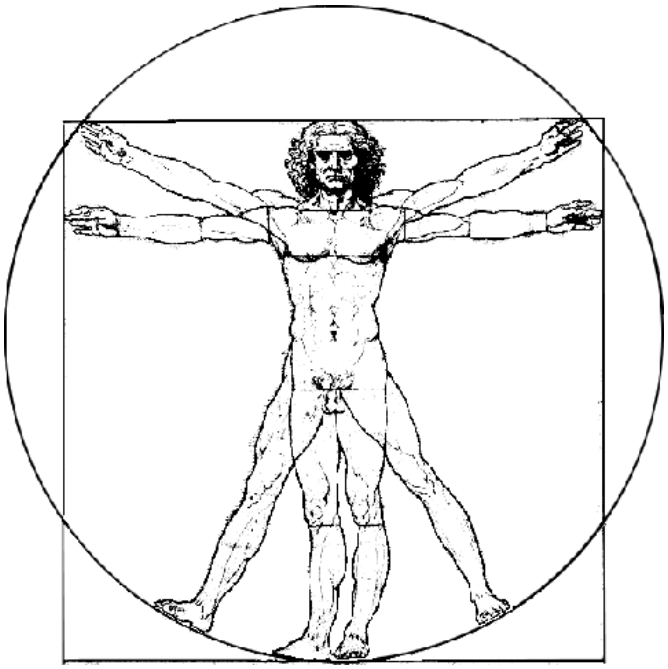
DEPARTMENT OF
HUMAN KINETICS AND ERGONOMICS



HKE Handbook 2011
Undergraduate Students

General Information

Timetables

Course Outlines

Assignments and Exam Information

RHODES UNIVERSITY

Where leaders learn

This handbook contains all relevant organisational information for HKE undergraduate students in 2011. Please study it carefully at the beginning of and regularly during the academic year and follow the instructions. No excuse will be accepted for ignorance when rules are violated.

Please note that dates and locations may be subject to change. Please check the departmental notice boards for updated information.

Content

Grahamstown, January 2011

Department of Human Kinetics and Ergonomics

Rhodes University

1 General Considerations

1.1 Department

Location:

The department with all its lecture rooms, laboratories and offices is located in the Human Kinetics and Ergonomics (HKE) building in upper African Street (between Croft Street and Warren Street; before the Sports Administration Building and next to the Rhodes Health Suite; on the University map in Rhodes calendar buildings G2 and G3).

Departmental Staff:

	phone	email
Ms J McDougall (Office Administrator)	046-603 8471	j.mcdougall@ru.ac.za
Professor M Goebel (Head of Department)	046-603 8468	m.goebel@ru.ac.za
Dr C Christie (Senior Lecturer)	046-603 8470	c.christie@ru.ac.za
Dr S Zschernack (Senior Lecturer)	046-603 8472	s.zschernack@ru.ac.za
Mr A Todd (Lecturer)	046-603 8469	a.todd@ru.ac.za
Ms M Mattison (Junior Lecturer)	046-603 8468	m.mattison@ru.ac.za
Mr T Douglas (Technical Officer)	046-603 8471	t.douglas@ru.ac.za
Ms J Nontyi (Department services)	046-603 8471	
Mr C Ngqoyiya (Department services)	046-603 8471	
Fax machine	046-603 8934	

Please feel free to contact the departmental staff members for any query you may have.

Departmental information:

Please obtain further information from the departmental notice boards or from the departmental website: http://www.ru.ac.za/humankineticsandergonomics.

1.2 Access and Security

Entrance to the HKE Department is via the large glass doors from the African Street side. For security reasons these doors will be locked outside of working hours (before 8:30 and after 16:30pm), during lunch (12:45 to 14:00), as well as during the examination and holiday periods.

In order to discourage criminals from entering the HKE Department please adhere to the following:

- Avoid using the side door, and if you do use it, ensure that it is properly closed behind you and locked.
- Escort strangers to their point of interest in the department as well as show them the way out.

- Be vigilant of strangers entering and exiting the Department.
- Report any suspicious people in the Department to the office administrator or academic staff.

1.3 Plagiarism

Plagiarism is a serious offence and Rhodes University has updated its Plagiarism Policy. Students are encouraged to familiarize themselves with the Rhodes University Plagiarism Policy which can be accessed on: https://www.ru.ac.za/documents/Institutional%20Planning/plagiarism_policy.pdf.

What is Plagiarism?

Plagiarism refers to the practice of presenting work material written by someone else as your own, and is thus unethical. Any use of material that is derived from the work of another person constitutes plagiarism, unless the source is clearly acknowledged in the manner described below. You will be guilty of plagiarism if, for example, you hand in an assignment under your own name which, either in part or as a whole:

- is copied from an essay or practical report written by another student,
- is copied from a document downloaded from a website,
- is copied from a published article or book chapter, or
- has been written for you by someone else.

How to avoid plagiarism

Acknowledge the source of the material! When writing an essay or laboratory report in an academic setting it is normal to draw on material written by other people. However, when you do this, it is important that you acknowledge the fact that you have drawn on other people's work. There are standard procedures for doing this - for example by citing a reference and providing details of the source in a reference list at the end of the assignment. You are expected to do this even where you do not quote directly from your source, but merely express, in your own words, ideas or arguments which you have taken from that source. In addition, where you quote verbatim from a published source, you must place the quoted material in inverted commas and provide a page number. The only situation in which these rules do not apply strictly is in examinations as these are normally written without access to books and other reference materials.

Please refer to section 7 of this handbook (Basic Format Guide) for details on how to reference in an HKE assignment. The library website has a useful guide to information literacy and can be accessed on http://www.ru.ac.za/static/library/infolit/use.html.

Copy and Paste Assignments

While not technically falling under the definition of plagiarism, students should be aware that correctly referenced "copy and paste" assignments, i.e. where the student has simply presented numerous correctly referenced quotes as the content of his/her assignment, is not considered acceptable, and would not merit a pass. This is so because such a student has not written anything of his/her own in these passages, and a mark cannot be allocated to the unconsidered words of others. If the entire assignment is composed of such extracts, it will, generally speaking, receive a mark of 0%.

Disciplinary action in response to plagiarism

As a university student it is important that you understand and observe the highest standards of ethics, integrity and professional practice in the writing of assignments and laboratory write-ups.

The Department of Human Kinetics and Ergonomics therefore expects these high standards to be observed as a matter of course. Many students think that there is no harm in copying sentences from books, articles and websites when composing any written work. However, in terms of the policy stated above, the use of even one sentence without acknowledgement constitutes plagiarism and is not acceptable.

Senate policy on plagiarism

The Senate of the University has adopted an overall policy towards the handling of plagiarism. In terms of this policy:

- Departments are encouraged to address the matter in their teaching, and to train students in the correct procedures for acknowledging the sources of material used for assignments.
- Cases of plagiarism must be addressed by disciplinary procedures within the Department or at University level.
- Disciplinary steps may range from giving a warning (for first time and minor offences), to imposing a mark penalty or in more serious cases, to withdrawing the student's DP.

HKE Department policy

First minor offence: 20% deduction of allocated mark, and student(s)' name(s) noted within department records.

First major offence: a mark of zero and name sent to the University's Plagiarism Committee.

Any second offence: withdrawal of the student's DP, a mark of zero and name sent to the University's Plagiarism Committee.

1.4 "Duly Performed" (DP) rule

Please note that the "Duly Performed" rule applies to all academic departments at Rhodes!

It is particularly important that students understand that no department is obliged to warn students that their performance is not meeting the requirements of the DP regulations of the department.

Students must be responsible for monitoring their own performance. If a department refuses a DP certificate to a student and the student appeals for reconsideration (to the Head of Department in the first instance and then to the Dean), no consideration will be given to any claim that the student was unaware that performance was such that it did not meet those requirements.

Students are responsible for determining whether they are satisfying the requirements of the department, by checking with their course coordinator or the Head of Department (HoD) in cases of doubt.

Requirements for the HKE department

In the Department of Human Kinetics and Ergonomics the earning of a DP certificate, and hence being allowed to write the examinations, is dependent upon the following requirements:

1. Attendance of at least 75% of tutorials for first and second year students.
2. Attendance at ALL tests and laboratories through the year.
3. Submission of ALL assignments and laboratory write-ups.
4. A *minimum* class mark of 40%, or higher!

In the event of missing a test, a laboratory session or not submitting a laboratory write-up, the lecturer concerned must be given a valid reason for the absence or omission in the form of a leave of absence (LOA) which can be obtained from the secretary's office. According to University rules, illness, university sporting events, or serious family issues are the only accepted reasons for having an LOA granted. In case of any doubt the course co-ordinator or HoD must be consulted BEFORE the student misses a test, laboratory or assignment deadline. If the LOA is not approved, then HoD will be notified, a DP warning will be issued the first time and the student will be given a mark of 0% for the assignment. The second time the DP will be denied.

