <li>• Human Information processing</li> <li>• Overview of Cognitive Ergonomics</li> <li>• Fatigue and performance influencing factors</li> </ul>
	<p>Performance Factors – Fatigue</p> <ul style="list-style-type: none"> <li>• Individual Variability</li> <li>• Chronobiology</li> <li>• Methods of assessment</li> <li>• Task related factors</li> </ul>
	<p>Understanding the Office</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> </ul>

	<ul style="list-style-type: none"> <li>• Visual fields</li> <li>• Computer Workstations</li> <li>• Methods of assessment</li> </ul>
	Workspace Design <ul style="list-style-type: none"> <li>• Work station analysis</li> <li>• Environmental factors</li> <li>• Organizational Factors</li> </ul>
	Applied Project
Projects (60hrs)	Basics of scientific study designs Applied Project(s)

## 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 projects course will be self-directed and under the supervision of an HKE staff member.

## 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 in costs. Details of the costs are communicated in the individual course documents.

## Requirements for Course Participation

*Prior learning:* In order 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. 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. they 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 of 10hrs per week; i.e. 2 hrs per work day)	80 hrs
2. Level 1 Ergonomics Assessment	3 Weeks <ul style="list-style-type: none"> <li>1 week Face-to-Face (4 full days)</li> <li>2 weeks Online (2hrs per day)</li> <li>Assignment(s)</li> </ul>	30 hrs 20 hrs 10hrs
3. Level 2 Ergonomics Assessment - Physical Work	1 Month <ul style="list-style-type: none"> <li>1 week Face-to-Face (4 full days)</li> <li>3 weeks Online (2 hrs per day)</li> <li>Assignment(s)</li> </ul>	30 hrs 30 hrs 20 hrs
4. Level 2 Ergonomics Assessment - Seated and Cognitive Work	1 Month <ul style="list-style-type: none"> <li>1 week Face-to-Face (4 full days)</li> <li>3 weeks Online</li> <li>Assignment(s)</li> </ul>	30 hrs 30 hrs 20 hrs
5. Self-directed project work	2 months – self-directed under supervision (Expectation of 8hrs per week (2 hrs 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 module to participate in, depending on interest and need, completing all modules as well as the self-directed project will make up the 360 hours of educational time required by the ESSA PAB for certification as Certified Ergonomics Associate (Table III). The hours invested in the course include participating in interactive activities, self-

directed learning, reading and researching tasks, assessments and 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 'students' 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 time. The intended learning outcomes (stated within each of the course guidelines) are assessed via mandatory assignments. To pass the course participants have to obtain an average mark of 50% for these assessments. 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 have to complete a self-directed project under the supervision of an HKE-appointed supervisor.

### Generic Learning Outcomes

Each course has specific learning outcomes that participants will 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.