

SR1002

**Introduction to the
Science of Sport,
Exercise & Health**

**Course Handbook
2019-20**

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Cover image:

Confocal micrograph of fluorescently labelled HeLa cells.

Nuclei are labelled in blue, tubulin in green and actin fibres in red.

Courtesy of:

Kevin Mackenzie

Microscopy and Histology Core Facility

Institute of Medical Sciences

University of Aberdeen

<http://www.abdn.ac.uk/ims/microscopy-histology>

Course Summary

This course will introduce physiology, anatomy and pharmacology in the context of sport and exercise science. Basic physiological function and concepts in pharmacology, human movement and energy metabolism will be described with an emphasis on their importance to human physiology and sport and exercise science. Basic physiological techniques will be outlined and will be related to effects and functions of exercise.

Course Co-ordinators: **Dr Michael Scholz (ext.438022); m.e.scholz@abdn.ac.uk**
Daniel Sutton (ext.437458); **Daniel.Sutton@abdn.ac.uk**

Course Aims & Learning Outcomes

- To provide a basic understanding of physiology, anatomy and pharmacology in general
- To provide a detailed introduction to sport and exercise physiology
- To provide an understanding of fundamental aspects of medical sciences applied to sport and exercise science
- To provide knowledge of basic techniques for assessing physiological function and exercise capacity.

Course Teaching Staff

Course Co-ordinator(s):

Dr Michael Scholz (MES), Medical Sciences
Daniel Sutton (DS), Medical Sciences

Other Staff:

Medical Sciences Staff

Dr Arimantas Lionikas (AL), , Medical Science
Prof Alison Jenkinson (AJ), Medical Sciences
Prof Graeme Nixon (GN), Medical Sciences
Dr Derek Scott (DAS), Medical Sciences

Other Staff

Christine Roberts, University Sport & Exercise Team
Gillian Kerr, University Sport & Exercise Team

Assessments & Examinations

Students are expected to attend all lectures, practical and lab classes and to complete all exercises by the given deadlines. The minimum performance acceptable for the granting of a class certificate is attendance at 75% of the lectures, seminars, practical classes, and presentation of all set course work, written and oral. Failure to do so may result in your class certificate being withheld. The course assessment consists of 100% continuous assessment. There is no written examination in December. The resit examination in July/August will consist of a two-hour MCQ examination and will carry 70% of the final mark; the remaining 30% will come from previous continuous assessment. The overall performance of the student will be expressed as a grade awarded on the attached Common Grading Scale (CGS).

Class Representatives

We value students' opinions in regard to enhancing the quality of teaching and its delivery; therefore, in conjunction with the Students' Association we support the Class Representative system.

In the School of Medicine, Medical Sciences and Nutrition we operate a system of course representatives, who are elected from within each course. Any student registered within a course that wishes to represent a given group of students can stand for election as a class representative. You will be informed when the elections for class representative will take place.

What will it involve?

It will involve speaking to your fellow students about the course you represent. This can include any comments that they may have. You will attend a Staff-Student Liaison Committee and you should represent the views and concerns of the students within this meeting. As a representative, you will also be able to contribute to the agenda. You will then feedback to the students after this meeting with any actions that are being taken.

Training

Training for class representatives will be run by the Students Association. Training will take place within each half-session. For more information about the class representative system visit www.ausa.org.uk or email the VP Education & Employability vped@abdn.ac.uk. Class representatives are also eligible to undertake the STAR (Students Taking Active Roles) Award with further information about this co-curricular award being available at: www.abdn.ac.uk/careers.

Problems with Coursework

If students have difficulties with any part of the course that they cannot cope with, alone they should notify the course coordinator immediately. If the problem relates to the subject matter general, advice would be to contact the member of staff who is teaching that part of the course. Students with registered disabilities should contact Mrs Jenna Reynolds (medsci@abdn.ac.uk) in the Medical Sciences Office (based in the Polwarth Building, Foresterhill), or Mrs Sheila Jones (s.jones@abdn.ac.uk) in the Old Aberdeen office associated with the teaching laboratories, to ensure that the appropriate facilities have been made available. Otherwise, you are strongly encouraged to contact any of the following as you see appropriate:

- Course student representatives
- Course co-ordinator
- Convenor of the Medical Sciences Staff/Student Liaison Committee (Professor Gordon McEwan)
- Personal Tutor
- Medical Sciences Disabilities Co-ordinator (Dr Derryck Shewan)

All staff are based at Foresterhill and we strongly encourage the use of email or telephone the Medical Sciences Office. You may have a wasted journey travelling to Foresterhill only to find staff unavailable.