If the reason is approved, it is up to the discretion of the individual lecturer whether to request a make-up assignment from the student, else the class record will be calculated from the remaining assignments.

Please note that if a practical session requiring a laboratory report was not attended or an assignment deadline was missed (for a valid reason as listed above), **submission of the assignment is still required**; the LOA will merely grant an extension. It is important that the student consults the relevant lecturer to discuss details.

Be aware that **signing on behalf of another person**, even if only for an attendance list, **is a severe violation of law** and will be prosecuted, possibly leading to an exclusion from the University.

1.5 Lecture attendance

Attendance at lectures is not compulsory, but it is strongly recommended to attend and participate in all lectures. Subsequent lectures mostly relate to each other, so any missed lecture makes it difficult to follow the course content. Lecture materials dispensed by the lecturers or write-ups from other students cannot replace an own understanding from a lecture. Please note, that 30% of the final mark is based on each semester's class work. Also be aware that it is each individual's responsibility to acquire the knowledge required to pass the exams!

1.6 Tutorial System

Tutorials are held for first and second year students and are designed in such a way as to compliment the lectures by recapping work done in class; no new work is covered in the tutorials. The tutorials will help to consolidate knowledge by providing students with the chance to discuss any problems experienced with the course, particularly with regards to understanding the principles underlying observations and measurements, and

developing observational, deductive and interpretive skills.

Tutorials refer to small formal discussion groups held weekly that each first and second year student is obliged to attend. Each student must attend one tutorial during each week of the term, on an allocated day of the week (this will fit into each student's timetable), unless the coordinator of the tutorials states otherwise. **Please note that a minimum of 75% attendance rate per semester is a DP requirement**. Short tutorial assignments are compulsory and form part of the class mark.

All concerns with regards to tutorials should be addressed to, Jonathan Davy (j.davy@ru.ac.za) for first year tutorials, or Eva-Maria Burford (g06b3990@campus.ru.ac.za) for second year tutorials.

1.7 Student feedback and participation

Students are asked to participate actively to the department by providing feedback and suggestions on how to improve and meet student needs. Any comments or requests are welcomed by departmental staff at any time.

Communication

In order to provide clear and confident communication between students and staff, the course coordinators and the class representatives are advised to meet once each term to exchange information and discuss upcoming problems. Both representatives shall discuss issues with her / his colleagues before and after this meeting to get a broader audience addressed.

Course coordinators:

HKE I:	A Todd
HKE II:	C Christie
HKE III:	S Zschernack (1st semester) / M Mattison (2nd semester)
HKE Honours:	M Goebel
HKE Masters & PhD:	M Goebel

Performance monitoring

Students are given feedback about their performance in tests and assignments as soon as possible. The department endeavours to publish a preliminary class record mark based on the assignments and tests completed at the end of each term. Students are encouraged to enquire about their class mark with their course co-ordinator and make use of this opportunity to monitor their own performance regularly and request support early enough.

Students are also encouraged to meet with the corresponding lecturer(s) for any questions which may arise during the term or exam preparation. Similarly, the HoD and lecturers are prepared to provide assistance with working through past exams.

1.8 Communication between staff and students

The HKE Department has notice boards for undergraduate students on which timetables, lab schedules, practical groups and other events are announced. It is the students' responsibility to regularly need to check these notice boards in case changes have occurred. Announcements may also be made during lecture times, or via e-mail. Again,

students are advised to regularly check these avenues of communication.

1.9 Social Functions

The HKE Department a more informal interaction between undergraduates, postgraduates and staff by organizing the following functions. All HKE students are invited to attend these functions.

- Cocktail function (organized by the 2nd years) (between 7 – 18 March)
- Career Days – 12 April and 26 July

Other visiting lecturers, guest speakers or functions will be announced via the HKE notice boards.

1.10 Dates of Terms for 2011

1st Semester

1st Term: Monday 14 February – Friday 1 April (7 teaching weeks)

2nd Term: Monday 11 April – Friday 27 May (7 teaching weeks)

Graduation Ceremonies: Thursday 7 April, Friday 8 April, Saturday 9 April

Swot week: Monday 30 May – Friday 3 June

Examinations: Saturday 4 June – Friday 24 June

2nd Semester

3rd Term: Monday 25 July – Friday 9 September (7 teaching weeks)

4th Term: Monday 19 September – Friday 28 October (6 teaching weeks)

Swot week: Monday 31 October – Friday 4 November

Examinations: Saturday 5 November – Thursday 1 December

2 General Course Information

2.1 Admission to study HKE

Any student accepted by Rhodes University is eligible to register for HKE. Students intending to major in HKE must be registered either in a BSc, BA, BCom or BJourn program. Please consider timetable clashes with other subjects as limiting factors when planning your degree.

2.2 University academic requirements

In order to obtain a BSc, BA, BCom or BJourn degree it is each student's responsibility to ensure that the respective faculty requirements have to be met (either refer to the 2011 Rhodes University calendar, the faculty website, or consult the Faculty Dean).

2.3 Structure of the HKE undergraduate degree

HKE undergraduate courses (Bachelor's Degree):

All courses comprise of two semester courses (e.g. HKE 101 and HKE 102).

1st year: Human Kinetics and Ergonomics I (HKE I = HKE 101 + HKE 102)

2nd year: Human Kinetics and Ergonomics II (HKE II = HKE 201 + HKE 202)

3rd year: Human Kinetics and Ergonomics III (HKE III = HKE 301 + HKE 302)

* *Please note that the Applied Anatomy and Physiology II course no longer exists as a separate credit, but has been incorporated in to the various HKE courses.*

In order to pass from one level to the next (e.g. from HKE I to HKE II) all semester-credits at the lower level are required.

HKE undergrad courses consist of different lecture modules (e.g. Physiology, Biomechanics, Ergonomics) and corresponding laboratory practicals. Table 1 provides a break-down of the various modules offered in each of the courses per semester.

Table 1: Module structure of the HKE degree.

HKE 101	**HKE 102**
Fundamental Concepts of HKE (a)	Biomechanics: Musculoskeletal levers
Functional Anatomy: Upper Extremities	Physiology: Cardiovascular & Respiratory
Anthropometry	Fundamental Concepts of HKE (b)

HKE 201	HKE 202
Functional Anatomy: Trunk & Vertebral column	Physiology: Muscle & Neural
Ergonomics: Workspace Design	Human Information Processing: Human Senses
Biomechanics	

HKE 301	HKE 302
Physiology: Nutrition, Endocrinology & Energy Expenditure	Functional Anatomy: Lower Extremities
Motor Learning	Biomechanics
Ergonomics: Tool Design	Environmental Ergonomics
Human Information Processing: Decision making	Ergonomics: Fatigue and Shiftwork
Macroergonomics and Work Organization	

2.4 Postgraduate Degrees in HKE

Postgraduate Honours course in HKE

The Honours course in Human Kinetics and Ergonomics is a one year full-time attendance joint seminar and thesis based course. It is aimed at providing graduates with research knowledge and application skills for responsible management and consultancy posts as well as for further academic degrees.

Minimum requirement for admission to HKE Honours is a Bachelor Degree in Human Kinetics and Ergonomics or any other Bachelor course providing the required basic knowledge. Final admission will be based on merit, depending on number of applicants, staffing and laboratory equipment resources. In past years, applicants with marks of at least 60 to 65% in HKE 3 were accepted. It must be noted however that second year marks are also considered, as well as involvement in HKE activities such as participation in research and consultancies.

HKE Masters

Thesis based; 2 year duration full time or 3 year duration part time.

2.5 Departmental infrastructure and services

Photocopying, scanning and printing services

Photocopies (and, if technology permits, printouts from flash stick to the photocopier) are 30c per copy. **There are NO "I.O.U's**".

Instructions: Please ask the secretary for the "access code" and photocopy book. Write down the number reading from the machine. Enter the "access code" and then press the "access" button. Make your copies and then write down the number reading again, from the machine. Pay your money to the secretary who will sign the photocopy book.

(Operation instructions are displayed above the photocopy machine).

Colour printing can be done via the secretary's DeskJet colour printer and is charged at R2 per page. Most departmental computers have the DeskJet mapped in their printer selection. Please inform the secretary if you do intend to use the colour printer.

Scanning can be performed using the photocopy machine and the computer set up next to it. Place the page to be scanned on the photocopier, then access the Adobe Acrobat software, click on "file", "import", "scan". Follow instructions from hereon.

Library

Please note there is no longer a departmental library. All periodicals can be found in the Main Rhodes Library on central campus, and only past research reports, projects and theses are held in the Department. Please see the Department's secretary if you want to gain access to these.

