



SR2002

**The Science of
Sports
Performance**

**Course Handbook
2019-20**

Contents

Course Summary
Course Aims & Learning Outcomes
Course Teaching Staff
Assessments & Examinations
Class Representatives
Problems with Coursework
Course Reading List
Lecture Synopsis
Practical/Lab/Tutorial Work
Medical Sciences Common Grading Scale
Course Timetable

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 is designed to analyse a range of factors which determine athletic performance. From biomechanics and muscle physiology, it develops and focuses on motor control of human movements. It covers the effects of muscle damage on sports performance and elaborates on mechanisms of muscle growth and regeneration after exercise. It also explores performance enhancement in sport as well as its regulation and testing.

Course Co-ordinator: Dr Jenny Gregory (ext. 7549) j.gregory@abdn.ac.uk

Course Aims & Learning Outcomes

The specific objectives of SR2002 are to:

- Understand the range of factors which contribute to sports performance
- Understand forces which contribute towards and limit human performance in selected sports
- Understand the neuromechanical aspects of movement
- Understand the mechanisms of muscle damage and growth after exercise
- Understand performance enhancement and drug use in sport

Course Teaching Staff

Course Co-ordinator(s):

Dr Jenny Gregory (JG)

Other Staff:

Professor Alison Jenkinson (AJ)

Dr Arimantas Lionikas (AL)

Professor Colin McCaig (CM)

Dr Fiona Saunders (FS)

Dr Michael Scholz (MS)

Dr Christine Roberts (CR)

Assessments & Examinations

Examination

The course mark is based on the in-course assessments only.

Assessment Summary

The overall performance of the student will be expressed as a grade awarded on the attached Common Grading Scale (CGS).

The final mark will consist of the following:

- Assessment 1 (MCQ test): 20%
- Assessment 2 (MCQ test): 25%
- Assessment 3 (MCQ test): 25%

- Practical 1 (MCQ test / short answers): 7.5%
- Practical 2 (Structured Lab Report) 15%
- Practical 3 (MCQ test / short answers): 7.5%

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 (j.reynolds@abdn.ac.uk) in the School Office (based in the IMS, 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)
- 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.

Course Reading List

- **Exercise Physiology: energy, nutrition & human performance, WD McArdle, FI Katch, VL Katch, Sixth Edition, 2007. Lippincott Williams & Wilkins.**
- Abernethy, B., Hanrahan, S.J., Kippers, V., Mackinnon, L.T. & Pandy, M.G. (2013) The biophysical foundations of human movement, 3rd Ed. Champaign, IL: Human Kinetics
- Enoka, R. (2015) Neuromechanics of human movement, 5th Ed. Champaign, IL: Human Kinetics
- MacIntosh, B.R., Gardiner, P.F. McComas, A.J. (2006) Skeletal muscle, 2nd Ed. Champaign, IL: Human Kinetics
- Carpenter, R., Reddi, B. (2012) Neurophysiology: A Conceptual Approach, 5th Ed.

Lecture Synopsis

Introduction to Biomechanics – Dr Jenny Gregory

Lecture 1: Science and Sport Performance: Introductory lecture

Lectures 2 & 3: Body composition the centre of gravity and motion

Lecture 4: Force and Torque

Lecture 5: Power and work

Lecture 6: Movement analysis

Lecture 7: Problem solving / writing lab reports

Muscle Function – Dr Arimantas Lionikas

Lecture 8: Muscle Mechanics I

Lecture 9: Muscle Mechanics II

Motor Units – Dr Arimantas Lionikas

Lecture 10: Motor unit: Structure and function

Lecture 11: Motor units in movements

Motor Control – Professor Colin McCaig

Lecture 12: Motor Control I

Lecture 13: Motor Control II

Lecture 14: Motor Control III

Drug Use in Sport – Dr Christine Roberts

Lecture 15: Drug Use in Sport I

Lecture 16: Drug Use in Sport II

Cellular Signalling – Dr Michael Scholz

Lecture 17: Cellular signalling: cell types and adaptations

Lecture 18: Cellular signalling: control of growth, quiescence and death

Muscle Adaptation to Exercise – Dr Michael Scholz

Lecture 19: Cellular signalling in muscle cells

Lecture 20: Exercise as a stimulus for adaptations

Lecture 21: Exercise as a stimulus for muscle growth

Muscle Damage – Professor Alison Jenkinson

Lecture 22: Muscle soreness and damage

Lecture 23: Antioxidants and muscle damage

Performance Enhancement – Professor Alison Jenkinson

Lecture 24: Performance enhancement I

Lecture 25: Performance enhancement II

Practical/Lab/Tutorial Work

Attendance is required at all practical classes. Practical classes will be divided into groups A, B and C that take place on consecutive weeks. Please stick to your allocated practical group. A test consisting of multiple choice and short answer questions will be used in assessment of the first and third practicals. The second practical will be assessed by a structured report to be submitted 2 weeks after the practical.

Practical classes might have an exercise element, so please ensure you always have the appropriate sports kit with you. A sweatshirt is advised too as there will be periods of written work. In addition, bring a notebook, a calculator and writing materials to each lab, to take appropriate notes.