If a course has been completed and students are no longer on campus (i.e. work from second semester during the summer vacation), coursework will be kept until the end of Fresher's Week, during the new academic year. After that point, unclaimed student work will be securely destroyed

Course Reading List

- McArdle W.D., Katch F.I., Katch V.L.. Exercise Physiology: Energy, Nutrition & Human Performance 6th edition. Publishers: Lippincott Williams and Wilkins*
- Silverthorn D.U. – Human Physiology; An Integrated Approach 4th Edition 2006, Pearson. ISBN 0321396235
Extra textbook
- Seeley R.R, Stephens T. D., Tate P., Anatomy and Physiology, 6th edition, 2003, 0-07-235113-6, McGraw-Hill

*Recommended text

Lecture Synopsis

A series of lectures introducing basic physiology, anatomy and pharmacology in relation to sports & exercise.

Lecture 1: Course Introduction – Dr Michael Scholz

Distribution of course manuals, outline of the course and general introduction

Form and Function – Is beauty only skin deep? - Anatomical conventions and the relevance of form and function

Lecture 2: Anatomy – Why do we need to know about it? – Dr Derek Scott

Why is knowledge of anatomy vital for all life sciences and for a better understanding of health, development, disease, nutrition, drug action and performance. A review how anatomy can be used in everyday situations such as surgery, sports training, drug development and biometrics.

Lecture 3: When Anatomy and Physiology Collide... – Dr Derek Scott

Why are anatomy and physiology inextricably linked together? Understanding of form or function gives us clues as to what is normal or abnormal in the human body. The concepts of cells, tissues and organs, and how they all work together. How do anatomists describe structures and functions?

Lecture 4: What's the Difference Between Men and Women? – Dr Derek Scott

Differences between men and women, why can anatomy be influenced by many factors? How does it affect how our body works and performs? What determines male or female anatomy? What advantages/disadvantages does being male or female convey? Gender differences/similarities in body shape/size, life length and performance.

Lecture 5: Let's Take A Look Inside – Imaging & Investigation in Anatomy – Dr Derek Scott

How do we image and investigate the body during health, disease and activity? Studying structures ranging from the cellular to the organismal level, even deep within the body. Topics to be covered: scanning and x-rays, histology and microscopy, computer modelling, cadaveric studies and anthropometry, advantages and limitations of these techniques.

Blood and Gas – The driving forces - The essentials of circulation and ventilation

Lecture 6: Pulmonary Structure and Function – Dr Arimantas Lionikas

Introduction into the elements of the pulmonary system, airways and pulmonary tissues, composition and properties of the alveolar membrane, blood vessels of the lung, pulmonary volumes

Lecture 7: Inspiration and expiration - Dr Arimantas Lionikas

Airflows and gas exchange, basic physics of gasses, pressures, partial pressures, humidity, gasses solved in liquids

Lecture 8: Mechanics of ventilation - what drives the ventilation? - Dr Arimantas Lionikas

Respiratory muscles, Elasticity of the lung, resistance

Lecture 9: Cardiovascular Structure and Function - Dr Arimantas Lionikas

The design of a very special pump: the myocardium, the valves and the electric control elements.

Lecture 10: Understanding the cardiac cycle - Dr Arimantas Lionikas

Introduction into the events during a heartbeat, systole, diastole, electrical events, mechanical events, valve actions, ECG

Lecture 11: Circulation: understanding the pipe work – Dr Arimantas Lionikas

Differences between arteries and veins, capillaries, vessels and its relation to blood pressure and perfusion. Role of the lymphatic system in circulation.

Lecture 12: Integration of Respiration and Circulation - Dr Arimantas Lionikas

How do respiration and circulation work together? Relation between ventilation and perfusion.