Furthermore, HKE related books (including textbooks) are kept in the Main Rhodes Library. Core readings for the various modules have been placed onto shortloan.

3 HKE I (1st year)

Two semester credits: HKE 101 and HKE 102.

Course coordinator: A Todd (email: a.todd@ru.ac.za, phone: 046 603 8469)

Tutorial and laboratory coordinator: J Davy (email: j.davy@ru.ac.za, phone: 046 603 8471)

3.1 Admission into HKE I

Any student accepted by Rhodes University is eligible to register for HKE I. Students intending to major in HKE must be registered either in a BSc, BA, BCom or BJourn program. A science background is beneficial, but not a requirement.

As there is no separate Data Analysis module anymore, students are strongly encouraged to take up Statistics 1 as a credit, as basic statistical knowledge will be required for interpretation and application during assignments such as lab write-ups.

3.2 Structure of HKE I

Lectures:

Lectures, laboratories and tutorials take place during the following lecture periods throughout the year.

Mon	9.35 - 10.20	Lecture
Tues	10.30 - 11.15	Lecture
Wed	11.25 - 12.10	Lecture
Fri	8.40 - 9.25	Lecture
Thu & Fri	14.00 - 16.00	Laboratory (students will be allocated to ONE slot)

Tutorials as per arrangement

Module Structure

With exception of the 4th term all lecture terms consist of seven lecture weeks per term:
1st term: 14 February - 1 April (7 lecture weeks);
2nd term: 11 April - 27 May (7 lecture weeks);
3rd term: 25 July - 9 September (7 lecture weeks);
4th term: 19 September - 28 October (6 lecture weeks).

Table 2 depicts the various HKE modules taught throughout the year.

Table 2: Module structure for HKE I.

	Term	Module	Lecturer	Dates
HKE 101	1	Fundamental Concepts of HKE (part a)	M Goebel	Mon 14 Feb – Tue 08 Mar (14 lectures)
		Functional Anatomy: Upper Extremities	N Ndaki	Wed 09 Mar – Fri 1 April (13 lectures)
	2	Functional Anatomy: Upper Extremities	N Ndaki	Mon 11 April – Fri 06 May (12 lectures)
		Anthropometry	A Todd	Mon 09 May – Fri 27 May (12 lectures)
HKE 102	3	Biomechanics: Musculoskeletal levers	A Todd	Mon 25 Jul – Tue 16 Aug (13 Lectures)
		Physiology: Cardiovascular	C Christie	Wed 17 Aug – Fri 09 Sep (14 lectures)
	4	Physiology: Respiratory	C Christie	Mon 19 Sep – Fri 07 Oct (12 lectures)
		Fundamental Concepts of HKE (part b)	M Goebel	Mon 10 Oct – Fri 28 Oct (12 lectures)

Laboratory practicals:

Weekly laboratory practicals, either on a Thursday or Friday afternoon (please check your allocated day on the HKE I notice board), will be held in association with the lectures and for general skills. Students may be requested to hand in worksheets or write-ups for some practicals. Please consider the format guide (section 7) when writing these documents. Table 3 contains the provisional topics for HKE I practical. Please note that these may be subject to change; updated practical schedules will bedisplayed on the HKE noticeboard.

Table 3: Preliminary topics of laboratories in HKE I (please check notice boards in the department for updates and be prepared for practicals scheduled within the allocated period EVERY Thursday / Friday except for public holidays).

Term	Dates	Module	Lecturer
1	17/18 Feb	Introduction to the HKE Department	Todd & Goebel
	24/25 Feb	Fundamental Concepts 1	Goebel
	03/04 Mar	Fundamental Concepts 2	Goebel
	10/11 Mar	Literature Research / Word	TBA
	17/18 Mar	Literature Research / Word	TBA
	24/25 Mar	Anatomy 1	Ndaki
	31 Mar/1 Apr	Anatomy 2	Ndaki
2	14/15 Apr	Anatomy 3	Ndaki
	21/22 Apr	*No Lab (Public Holiday)*	-
	28/29 Apr	Data Analysis / Excel	TBA
	05/06 May	Data Analysis / Excel	TBA
	12/13 May	Anthropometry 1	Todd
	19/20 May	Anthropometry 2	Todd
	26/27 May	Exam Revision	Goebel, Ndaki & Todd
3	28/29 July	TBA	
	04/05 Aug	Biomechanics 1	Todd
	11/12 Aug	Biomechanics 2	Todd
	18/19 Aug	Career Counselling	TBA
	25/26 Aug	Physiology 1	Christie
	01/02 Sep	Physiology 2	Christie
	08/09 Sep	TBA	
4	22/23 Sep	TBA	
	29/30 Sep	Physiology 3	Christie
	06/07 Oct	Physiology 4	Christie
	13/14 Oct	Fundamental Concepts 1	Goebel
	20/21 Oct	Fundamental Concepts 2	Goebel
	27/28 Oct	Exam Revision	Todd, Christie & Goebel

Tutorials:

Every first year student has to attend 75% of all tutorials each semester, which means that missing more than two tutorials per semester will result in that student's DP being revoked, i.e. he / she will not be allowed to write the HKE examinations. Students may only miss more tutorials if they have filled out a leave of absence (LOA) form, accompanied by a letter stating a valid reason for their absence, which is to be handed in to the secretary. With exception of medical reasons the LOA has to be submitted BEFORE missing the tutorial.

With regards to written work, each student will have between 2 and 3 tutorial assignments to hand in per term. The topics for each piece of work will be handed out to each student one week before it is due. All tutorial work must be handed in on the specified date, by 9 am no later (usually a Monday). This work will count for marks.

Any complaints or problems that students may have with the tutorials, the work or the tutors should be brought to the attention of the first year laboratory/tutorial coordinator.

Supplementary Instruction:

Over and above the lectures, practicals and tutorials supplementary instruction (SI) sessions are offered on request. Students are asked to identify and express the need for such sessions directly to the course or tutorial coordinators, or via the class representatives.

3.3 Tests, assignments and examination in HKE I

Each module's lecturer will set tests and assignments to his/her discretion and dates will be announced in lectures or via the HKE I notice board. The marks from these assignments will be averaged to produce a class mark for each module. The module class marks for the semester will build the class record which contributes 30% to the total semester mark.

The two examination papers (each 3 hrs) at the end of each semester contribute 70% to the total semester mark (see Table 4).

***Please note*: Only students with a class mark of 40% or higher will be permitted to write the exams!**

Table 4: Mark composition of HKE I.

		HKE 101		HKE 102	
Class record	(30%)	7.5%	Fundamental Concepts (part a)	7.5%	Biomechanics
		15%	Functional Anatomy	15%	Physiology
		7.5%	Anthropometry	7.5%	Fundamental Concepts (part b)
Examina-tions	(70%)	35%	Paper 1 (3hrs): Fundamental Concepts & Anthropometry	35%	Paper 1 (3hrs): Fundamental Concepts and Biomechanics
		35%	Paper 2 (3hrs): Anatomy	35%	Paper 2 (3hrs): Physiology
Total	(100%)				

Pass criteria:

A pass mark at Rhodes University is 50% or higher (class record and examinations combined). Admission to second semester HKE 102 requires a sub-minimum of 40% in HKE 101. Students with an examination mark of 40-49% are considered for supplementary exams for both semesters (this is only optional for HKE I).

In order to pass into the next year (HKE 2) the overall final marks for both semester courses must aggregate to at least 50% (average year mark), with a sub-minimum of 40% required for each semester (i.e. HKE 101 and HKE 102).

3.4 Course content for HKE I

The following modules make up the HKE I course. Please note that the details listed under each module are a guideline only and may be subject to change.

Fundamental Concepts (part 1) in HKE 101 (M. Goebel)

The objective of this module is to establish the appropriate "mind-set" for a thorough understanding of the study of *Human Kinetics and Ergonomics.*

Based on the complex set of objectives studying the Human Factor within the different contexts of life, the different focuses of study are outlined. This is embedded into the historical development of studying human performance, human health and human labour in order to explain the basic concepts of study that have developed since then. From this, students will learn about the different approaches to study the Human Factor from an anatomical/mechanical, physiological, mental, psychological, social and economical perspective, what establishes the holistic approach of HKE. Topics include:

- Concepts of health - the ultimate objective of Human Factors study
- The physical, social and economic environment of human activity and its relationship to study the Human Factor
- History of researching human performance, human health and human labour
- Concepts of the cognate disciplines of HKE

- Human variability
- Balancing performance and health in the different environments
- Concepts of tasks and resources
- Effects of behaviour and environmental conditions
- Holistic approach of Human Factors study

In the Ergonomics section of this module different domains of work life are highlighted with their specific challenges for ergonomics intervention. Basic principles of analysis and design are applied using such examples. Topics include:

- Objectives and basic paradigms of ergonomics
- Safety and Health legislation
- Examples from work life showing the different objectives and different approaches of ergonomics interventions
- Analysis of typical tasks, e.g. agriculture, industry and office workplaces
- Basic methods of workplace analysis and design
- Areas of ergonomics activities

Functional Anatomy – The Upper Extremities in HKE 101 (N. Ndaki)

This module introduces the study of musculoskeletal anatomy and then focuses on the functional application of the musculoskeletal system to movement. Structures of the upper extremities are covered in detail and related to movement capabilities and selected injury mechanisms.