University Policies

Students are asked to make themselves familiar with the information on key institutional policies which have been made available within MyAberdeen (<https://abdn.blackboard.com/bbcswebdav/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			

SR2002 Course Timetable 2019-2020

Date	Time	Place	Subject	Session	Staff
Week 7					
Mon 9 Sep	10:00-11:00	NK14	Introduction: The Science of Sport Performance	Lecture	JG
Tue 10 Sep					
Wed 11 Sep					
Thu 12 Sep	10:00-11:00	Auris LT	Body composition	Lecture	JG
	11:00-12:00	Auris LT	Motion	Lecture	JG
Fri 13 Sep					
Week 8					
Mon 16 Sep	10:00-11:00	NK14	Force and Torque	Lecture	JG
Tue 17 Sep					
Wed 18 Sep					
Thu 19 Sep	10:00-11:00	TC11	Power and Work	Lecture	JG
	11:00-12:00	Auris LT	Movement Analysis	Lecture	JG
	15:00-18:00	ZB06	Practical 1: Mechanical Efficiency of Muscle Exercise A	Practical	JG
Fri 20 Sep					
Week 9					
Mon 23 Sep	10:00-11:00	NK14	Private Study (practice revision questions)	Lecture	JG
Tue 24 Sep					
Wed 25 Sep					
Thu 26 Sep	10:00-11:00	Auris LT	Problem Solving / assessment revision	Lecture	JG
	11:00-12:00	Auris LT	Writing a lab report	Lecture	JG
	15:00-18:00	ZB06	Practical 1: Mechanical Efficiency of Muscle Exercise B	Practical	JG
Fri 27 Sep					
Week 10					
Mon 30 Sep	10:00-12:00	St Mary's 105	Assessment 1	Assessment	JG
Tue 1 Oct					
Wed 2 Oct					
Thu 3 Oct	10:00-11:00	Auris LT	Muscle Mechanics I	Lecture	AL
	11:00-12:00	Auris LT	Muscle Mechanics II	Lecture	AL
	15:00-18:00	ZB06	Practical 1: Mechanical Efficiency of Muscle Exercise C	Practical	JG
Fri 4 Oct					
Week 11					
Mon 7 Oct	10:00-11:00	NK14	Motor Unit: Structure and Function	Lecture	AL
Tue 8 Oct					
Wed 9 Oct					
Thu 10 Oct	10:00-11:00	Auris LT	Motor units in movements	Lecture	AL
	11:00-12:00	Auris LT	Muscle fibre types and athletic performance	Lecture	AL
	15:00-17:00	ASV	Practical 2: Testing Power in Sports A	Practical	JG & AL
Fri 11 Oct					
Week 12					

Mon 14 Oct	10:00-12:00		Private study		JG
Tue 15 Oct					
Wed 16 Oct					
Thu 17 Oct	10:00-11:00	Auris LT	Drug use in Sport I	Lecture	CR
	11:00-12:00	Auris LT	Drug use in Sport II	Lecture	CR
	15:00-17:00	ASV	Practical 2: Testing Power in Sports B	Practical	JG
Fri 18 Oct					
Week 13					
Mon 21 Oct	10:00-11:00	NK14	Motor control I	Lecture	CM
Tue 22 Oct					
Wed 23 Oct					
Thu 24 Oct	10:00-11:00	Auris LT	Motor control II	Lecture	CM
	11:00-12:00	Auris LT	Motor control III	Lecture	CM
	15:00-17:00	ASV	Practical 2: Testing Power in Sports C	Practical	JG
Fri 25 Oct					
Week 14					
Mon 28 Oct	10:00-12:00	FN114	Assessment 2	Assessment	JG
Tue 29 Oct					
Wed 30 Oct					
Thu 31 Oct	10:00-11:00	Auris LT	Cellular signalling: cell types and adaptations	Lecture	MS
	11:00-12:00	Auris LT	Cellular signalling: control of growth, quiescence and death	Lecture	MS
Fri 1 Nov					
Week 15					
Mon 4 Nov	10:00-11:00	NK14	Private Study		
Tue 5 Nov					
Wed 6 Nov					
Thu 7 Nov	10:00-11:00	Auris LT	Exercise as a stimulus for adaptations	Lecture	MS
	11:00-12:00	Auris LT	Exercise as a stimulus for muscle growth	Lecture	MS
	15:00-18:00	ZB11	Practical 3: Muscle fibre typing A	Practical	JG & AL
Fri 8 Nov					
Week 16					
Mon 11 Nov	10:00-12:00		Private study		JG
Tue 12 Nov					
Wed 13 Nov					
Thu 14 Nov	10:00-11:00	Auris LT	Muscle soreness and damage	Lecture	AJ
	11:00-12:00	Auris LT	Antioxidants and muscle damage	Lecture	AJ
	15:00-18:00	ZB11	Practical 3: Muscle fibre typing B	Practical	JG & AL
Fri 15 Nov					
Week 17					
Mon 18 Nov	10:00-11:00	NK14	Performance Enhancement I	Lecture	AJ
Tue 19 Nov					
Wed 20 Nov					
Thu 21 Nov	10:00-11:00	Auris LT	Performance Enhancement II	Lecture	AJ
	11:00-12:00	Auris LT	Course Revision	Lecture	JG

	15:00-18:00	ZB11	Practical 3: Muscle fibre typing C	Practical	JG & AL
Fri 22 Nov					
Week 18 - No teaching during this week REVISION WEEK					
Mon 25 Nov	10:00-12:00	FN114	Assessment 3	Assessment	JG
Tue 26 Nov					
Wed 27 Nov					
Thu 28 Nov	11:00-12:00	Auris LT	Course Revision	Revision	JG
Fri 29 Nov					

Staff

Dr. Jenny Gregory (JG) - Course Co-ordinator
Prof. Alison Jenkinson (AJ)
Dr. Arimantas Lionikas (AL)
Prof. Colin McCaig (CM)
Dr. Fiona Saunders (FS)
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