Power and Performance – What’s under the bonnet? - Introduction to muscle physiology and energetics

Lecture 13: Energy and power – Dr Michael Scholz

Introduction to energy transfer and conversion, basics of energetics, overview of different types of energy and how energy can be converted.

Lecture 14: Energy conversion and transfer in the body – Dr Michael Scholz

How is energy from foods converted to be useful? Phosphates as ‘Energy Currencies’ of the body.

Lecture 15: Energy systems – Dr Michael Scholz

The biological ‘hybrid drive’. Interacting energy systems of the body: different systems for different situations and different activities. An overview of pathways of the energy metabolism and when they are used.

Lecture 16: Force, acceleration, speed – Dr Michael Scholz

Introduction to mechanics and kinetics, basics of movement, force production and work

Lecture 17: Muscle structure – the design of a special engine – Dr Michael Scholz

Description of passive and active elements in the muscle, which allow the production of force and movement.

Lecture 18: Muscle function – Dr Michael Scholz

Introduction to muscle contractions, types of contraction, contraction force, contraction speed. Mechanisms of the sliding filaments and cross-bridge cycling

Five pieces of fruit and a deep-fried Mars bar! - Understanding the importance of a balanced diet

Lecture 19: Introduction to nutrition - Prof Alison Jenkinson

What constitutes food? What is the energy value of different types of food. How can you measure the energy value of food? What do food labels tell us about food?

Lecture 20: Protein fat and carbohydrates - Prof Alison Jenkinson What are they, food sources, and functions. How much should we have in our diet; the 'eat well' plate model.

Lecture 21: Vitamins and minerals - Prof Alison Jenkinson

What are they, food sources, functions? Are mega doses of vitamins and minerals common amongst athletes? Do they work?

Lecture 22: Good nutrition for health - Prof Alison Jenkinson

What is the association between nutritional habits and disease development and progression?

Lecture 23: Optimal nutrition for performance - Prof Alison Jenkinson

Basic concepts. How much more do athletes require to meet requirements? Is dietary protein or carbohydrate more important for performance? The ideal pre-exercise, during exercise and post-exercise recovery meals/snacks.

Lecture 24: Is the Scottish diet that bad? - Prof Alison Jenkinson

What foods do Scottish people consume, how much and how do these affect their health?

Fluid Balance – The day in the life of a sports drink - An introduction to fluid balance and the importance of absorption and excretion

Lecture 25: Water of life – Dr Michael Scholz

Water as the foundation of life. Why is water so important for us? Are we really still carrying the oceans in us?

Lecture 26: ‘better by the mouthful...’ – Michael Scholz

Fluid absorption and distribution, why do we become thirsty? Where do the fluids go?

Lecture 27: ‘only a passing lot...’ – Michael Scholz

Introduction to kidney function and fluid excretion

Lecture 28: Fluid balance – Michael Scholz

How is fluid balance achieved and maintained? Which other organ systems are involved and effected by fluid balance?

Lecture 29: ‘Control the heat’ – Michael Scholz

Water cooling for the engine, fluid balance and thermoregulation in relation to exercise.

Lecture 30: What makes ‘a sports drink’ a sports drink? – Michael Scholz

How does fluid replacement impact performance? Which other substances make a 'good' drink?

The Magic Bullet – Getting pharmacology up to speed - An introduction to pharmacology and understanding ergogenic aids

Lecture 31: 'Harmless Herbs?' – Prof Graeme Nixon

The use of herbal compounds to improve exercise training and performance.

Lecture 32: 'A coffee and a Lemsip please' – Prof Graeme Nixon

Effects of substances that act as stimulants including caffeine, amphetamines and beta agonists on exercise training and performance.

Lecture 33: 'Slow and steady wins the race' – Prof Graeme Nixon

Effect of beta **blockers** and narcotic analgesics on exercise training and performance.

Lecture 34: 'Does size matter?' – Prof Graeme Nixon

The effects of anabolic steroids and growth hormone on exercise training and performance.