- Basic Concepts and Terminology: anatomical planes, axes and directions, movement descriptions, forces, stress and strain, basic pathological models
- Overview of the skeletal system: structure of bone, types of bones, articulations, anatomical landmarks.
- Introduction to biomaterials of the musculoskeletal system
- Functional anatomy of the pectoral girdle, shoulder joint, elbow joint and wrist and hand

Anthropometry in HKE 101 (A. Todd)

The object of this module is to provide the student with a basic understanding of the morphology of the human body and its application to ergonomics, sports science and health.

- Assessment of frame size
- Anthropometric landmarks and techniques
- Assessment of body composition
- Skinfolds
- Bioelectrical impedance
- Hydrostatic weighing
- Somatotying
    - Heath-Carter method
    - Somatotyping and performance

Biomechanics in HKE 102 (A. Todd)

This course serves as a basic introduction to the biomechanical analysis of human movement and is comprised of 26 lectures. The focus of this course will be threefold, firstly to provide an introduction to the basic concepts of biomechanics including spatial displacement with respect to time. Secondly, it will focus on developing an understanding of the human musculoskeletal system and the implications this has for human performance. Lastly the course will focus on developing an understanding of the concept of centre of mass and how it can be determined during human movement.

- Basic introduction – What is biomechanics
- Introduction to movement - spatial displacement with respect to time: speed, velocity, acceleration, momentum
- Musculoskeletal levers
  - What is a lever, lever classes
  - Turning effects, torque
  - Effort and Gear Ratios
  - Design of human musculoskeletal system
    - Mechanical advantage and disadvantage
    - Design for strength including types of strength
    - Design for speed and range of motion
    - Force-velocity relationship
    - Overcoming mechanical disadvantage
    - Implications for human movement
  - Resolution of musculoskeletal forces
    - Geometric construction
    - Pythagoras
    - Basic Trigonometry
    - Impact of line-of-action
    - Equilibrium
    - Procedural steps (1-6)
    - Bi-articular muscles
    - Shunt and spurt muscles
    - Muscle fibre orientation

Cardiovascular Physiology in HKE 101 (C. Christie)

The focus in this module is specifically on the structure and function of the cardiovascular system and the concept of energy systems.

- Structure and function of the heart
- Hearts blood supply and the conduction system and pacemaker
- Cardiac cycle
- Cardiac output, heart rate and stroke volume
- Hemodynamics
- Resistance to blood flow
- Blood pressure
- Circulatory adjustments
- Energy systems

Respiratory Physiology in HKE 101 (C Christie)

In this module the subject of physiology will be introduced and will focus specifically on the structure and function of the respiratory system.

- Introduction and anatomy of the system
- Pulmonary ventilation and ventilatory mechanics
- Ventilation and perfusion in the resting lung
- Exchange of O_2 and CO_2; Transport of O_2 and CO_2.
- Control of respiration
- Lung volumes and capacities; Lung function testing
- Asthma and exercise-induced asthma
- Industrial work and lung function and obesity and lung function
- “Ventilation and exercise”

Fundamental Concepts in HKE (part 2) (M. Goebel)

The objective of this module is to establish the appropriate "mind-set" for a thorough understanding of the study of *Human Kinetics and Ergonomics.*

Based on the complex set of objectives studying the Human Factor within the different contexts of life, the different focuses of study are outlined. This is embedded into the historical development of studying human performance, human health and human labour in order to explain the basic concepts of study that have developed since then. From this, students will learn about the different approaches to study the Human Factor from an anatomical/mechanical, physiological, mental, psychological, social and economical perspective, what establishes the holistic approach of HKE. Topics include:

- Concepts of health - the ultimate objective of Human Factors study
- The physical, social and economic environment of human activity and its relationship to study the Human Factor
- History of researching human performance, human health and human labour
- Concepts of the cognate disciplines of HKE
- Human variability
- Balancing performance and health in the different environments
- Concepts of tasks and resources
- Effects of behaviour and environmental conditions
- Holistic approach of Human Factors study

In the Ergonomics section of this module different domains of work life are highlighted with their specific challenges for ergonomics intervention. Basic principles of analysis and design are applied using such examples. Topics include:

- Objectives and basic paradigms of ergonomics
- Safety and Health legislation
- Examples from work life showing the different objectives and different approaches of ergonomics interventions
- Analysis of typical tasks, e.g. agriculture, industry and office workplaces
- Basic methods of workplace analysis and design
- Areas of ergonomics activities

3.5 Prescribed books for HKE I

Tortora, G.J. and Derrickson, B.H. (2005). *Principles of Anatomy & Physiology.* 11th Edition. New York: Wiley & Sons.

(or: Tortora, G.J. and Grabowski, S.R. (2003). *Principles of Anatomy & Physiology***.** 10th Edition. New York: Wiley & Sons.)

Hall, S.B. (2007). Basic Biomechanics. 5th Edition (or newer). Boston: McGraw-Hill International. ISBN 9780-0-07-110666-5.

4 HKE II (2nd year)

Two semester credits: HKE 201 and HKE 202.

Class coordinator: C Christie (email: c.christie@ru.ac.za, phone: 046-603 8470)

Tutorial and laboratory coordinator: E Burford (email: g06b3990@campus.ru.ac.za, phone: 046 603 8471)

4.1 Admission into HKE II

An aggregated pass mark for HKE I (minimum 50%) is a minimum requirement for admission to HKE II.

4.2 Structure of HKE II

Lectures:

Lectures, laboratories and tutorials take place during the following lecture periods throughout the year.

Mon	11.25 - 12.10	Lecture
Mon	14.00 - 17.00	Laboratory
Tues	7.45 - 8.30	Lecture
Wed	8.40 - 9.25	Lecture
Fri	10.30 - 11.15	Lecture

Tutorials as per arrangement

Module Structure:

With exception of the 4th term all lecture terms consist of seven lecture weeks per term:
1st term: 14 February - 1 April (7 lecture weeks);
2nd term: 11 April - 27 May (7 lecture weeks);
3rd term: 25 July - 9 September (7 lecture weeks);
4th term: 19 September - 28 October (6 lecture weeks).

Table 2 depicts the various HKE modules taught throughout the year.

Table 5: Module structure for HKE II.

	Term	Module	Lecturer	Dates
HKE 201	1	Functional Anatomy – Trunk & Vertebral Column	A Parker	Mon 14 Feb – Tue 08 Mar (14 lectures)
		Ergonomics - Workspace design	M Goebel	Wed 09 Mar – Fri 1 April (13 lectures)
	2	Biomechanics	A Todd	Mon 11 April – Fri 27 May (24 lectures)
HKE 202	3	Physiology: Muscle & Neural	C Christie	Mon 25 Jul – Fri 09 Sep (27 lectures)
	4	Human Information Processing: Human Senses	S Zschernack	Mon 19 Sep – Fri 28 Oct (24 lectures)

Laboratory Practicals

Weekly laboratory practicals will be held in association with the lectures and for general skills (see Table 6). Students may be requested to hand in worksheets or write-ups for some practicals. Please consider the format guide for the writing of those documents.

Table 6: Preliminary topics of laboratory in HKE II (please check notice boards in the department for updates and be prepared for practicals scheduled within the practical periods EVERY Monday except for public holidays).

Term	Date	Subject	Lecturer
1	14 Feb	TBA	
	21 Feb	Statistics	Todd
	28 Feb	Anatomy	Parker
	7 Mar	Anatomy	Parker
	14 Mar	Ergonomics – Workspace Design	Goebel
	21 Mar	*No Lab (Public Holiday)*	-
	28 Mar	Ergonomics – Workspace Design	Goebel
2	11 Apr	*TBA*	
	18 Apr	Biomechanics	Todd
	25 Apr	*No Lab (Public Holiday)*	-
	2 May	*No Lab (Public Holiday)*	-
	9 May	Biomechanics	Todd
	16 May	Biomechanics	Todd
	23 May	Biomechanics	Todd

3	25 Jul	*TBA*	
	1 Aug	Physiology	Christie
	8 Aug	Physiology	Christie
	15 Aug	Physiology	Christie
	22 Aug	Physiology	Christie
	29 Aug	Physiology	Christie
	5 Sep	TBA	
4	19 Sep	TBA	
	26 Sep	Presentation Skills & Power Point	Zschernack
	3 Oct	Human Information Processing	Zschernack
	10 Oct	Human Information Processing	Zschernack
	17 Oct	Human Information Processing	Zschernack
	24 Oct	Human Information Processing	Zschernack

Tutorials:

Every second year student has to attend 75% of all tutorials each semester, which means that missing more than two tutorials per semester will result in that student's DP being revoked. Students may only miss more tutorials if they have filled out a leave of absence form, accompanied by a letter stating a valid reason for their absence, which is to be handed in to the secretary.

With regards to written work, each student will have between 2 and 3 tutorial assignments to hand in per term. The topics for each piece of work will be handed out to each student one week before it is due. All tutorial work must be handed in on the specified date, by 9 a.m. no later (usually a Monday). This work will count for marks.

Any complaints or problems that students may have with the tutorials, the work or the tutors should be brought to the attention of the first year laboratory/tutorial coordinator.

Supplementary Instruction:

Supplementary instruction sessions are offered on request. Students are asked to identify and express the need for such sessions directly to the course or tutorial coordinators, or via the class representatives.

4.3 Tests, assignments and examinations in HKE II

Each module's lecturer will set tests and assignments to his/her discretion. The marks from these assignments will be averaged to produce a class mark for each module. The module class marks for the semester will, in conjunction with the tutorial mark, build the class record which contributes 30% to the total semester mark.

The HKE II examination at the end of each semester exists of two papers (each 3hrs) which together contribute 70% to the total semester mark (see Table 7).

Table 7: Mark composition of HKE II.

		HKE 201		HKE 202	
Class record	(30%)	7.5 %	Functional Anatomy	15%	Physiology
		7.5%	Ergonomics Workspace Design	15%	Human Information Processing
		15%	Biomechanics		
Examina-tions	(70%)	35%	Paper 1 (3hrs): Functional Anatomy and Ergonomics	35%	Paper 1 (3hrs): Physiology
		35%	Paper 2 (3hrs): Biomechanics	35%	Paper 2 (3hrs): Human Information Processing
Total	(100%)				

Please note: Only students with a class mark of 40% or higher will be permitted to write the exams!

Pass criteria:

HKE II: In order to pass into the next year the overall final marks for both semester courses must aggregate to at least 50% (average year mark), with a sub-minimum of 40% required for each HKE 201 and HKE 202. Admission to second semester HKE 202 requires a sub-minimum of 40% in HKE 201.

Second year students are NOT considered for supplementary exams!

Students have to have obtained a pass for HKE II in order to be allowed into HKE III.

4.4 Course content for HKE II

The following modules make up the HKE II course. Please note that the details listed under each module are a guideline only and may be subject to change.

Functional Anatomy – The Trunk and Vertebral Column in HKE 201 (A. Parker)

This module continues the study of musculoskeletal anatomy by concentrating on the trunk, particularly the vertebral column. The main focus remains relating the musculoskeletal structure to movement capabilities under ‘normal’ conditions and during selected injuries / disorders.

Ergonomics: Workspace Design in HKE 201 (M. Goebel)

This module builds on the knowledge students would have gained from the Anthropometry course to use it for designing an external environment, such as workstations. This is performed in conjunction with the effects of different body posture on humans.

- Basic design paradigms
- Body postures and its effect on humans
- The standing operator

- The seated operator
- Workspace design
- Methods and Tools for Workstations design

Biomechanics in HKE 201 (A. Todd)

This topic provides a basic understanding of the key concepts for the mechanical analysis of the human body under static and dynamic conditions. These concepts include friction, force, work, power and the concept of energy. This quantitative approach provides a solid theoretical foundation for students who intend to conduct research in biomechanics.

- Centre of mass determination:
  - Weight and Mass
  - Defining COM
  - COM in humans
  - Determination of COM: balancing, suspension
  - Application to human movement
  - COM and stability
  - COM determination of humans: manikins, reaction board, latest technologies
  - Determination of body segment COM
- Friction:
  - Surface Friction
  - Constant of proportionality
  - Surface area
- Force, work, power and the concept of energy:
  - Definitions and conversions
  - Force
  - Work
  - Power
  - Energy
    - Kinetic Energy: The energy of motion - - KE and Work
    - Potential Energy: The expectation of motion - forms of PE
    - Conservation of Energy
    - How is energy conserved
    - Heat, Work and Energy: metabolic equivalent
    - The work-energy relationship
    - The work-energy theorem
    - Work-done in muscles
    - Energy and speed
- Momentum – impulse relationship: Force of impact
    - Newton's II Law
    - Quantifying the force of an impact
    - Analysing collisions
      - Non-elastic collisions
      - Elastic collisions
      - Coefficient of restitution
    - Mechanics of Striking

Endocrine Physiology in HKE 202 (C Christie)

This section will focus specifically on the endocrine and neural systems with a specific focus on physical activity.

- Hormones and mechanism of action
- Endocrinology concepts
- Hypothalamus and anterior pituitary
- Posterior pituitary
- Pancreas
- Blood glucose control at rest and during exercise
- Diabetes
- Thyroid gland
- Adrenal gland
- Endocrine function and exercise

Muscle Physiology in HKE 202 (C Christie)

This part of the Physiology module will focus specifically on the structure and function of skeletal muscle tissue. Adaptations to endurance and strength training as well as different types of muscle contractions will also be covered.

- Histology of the nervous system
- Ion channels
- Resting membrane potentials
- Graded and Action potentials
- Transmission at synapses
- Types of neural circuits
- Physiology of the Autonomic Nervous System
- Reflexes and reflex arcs
- Muscle spindles and golgi tendon organs
- Characteristics, Types, Functions and Gross Anatomy of muscle tissue
- Microscopic Anatomy
- Subcellular Organisation
- Motor units
- Muscle Contraction (ECC)
- Types of muscle contraction
- Sarcoplasmic Reticulum
- Delayed Onset of Muscle Soreness
- Adaptation to endurance training
- Adaptation to strength training
- Deadaptation
- Force-velocity relationship
- Length-tension
- Muscle cramps
- Muscle Fatigue

Human Information Processing: Human Senses in HKE 202 (TBA)

This module will focus specifically on the visual, auditory and body senses. It will provide insight in the physiological, physical and perceptual background.

- Vision
  - Basic physics of light
  - Functional anatomy of the eye
  - Field of vision
  - Dark light adaptation
  - Visual illusions
  - Eye movements
  - Illumination
- Sound
  - Basic physics of sound
  - Functional anatomy of the ear
  - Perception of pitch and loudness
  - Age-related and noise-induces hearing loss
  - Measuring of noise
  - Noise reduction
- Body senses
  - Taste
  - Olfaction
  - General senses: Touch, pain, temperature
  - The vestibular system
  - Vibration

4.5 Prescribed books for HKE II

McArdle, W.D., Katch, F.I. and Katch, V.L. (2001). *Exercise Physiology: Energy, Nutrition and Human Performance.* 5th edition or latest edition. Lea & Febiger, Philadelphia. (ISBN 0-8121-0682-2).

Bridger, R.S. (2003). *Introduction to Ergonomics.* 2nd edition or latest edition, Taylor & Francis, London.

Hall, S.B. (2007). Basic Biomechanics. 5th Edition (or newer). Boston: McGraw-Hill International. ISBN 9780-0-07-110666-5.

5 HKE III (3rd year)

Two semester credits: HKE 301 and HKE 302.

Class coordinators: 1st Semester - S. Zschernack (email: s.zschernack@ru.ac.za, phone: 046 603 8472); 2nd Semester - M. Mattison (email: m.mattison@ru.ac.za, phone: 046 603 8471)

Laboratory coordinator: D Cripwell (email: g04c1217@campus.ru.ac.za, or 046 6038471)

5.1 Admission into HKE III

Students must have passed HKE II (aggregated HKE 201 and 202 minimum 50%).

5.2 Structure of HKE III

Module Structure

With exception of the 4th term all lecture terms consist of seven lecture weeks per term:
1st term: 14 February - 1 April (7 lecture weeks);
2nd term: 11 April - 27 May (7 lecture weeks);
3rd term: 25 July - 9 September (7 lecture weeks);
4th term: 19 September - 28 October (6 lecture weeks).

During these dates two modules will run concurrently.

Lectures:

Table 8: Module structure for HKE III.