The Nervous System – Keeping your eye on the ball - An overview of neural control and central adaptive processes

Lecture 35: 'Life on a wire' – Dr Michael Scholz

Importance, roles and structures of nerves and the nervous system

Lecture 36: 'Has your second neuron gone inhibitory?' – Dr Michael Scholz

Cognitive functions and central control, how sensory inputs and ideas form reactions.

Lecture 37: '...it was just a reflex!' – Dr Michael Scholz

Control and training of complex motor processes, reflexes and how they control balance movements and actions.

Practical/Lab/Tutorial Work

Practical/Lab Work

You are expected to attend all practical sessions to obtain a class certificate. There are two practical's and one tutorial, each session runs 4 times. Students will be randomly allocated to four groups. Swaps of practical groups are only possible if discussed with the course-coordinator in advance. Practical sessions will be based at the Aberdeen Sports Village.

Attendance will be taken at all practical classes. It is important you bring sports apparel and footwear with you since you will play an active part in the class and mild physical exertion may be required.

Course Work

There will be five MCQ assessments during the course. Each assessment will contain circa 20-25 questions and will carry 20% of the final mark. The questions will cover the lectures and practical sessions. The assessments are supervised online assessments. Only one submission per assessment is permitted. Detailed instructions will be available on MyAberdeen.

University Policies

Students are asked to make themselves familiar with the information on key institutional policies which been made available within MyAberdeen (<https://abdn.blackboard.com/bbcswbdav/institution/Policies>). These policies are relevant to all students and will be useful to you throughout your studies. They contain important information and address issues such as what to do if you are absent, how to raise an appeal or a complaint and indicate how seriously the University takes your feedback.

These institutional policies should be read in conjunction with this programme and/or course handbook, in which School and College specific policies are detailed. Further information can be found on the [University's Infohub webpage](#) or by visiting the Infohub.

The information included in the institutional area for 2019/20 includes the following:

- Absence
- Appeals & Complaints
- Student Discipline
- Class Certificates
- MyAberdeen
- Originality Checking
- Feedback
- Communication
- Graduate Attributes
- The Co-Curriculum

Medical Sciences Common Grading Scale

Grade	Grade Point	Category	Honours Class	Description
A1	22	Excellent	First	<ul style="list-style-type: none"> Outstanding ability and critical thought Evidence of extensive reading Superior understanding The best performance that can be expected from a student at this level
A2	21			
A3	20			
A4	19			
A5	18			
B1	17	Very Good	Upper Second	<ul style="list-style-type: none"> Able to argue logically and organise answers well Shows a thorough grasp of concepts Good use of examples to illustrate points and justify arguments Evidence of reading and wide appreciation of subject
B2	16			
B3	15			
C1	14	Good	Lower Second	<ul style="list-style-type: none"> Repetition of lecture notes without evidence of further appreciation of subject Lacking illustrative examples and originality Basic level of understanding
C2	13			
C3	12			
D1	11	Pass	Third	<ul style="list-style-type: none"> Limited ability to argue logically and organise answers Failure to develop or illustrate points The minimum level of performance required for a student to be awarded a pass
D2	10			
D3	9			
E1	8	Fail	Fail	<ul style="list-style-type: none"> Weak presentation Tendency to irrelevance Some attempt at an answer but seriously lacking in content and/or ability to organise thoughts
E2	7			
E3	6			
F1	5	Clear Fail	Not used for Honours	<ul style="list-style-type: none"> Contains major errors or misconceptions Poor presentation
F2	4			
F3	3			
G1	2	Clear Fail/ Abysmal	-	<ul style="list-style-type: none"> Token or no submission
G2	1			
G3	0			