	Term	Block A				Block B		
		Module	**Lecturer**	**Dates**		**Module**	**Lecturer**	**Dates**
HKE 301	**1**	Physiology	Christie	Mon 14 Feb - Fri 25 Mar (4 lectures per week)		Environmental Ergonomics	Zschernack	Mon 14 Feb - Fri 25 Mar (4 lectures per week)
	2	Motor Learning and Ergonomics: Tool Design	Goebel	Mon 11 Apr - Fri 27 May (4 lectures per week)		Macroergonomics and Work Organization	Zschernack	Mon 11 Apr - Fri 27 May (4 lectures per week)
HKE 302	**3**	Functional Anatomy: Lower Extremities	Mattison	Mon 25 Jul – Fri 9 Sep (4 lectures per week)		Human Information Processing: Decision Making	TBA	Mon 25 Jul – Fri 9 Sep (4 lectures per week)
	4	Biomechanics	Todd	Mon 19 Sep – Fri 28 Oct (4 lectures per week)		Ergonomics: Fatigue and Shift Work	TBA	Mon 19 Sep – Fri 28 Oct (4 lectures per week)

Lectures:

Lectures, laboratories and tutorials take place during the following lecture periods throughout the year.

Mon	10.30 - 11.15	Lecture
Tues	11.25 - 12.10	Lecture
Tues	12.20 - 13.05	Lecture
Tues	14.00 - 17.00	Laboratory practical
Wed	7.45 - 8.30	Lecture
Thurs	8.40 - 9.25	Lecture
Fri	9.35 - 10.20	Lecture

Laboratory practicals:

Laboratory practicals will be held in association to the lectures and for general skills (see Table 9). Students may be requested to hand in worksheets or with write-ups for each practical. Please consider the format guide (section 9) for writing.

Table 9: Preliminary topics of laboratory practicals in HKE III (please check displays at the department for updates and be prepared for practicals scheduled within the practical periods every Monday except for public holidays).

Term	Date	Subject	Lecturer
	15 Feb	TBA	-
	22 Feb	Physiology 1	Christie
	1 Mar	Environmental Ergonomics 1	Zschernack
1	8 Mar	Physiology 2	Christie
	15 Mar	Environmental Ergonomics 2	Zschernack
	22 Mar	Physiology 3	Christie
	29 Mar	TBA	-
	12 Apr	Career Day 1	Guest Speakers
	19 Apr	Motor Learning 1	Goebel
	26 Apr	Macroergonomics and Work Organization 1	Zschernack
2	3 May	Motor Learning 2	Goebel
	10 May	Tool Design 1	Goebel
	17 May	Macroergonomics and Work Organization 2	Zschernack
	24 May	Tool Design 2	Goebel

3	26 Jul	Career Day 2	Guest Speakers
	2 Aug	Functional Anatomy 1	Mattison
	9 Aug	Human Information Processing: Decision Making 1	TBA
	16 Aug	Functional Anatomy 2	Mattison
	23 Aug	Human Information Processing: Decision Making 2	TBA
	30 Aug	Functional Anatomy 3	Mattison
	6 Sep	TBA	
4	20 Sep	TBA	
	27 Sep	Biomechanics 1	Todd
	04 Oct	Ergonomics: Fatigue and Shift Work 1	TBA
	11 Oct	Biomechanics 2	Todd
	18 Oct	Ergonomics: Fatigue and Shift Work 2	TBA
	25 Oct	Biomechanics 3	Todd

Tutorials / Supplementary Instruction

There are **no** formal tutorials for third year students. However, supplementary instruction sessions can be arranged on demand of the students.

5.3 Tests, assignments and examination in HKE III

Each module's lecturer will set tests and assignments to his/her discretion. The marks from these assignments will be averaged to produce a class mark for each module. The module class marks for the semester will build the class record which contributes 30% to the total semester mark.

The three examination papers (each 2 hrs) at the end of each semester contribute 70% to the total semester mark (

Table **10**).

Table 10: Mark composition of HKE III.

	HKE 301		HKE 302	
Class record (30%)	10%	Physiology	10%	Functional Anatomy: Lower Extremities
	5%	Environmental Ergonomics	5%	Human Information Processing: Decision Making
	5%	Motor Learning	10%	Biomechanics
	5%	Ergonomics: Tool Design	5%	Ergonomics: Fatigue and Shiftwork
	5%	Macroergonomics and Work Organization		
Examinations (70%)	23.33%	Paper 1 (2hrs): Physiology	23.33%	Paper 1 (2hrs): Functional Anatomy
	23.33%	Paper 2 (2hrs): Motor Learning + Tool Design	23.33%	Paper 2 (2hrs): Biomechanics
	23.33%	Paper 3 (2hrs): Environmental Ergonomics + Macroergonomics and Work Organization	23.33%	Paper 3 (2hrs): Human Information Processing: Decision Making + Fatigue and Shiftwork
Total (100%)				

Pass criteria:

The overall final marks for both semester courses must aggregate to at least 50% (aggregated year mark), with a sub-minimum of 40% required for each HKE 301 and HKE 302.

Admission to second semester HKE 302 requires a sub-minimum of 40% in HKE 301.

Third year students are NOT considered for supplementary exams!

5.4 Course content for HKE III

The following modules make up the HKE III course. Please note that the details listed under each module are a guideline only and may be subject to change.

Exercise Physiology in HKE 301 (C Christie)

The second semester section will focus on the concept of energy expenditure including how it is measured and typical energy cost values during different activities. Physiological responses to activities of varying intensities and durations will be

discussed as well as substrate utilisation and the concept of fatigue. The energy balance equation will be introduced and over and under nutrition will be covered.

- Overview of the energy systems
- Measurement of energy expenditure (EE)
- EE at rest and daily rates of EE
- EE during physical activities
- Exercise domains
- Regulation of CHO and fat metabolism during exercise
- Concept of maximal oxygen consumption
- Limitations to maximal exercise
- Limitations to submaximal exercise
- Predicting performance
- Physiological models – Fatigue
- The concept of energy balance
- Principles of everyday eating
- Energy intakes (diets) of South Africans – affluent and rural
- Energy balance and obesity
- Obesity and the risk for cardiovascular disease
- Energy balance and eating disorders
- Physical activity guidelines for healthy individuals

Physiology: Nutrition in HKE 302 (C Christie)

This module concentrates on nutritional strategies for the enhancement of sport and working performance. Thermoregulation, heat stress and fluid balance will be covered in the latter part of the semester.

- Principles of everyday eating:
- General overview of nutrition
- Fats and oils
- Carbohydrates
- Glycemic index (including 2 journal articles)
- Fibre; sugar; electrolytes; alcohol
- Protein
- Vitamins and minerals
- Food labelling
- Role of dietician
- Energy requirements and dietary needs for endurance activities
- How the body uses the food we ingest
- Carbohydrate loading for endurance exercise
- High fat diets
- Strategies to enhance fat utilisation during exercise

Human Information Processing: Motor performance in HKE 301 (M. Goebel)

This module integrates the functional aspects of force production, sensory and cognitive control as well as metabolic support to a holistic concept of human motor performance. It

aims to deliver a fundamental description of human performance for all types of human actions, in sports as well as in work life.

- Types of movements and movement classification
- Composition of complex movements and reaction behaviour
- Organisation of the motor system
- Generation of movement pattern
- Sensory and autonomous movement control
- Learning and training of complex movements
- Human fatigue

Ergonomics: Tool Design in HKE 301 (M. Goebel)

This module is enhancing the knowledge of biomechanics to the interaction of humans with the environment. This is relevant for all types of handles and tools humans will use in work life, at sports activities or in the domestic area in order to obtain an effective, efficient and safe usage.

Lectures will explain the force transmission between the human hand and an object, and further with its reverse effects to the human, considering the human characteristics of movement and force production.

- Force transmission between the human hand and handle
- Action and reaction forces
- Friction and form coupling
- Basics of grip design: forms and profiles
- Mass distribution and hand position
- Reaction forces
- Arm and body movements

Macroergonomics and Work organisation in HKE 301 (S Zschernack)

This module has a two- fold focus: 1. Students will be introduced to the basic methods of work organisation and time management that are used in industry and administration etc. 2. Ergonomics knowledge will be applied on the macroscopic level of work design and work organisations. This integrated concept will enable students to perform a holistic work design and to co-operate with other work designers (e.g. industrial engineers) by introducing the ergonomics aspects of work design.

- Historical development of work organisation
- Methods of motion and time study
- Categorisation of working procedures
- Stop watch studies, work sampling and Methods Time Measurement (MTM)
- Resource logistics and forms of organisation
- Planning and assignment of workforce
- Human Technology Organisation (HTO) Approach
- Participatory Ergonomics
- Consideration of Human variability and human reliability
- Training and development of human resources

Functional Anatomy – Lower Extremities in HKE 302 (M. Mattison)

This module introduces concludes the HKE study of musculoskeletal anatomy by focussing on the structures of the lower extremities. The pelvis, hip, knee and foot are covered in detail and related to movement capabilities and selected injury mechanisms.

Environmental Ergonomics in HKE 301 (S Zschernack)

This module will focus on the environmental factors that need to be taken into consideration for human centred work design.

- Light and Illumination
- Noise
- Vibration
- Other environmental hazards

Human Information Processing: Decision Making in HKE 302 (TBA)

This module focuses on memory and information processing as well as the principles of Human-Machine-Interaction.

- Information processing
    - Models of human information processing
    - Short term memory
    - Long term memory
    - Remembering and forgetting
    - Attention
- Human Machine interaction
    - Characteristics of Human-machine-communication
    - Display types and sizes
    - Compatibility and conventions

Biomechanics in HKE 302 (A. Todd)

This course introduces students to more advanced biomechanical concepts and will be split into two sections. First it will focus on lower limb biomechanics with particular attention being given to developing an understanding of human gait and isokinetic analysis of gait pathologies. The second section will focus on the biomechanics of the lower back.

Section 1: Lower limb biomechanics – Gait analysis and isokinetic assessment

- Gait terminology
- The Gait cycle: heel contact, foot flat, mid-stance, heel off, toe off, mid swing
- Muscle activation during gait
- The six determinants of gait: pelvic rotation, pelvic tilt, knee flexion, ankle mechanism, foot mechanism, lateral displacement of body
- Ground reaction forces
- Lower limb pathologies: An isokinetic overview
    - Overview of isokinetics
    - Isokinetic testing
    - Interpretation of isokinetic data

- Correlation of isokinetic graphs with pathologies
- Scientific and clinical rationale
- Eccentric exercise and isokinetics

Part 2: Biomechanics of the lower back

- Introduction – What is back pain
- Lower back pain and MMH
- Forces acting on the lower back
  - Internal and external forces
  - Intraabdominal forces
  - Determining compression and shear forces
- Assessment of spinal loading
  - Estimating forces
  - Static and dynamic models
- What really causes injury?
  - Structural tolerance
  - Biomechanical logic
- Risk factors at work
- Causation and lower back pain
- Prevention of injury

Ergonomics: Fatigue and Shiftwork in HKE 302 (TBA)

This module will give insight how time (duration, time of the day) and motivational aspects influence human performance and highlight organisational measures to reduce negative effects on human performance.

- Fatigue and endurance
- Endurance of static and dynamic muscle work, muscle exhaustion
- Types of Fatigue
- Fatigue-similar conditions: monotony, saturation, overload
- The vigilance-phenomenon
- Work-to-rest regimes
- Measure in work structuring: job enlargement, job enrichment, job rotation
- Biochronology and shift work
- Circadian rhythm of bodily functions
- Circadian rhythm of human performance
- Implications for shift work and shift design
- Psychological and behavioural aspects
- Motivation
- Satisfaction

5.5 Prescribed books for HKE III

McArdle, W.D., Katch, F.I. and Katch, V.L. (2001). *Exercise Physiology: Energy, Nutrition and Human Performance.* 5th edition or latest edition. Lea & Febiger, Philadelphia. (ISBN 0-8121-0682-2).

Bridger, R.S. (2003). *Introduction to Ergonomics.* 2nd edition or latest edition. Taylor & Francis, London.

Hall, S.B. (2007). Basic Biomechanics. 5th Edition (or newer). Boston: McGraw-Hill International. ISBN 9780-0-07-110666-5.

6 Further Book Suggestions for HKE

	HKE I	HKE II	HKE III
American College of Sports Medicine (1995). *Guidelines for Exercise Testing and Exercise Prescription*. 5th Edition or latest edition. Philadelphia: Lea & Febiger. (ISBN 0-8121-0524-9).			X
Bridger, R.S. (2003). *Introduction to Ergonomics*. 2nd edition. New York: Taylor and Francis. (ISBN 0-415-27378-1).		X	X
Currell, G. and Dowman, A. (2009). Essential Mathematics and Statistics for Science. 2nd Edition or latest edition. Wiley-Blackwell (ISBN 978-0-470-69448-0)	X	X	X
Haslegrave, C.M., Chaffin, D.B. and Delleman, N.J. (2004). *Working Postures and Movements: Tools for Evaluation and Engineering*. (ISBN: 9780415279086) CRC Press		X	X
Helander, M. (2006). *A Guide to Human Factors and Ergonomics*. Taylor and Francis, 2nd edition.		X	X
Noakes, T. (1992). *Lore of Running*. (3rd Edition). Cape Town: Oxford University Press Southern Africa.			X
Oatis, C.A. (2004). *Kinesiology – The Mechanics and Pathomechanics of Human Movement.* 1st Edition. Lippincott Williams and Wilkins (ISBN 978-0-7817-5513-9).	X	X	X
Pheasant, S. and Haslegrave, C.M. (2006). *Bodyspace*. 3rd edition. Taylor and Francis, London.		X	
Sanders, M.S. and McCormick, E.J. (1993). *Human Factors in Engineering and Design*, 7th edition, New York: McGraw-Hill.			X
Stanton, N., Hedge, A., Brookhuis, K., Salas, E. and Hendrick, H. (2005). *Handbook of Human Factors and Ergonomics Methods*. CRC Press.			X
Wilson, J.R. and Corlett, E.N. (1995). *Evaluation of Human Work: A practical ergonomics methodology.* 2nd edition Taylor and Francis, London.			X

7 Basic Format Guide

Preface: This format guide describes some general formal rules of scientific writing and is in this form sufficient for undergraduate laboratory or project reports etc.

Different disciplines may use slightly different formal rules, e.g. for referencing, so do not be surprised if you find minor differences between this guide and other papers. However, this guide is to be considered as standard for any HKE documentation.

7.1 Style of writing

The main purpose of writing a report is to communicate clearly and simply what you have done, why you have done it, and what the results mean.

Writing style is very important. Think before you write and group related ideas together in a logical sequence. Use the third person singular, past tense in such writing. Clearly distinguish between logic and facts, information of other sources (e.g. literature) and your own point of view. All those types of information are allowed and welcome if they help to answer a research question, but the reader must be made aware which type of information you are dealing with. The most frequent mistake of this type is to postulate an own opinion in a style that it appears as a fact to the reader. Do not write "The hot weather was fatiguing the subjects" if this is just your thinking and you do not have any evidence for this statement. Better write "It cannot be excluded that the hot weather had an additional impact to the subjects" if you want to point the reader's attention to the hot temperatures.

Write the report as if it is to be read by an intelligent and very sceptical peer. Do not make unsupported assertions. Do not hide behind jargon - if you use a technical term new to you include a brief explanation.

The ten Commandments of Good Writing (according to Howard G. Knuttgen):

1) Each pronoun should agree with their antecedent.
2) Just between you and I, case is important.
3) A preposition is a poor word to end a sentence with.
4) Verbs has to agree with their subjects.
5) Don't use no double negatives.
6) A writer mustn't shift the readers point of view
7) When dangling, don't use participles.
8) Join clauses good, like a conjunction should.
9) Don't write a run-on sentence because it is difficult when you got to punctuate it so it makes sense when the reader reads what you wrote.
10) About sentence fragments.

For further tips on writing reports, presentations and posters go to: http://www.library.uct.ac.za/infolit/comm.htm.

7.2 Structure of scientific papers and assignments

Scientific papers and assignments take many forms. They can be short or long, empirical (when data are gathered) or literature research, and they can be structured or unstructured. The following will help you prepare your report to suit these various formats.

a) Structured Assignments

These are assignments in which specific questions are asked or specific requirements are to be met. The easiest way to deal with this is sequentially, with a clear labelling of your responses to the questions or requirements. The report should have a Title Page (see section 7.3.1), and should you employ references, use the prescribed format (see section 7.3.5). In summary, the structure of the assignments will dictate the format of the report.

b) Unstructured Assignments and Project Reports

These are assignments for which there is no specific structure, as it is also the case for any type of reports. Where the structure is not completely specified use one of the following formats.

7.2.1 Literature Research

Both short and long literature research projects should be presented in sections appropriate to the topic. These sections might progress from the specific towards the general, or they might simply be representative of the various aspects of the topic. Regardless what the content is, the ideas should combine and flow logically to present a complete picture of the topic. The report should have a Title Page (see section 0) and all references should follow the prescribed format (see section 7.3.5).

Long literature research projects should also have an Abstract and a Table of Contents following the Title Page. The Abstract is a very short (~200 words) summary of the research.

7.2.2 Short Reports of Empirical Data Collection

Laboratory or experimental project reports should contain the following information, in this order:

Title Page

See section 7.3.1.

Purpose/Introduction

Briefly spell out why you did the project (what were you trying to discover; what was the research question), introducing the reader to the topic addressed.

Review of Literature

A logically sequenced discussion of directly and indirectly ***related*** topics.