Course Timetable SR1002: 2019-2020

Date	Time	Place	Subject	Session	Staff
Week 7					
Mon 9 Sep	10:00-11:00	Meston 1	Course Introduction	Lecture	MES
			Form and Function - Is beauty only skin deep?		
Tue 10 Sep	12:00-13:00	Zoo LT	Anatomy – Why do we need to know about it?	Lecture	DAS
Wed 11 Sep					
Thu 12 Sep	14:00-15:00		Private study time	study	
Fri 13 Sep	12:00-13:00	Regent	When Anatomy and Physiology Collide...	Lecture	DAS
Week 8					
Mon 16 Sep	10:00-11:00	Meston1	What's the Difference Between Men and Women?	Lecture	DAS
Tue 17 Sep	12:00-13:00	ZooLT	Let's Take A Look Inside – Imaging & Investigation in Anatomy	Lecture	DAS
	15:00-17:00	ASV	Sport & Exercise Introduction Practical Group A	Practical	S&E
			Blood and Gas – The driving forces		
Wed 18 Sep					
Thu 19 Sep	14:00-15:00	Meston 1	Respiration 1	Lecture	AL
	15:00-17:00	ASV	Sport & Exercise Introduction Practical Group B	Practical	S&E
Fri 20 Sep	12:00-13:00	Regent	Respiration 2	Lecture	AL
Week 9					
Mon 23 Sep	10:00-11:00	Meston 1	The heart	Lecture	AL
Tue 24 Sep	12:00-13:00	ZooLT	The cardiac cycle	Lecture	AL
	15:00-17:00	ASV	Sport & Exercise Introduction Practical Group C	Practical	S&E
Wed 25 Sep					
Thu 26 Sep	14:00-15:00	Meston 1	The circulation and blood vessels 1	Lecture	AL
	15:00-17:00	ASV	Sport & Exercise Introduction Practical Group D	Practical	S&E
Fri 27 Sep	12:00-13:00	Regent	The circulation and blood vessels 2	Lecture	AL
			Power and Performance - What is under the bonnet?		
Week 10					
Mon 30 Sep	10:00-12:00	MR117/E W F81	Assessment 1 -10:00-10:30 Group A	Assessment	MES
			Assessment 1 -10:30-11:00 Group B	Assessment	MES
			Assessment 1 -11:00-11:30 Group C	Assessment	MES
			Assessment 1 -11:30-12:00 Group D	Assessment	MES
Tue 1 Oct	12:00-13:00	ZooLT	Energy and power - introduction to energy transfer and conversion	Lecture	MES
Wed 2 Oct					
Thu 3 Oct	14:00-15:00	Meston 1	Energy conversion and transfer in the body	Lecture	MES
Fri 4 Oct	12:00-13:00	Regent	Private Study time		
Week 11					
Mon 7 Oct	10:00-11:00	Meston 1	Energy system - The biological 'hybrid drive'	Lecture	MES
Tue 8 Oct	12:00-13:00	ZooLT	Force, acceleration, speed – introduction to muscle mechanics	Lecture	MES
	15:00-17:00	ASV	Field Based Fitness Testing Practical Group A	Practical	S&E
Wed 9 Oct					
Thu 10 Oct	14:00-15:00	Meston 1	Muscle structure – the design of a special engine	Lecture	MES
	15:00-17:00	ASV	Field Based Fitness Testing Practical Group B	Practical	S&E
Fri 11 Oct	12:00-13:00	Regent	Muscle function	Lecture	MES