Often you will need to refer to someone else's work to justify something you are saying (see section 7.3.5 on referencing).

Methods

Detail how data collection was conducted (in case of assignments only if it was not specified in an assignment, or if it differed from that specified in the assignment).

Specify equipment used and data collected.

Results

Present all results in summary form (or other appropriate statistics) as Tables or Figures (see section 7.3.3) and written summaries in order to make a results section more meaningful. In this section the results are only ***described***, ***not discussed!***

Discussion

Use this section to discuss the results found as well as to relate the results to reviewed literature.

This section of a report is probably the most important. It is here that one discusses the results obtained i.e. give possible reasons for one's findings substantiated by findings from the relevant literature.

In laboratory exercises there may be a "COMMENTARY" in which you are asked certain questions about what you found. These questions should be addressed under this heading, but should not be dealt with in merely a question/answer form. The questions are there to guide your thinking.

Conclusions

Draw conclusions based on the results found.

7.3 General formats

Please note that this is only a general recommendation. Changes might be required depending on the subject, the type of report, or as required by the lecturer.

7.3.1 Page format

Leave

25 mm top margin,

25-35 mm left margin (depending on how much space is required for binding),

25 mm right margin and

30 mm bottom margin (page number centred)

[TITLE OF PAPER]

BY

[AUTHORS NAME]

PROJECT / THESIS / DISSERTATION
[print only the appropriate type]

Submitted in partial fulfilment of the requirements for the Course Human Kinetics and Ergonomics [201]

[Name of module]

Department of Human Kinetics and Ergonomics
Rhodes University, 2010
Grahamstown, South Africa

Figure 1: Title page layout (text in squared brackets: fill in the appropriate information).

A MS-Word template can be copied from the departmental secretary or from the HKE website.

7.3.2 Text format

Use ARIAL font 12pt size and a line spacing of 1.5 as standard.

7.3.3 Figures, tables and equations

All figures, tables and equation need to be referred to in the main text.

Each ***figure*** should have a numbered caption at the bottom that concisely describes the figure. An example is provided in Figure 2.

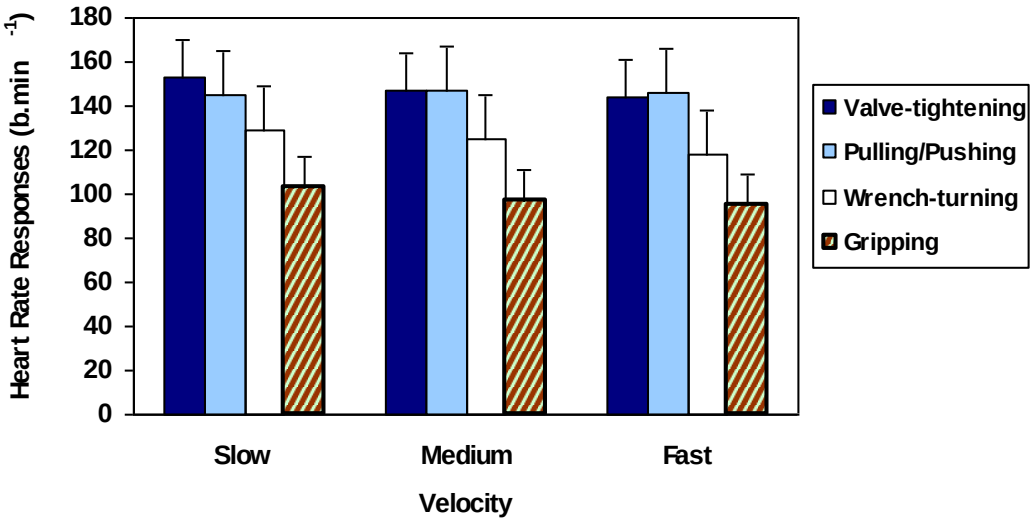


Figure 2: Mean heart rate responses.

Each ***table*** should have a numbered caption at the top that tells concisely just what it contains. Example:

Table XI: Laboratory Test (LT) responses at Slow Isokinetic Speed ($30^{o} \cdot s^{-1}$): comparisons across joints tested. Means (±SD). *****

Joint	Motion	Peak Torque ($Nm \cdot kg^{-1}$)	Total Work ($J \cdot kg^{-1}$)	Average Power ($W \cdot kg^{-1}$)
Trunk	Extension	3.82 (±0.78)	4.77 (±0.82)	1.22 (±0.26)
	Flexion	3.26 (±0.46)	4.63 (±0.49)	1.19 (±0.16)
Hip	Extension	3.23 (±0.78)	3.94 (±1.01)	1.11 (±0.28)
	Flexion	1.93 (±0.36)	2.00 (±0.34)	0.56 (±0.11)
Knee	Extension	3.34 (±0.48)	3.11 (±0.49)	0.90 (±0.17)
	Flexion	2.09 (±0.35)	2.39 (±0.43)	0.72 (±0.15)

***** None of these tests involved gravity-correction

As an option, Roman or Arabic numerals may be used for tables, as long as the numbering applied is consistent throughout the paper.

Equations are numbered in parenthesis right to the equation and referenced accordingly. Example:

$$A + B = C \qquad \text{(eq. 1)}$$

Equations do not have a caption or heading.

7.3.4 Appendices

In an appendix or appendices any material supportive should be included which would interfere with the flow of the report if contained within the body of the report, such as:

- raw data
- lists of items too lengthy to include in results
- supportive letters
- ancillary information

Each new type of material should be contained within its own appendix. Label Appendix A / Appendix B etc.

7.3.5 Referencing

* *Please note that from 2010 onwards, the HKE Department complies with the APA standard of referencing.*

General rules

- ALL references used must be included in the report / documentation
- References must be listed in ALPHABETICAL ORDER in the reference list.
- Do NOT number the references.

In-text referencing

Table 12**:** Examples of reference citations in the text.

Direct quote	(Bradley, 1998, p. 276) or Bradley (1998, p. 276)
Paraphrasing with one author	(Bradley, 1998)
Paraphrasing with two authors	(Bradley and Calhoun, 1998)
Paraphrasing with more than two authors	(Bradley *et al*., 1998)

When referencing more than one source in-text, the sequence of authors is listed in chronological order (i.e. in ascending order of their dates), or in order of importance. If two sources with the same date are referenced then these sources are listed in alphabetical order or in order of importance.

Some examples:

"It has been identified (De Vries, 1980) that ..."

"Astrand and Rodahl (1977) point out that ..."

"One experiment conducted by Gordon *et al.* (1983) ....."

"Several authors (Marras *et al.,* 1995; Wilson and Corlett, 1995; Salvendy, 2006) agree that ....."

Note that *et al.*, must be in italics with only one full stop (after “al.”).

Listing primary sources

Generally, list all authors and mark book names and journal titles italics (or bold). In the following, examples of different sources are outlined.

Books:

Spencer, R.F. & Johnson, G.T. (1999). *Applied Physiology*. 2nd edition. Cape Town: Harper and Collins Publishers.

Chapters in edited volumes:

Spencer, R.F. & Johnson, G.T. (1997). The basic principles of Applied Physiology. In T. Cohen and R. Godman (eds): *Early studies into work physiology*. New York: Harper and Row Publishers, pp. 120-125.

Journal Articles:

Cann, R.L. & Brown, W. (1991). Acceleration and speed as factors in human performance. *American Journal of Sports Medicine, 21(1),* 120-125.

Brage, S., Ekelund, U., Brage, N., Hennings, M.A., Froberg, K., Franks, P.W. & Wareham, N.J. (2007). Hierarchy of individual calibration levels for heart rate and accelerometry to measure physical activity. *Journal of Applied Physiology*, 103, 682-692.

Conference proceedings:

Scott, P.A. & Charteris, J. (1995). Lifting in South African Industry. *Proceedings: Joint IEA World Conference and 2nd South African Congress. Cape Town, 12-20 July 2000*, 500-520.

Theses:

Almeida, D.M. (1990). *Fathers' anticipation of family work.* Unpublished Master's thesis. University of Victorial, British Columbia, Canada.

World wide web:

Christie, C.J. (2001). *Case Study: Aerobic Capacity*. URL: http://www.ru.ac.za/aerobic. Last accessed: 17 August 2008.

Referencing secondary sources

Secondary sources are references which were not directly consulted, but only gathered (re-cited) from primary sources. Wherever possible, go to the original reference - secondary sources should be kept to a minimum and used only when the original article is not available. If you are using a secondary source in your work, you must use the following format:

Within the text you acknowledge the author/s and date of the secondary source like a primary source, e.g. "McGill (2002, as cited in Bridger, 2009) stated that .....".

In the reference list you then include only the primary source, i.e. in this example: Bridger, R.S. (2009). *Introduction to Ergonomics*. 3rd edition. Boca Raton: CRC press.