Week 12					
			Five pieces of fruit and a deep-fried Mars bar!		
Mon 14 Oct	10:00-12:00	MR117/E W F81	Assessment 2 -10:00-10:30 Group A	Assessment	MES
			Assessment 2 -10:30-11:00 Group B	Assessment	MES
			Assessment 2 -11:00-11:30 Group C	Assessment	MES
			Assessment 2 -11:30-12:00 Group D	Assessment	MES
Tue 15 Oct	15:00-17:00	ASV	Field Based Fitness Testing Practical Group C	Practical	S&E
Wed 16 Oct					
Thu 17 Oct	14:00-15:00	Meston 1	Introduction to nutrition	Lecture	AJ
	15:00-17:00	ASV	Field Based Fitness Testing Practical Group D	Practical	S&E
Fri 18 Oct	12:00-13:00	Regent	Protein, fat and carbohydrates	Lecture	AJ
Week 13					
Mon 21 Oct	10:00-11:00	Meston 1	Vitamins and minerals	Lecture	AJ
Tue 22 Oct	12:00-13:00	ZooLT	Good nutrition for health	Lecture	AJ
Wed 23 Oct					
Thu 24 Oct	14:00-15:00	Meston 1	Optimal nutrition for performance - basic concepts	Lecture	AJ
Fri 25 Oct	12:00-13:00	Regent	Is the Scottish diet that bad?	Lecture	AJ
Week 14					
			Fluid Balance - The day in the life of a sports drink		
Mon 28 Oct	10:00-12:00	MR117/E W F81	Assessment 3 -10:00-10:30 Group A	Assessment	MES
			Assessment 3 -10:30-11:00 Group B	Assessment	MES
			Assessment 3 -11:00-11:30 Group C	Assessment	MES
			Assessment 3 -11:30-12:00 Group D	Assessment	MES
Tue 29 Oct	12:00-13:00	ZooLT	Sports Safety & Practice Management	Lecture	S&E
	15:00-17:00	MR613	Sport safety tutorial A	Tutorial	S&E
Wed 30 Oct					
Thu 31 Oct	14:00-15:00	Meston 1	Water of life – Water as the foundation of life	Lecture	MES
	15:00-17:00	MR613	Sport safety tutorial B	Tutorial	S&E
Fri 1 Nov	12:00-13:00	Regent	better by the mouthful...', fluid absorption and distribution	Lecture	MES
Week 15					
Mon 4 Nov	10:00-11:00	Meston 1	'only a passing lot...' kidney function and fluid excretion	Lecture	MES
Tue 5 Nov	12:00-13:00	ZooLT	Fluid balance	Lecture	MES
	15:00-17:00	MR266	Sport safety tutorial C	Tutorial	S&E
Wed 6 Nov					
Thu 7 Nov	14:00-15:00	Meston 1	'Control the heat' - Water cooling for the engine	Lecture	MES
	15:00-17:00	MR314	Sport safety tutorial D	Tutorial	S&E
Fri 8 Nov	12:00-13:00	Regent	What makes 'a sports drink' a sports drink?	Lecture	MES
Week 16					
			The Magic Bullet - Getting pharmacology up to speed		
Mon 11 Nov	10:00-12:00	MR117/E W F81	Assessment 4 -10:00-10:30 Group A	Assessment	MES
			Assessment 4 -10:30-11:00 Group B	Assessment	MES
			Assessment 4 -11:00-11:30 Group C	Assessment	MES
			Assessment 4 -11:30-12:00 Group D	Assessment	MES
Tue 12 Nov	12:00-13:00	ZooLT	'Harmless Herbs?'	Lecture	GN
Wed 13 Nov					
Thu 14 Nov	14:00-15:00	Meston 1	'Life on a wire' – nerves and nervous system	Lecture	MES

Fri 15 Nov	12:00-13:00	Regent	'A coffee and a Lemsip please'	Lecture	GN
Week 17					
Mon 18 Nov	10:00-11:00	Meston 1	'Slow and steady wins the race'	Lecture	GN
			The Nervous System - Keeping your eye on the ball!		
Tue 19 Nov	12:00-13:00	ZooLT	'Does size matter?'	Lecture	GN
Wed 20 Nov					
Thu 21 Nov	14:00-15:00	Meston 1	'Has your second neuron gone inhibitory?' – Cognitive functions and central control	Lecture	MES
Fri 22 Nov	12:00-13:00	Regent	'...it was just a reflex!' – control and training of complex motor processes	Lecture	MES
Week 18 - No teaching during this week REVISION WEEK					
Mon 25 Nov	10:00-12:00	MR117/E W F81	Assessment 5 and course review - 10-10.30 Group A	Assessment	MES
			Assessment 5 and course review - 10.30-11 Group B	Assessment	MES
			Assessment 5 and course review- 11-11.30 Group C	Assessment	MES
			Assessment 5 and course review- 11.30-12 Group D	Assessment	MES
Tue 26 Nov					
Wed 27 Nov					
Thu 28 Nov					
Fri 29 Nov					

Staff

Dr Michael Scholz (MES), Biomedical Sciences (Course Co-ordinator)
Dr Arimantas Lionikas, Biomedical Sciences
Prof Alison Jenkinson, Biomedical Sciences
Prof Graeme Nixon (GN), Biomedical Sciences
Dr Derek Scott (DS), Biomedical Sciences
University Sport & Exercise Team (S&E)