

## Course Information Sheet

# BSc (Hons) Strength and Conditioning with Rehabilitation

**Mode and course length** – Full-Time (4 years)

**Location** – ARU Cambridge Campus

**Awarding Body** – Anglia Ruskin University. As a registered Higher Education provider Anglia Ruskin University is regulated by the Office for Students.

## Overview

Train as a strength and conditioning coach in our professionally accredited labs in Cambridge, with the option to specialise in physiology or biomechanics. Prepare for a career working with professional sports teams or athletes.

Working as a strength and conditioning coach is challenging and rewarding. You're responsible for the physical and physiological development of athletes in search of performance gains – though there's also the option to work beyond elite sport.

Strength and conditioning is more than just gym work. You'll help athletes to develop the speed, agility, endurance and strength they need to compete at the highest levels. With athletes progressing from basic rehabilitation exercise up to reconditioning for return to play, the role of the strength and conditioning coach is becoming more and more prominent.

Our degree course will give you the knowledge and skills you need to work with professional sportspeople, and it's aligned to UK Strength and Conditioning Association Standards. But there are opportunities outside of professional sport, too: our course recognises broader national concerns about low levels of physical activity. There's an emerging need for qualified healthcare professionals to work with a broad range of clients. We'll therefore encourage and support you to gain fitness industry qualifications.

Two of the core strands of strength and conditioning and rehabilitation are biomechanics and exercise physiology. We'll cover both of them in detail throughout the course, but from Year 2 you'll have the chance to specialise. If you're interested in the movements your players make, or the joint loading that could lead to injuries, biomechanics may be the path for you. Or if you're fascinated by a player's capacity to perform at the end of a game, or finish strongly in a race, you can focus on physiology.

You'll learn to work safely and ethically as a strength and conditioning coach in our accredited labs in the Cambridge Centre for Sports and Exercise Science. As well as gaining practical knowledge that's in demand from top-level clubs and sporting organisations, you'll also develop your research skills. In Year 3, our final year research project gives you the chance to complete an in-depth investigation into an area of sporting practice.

By studying at ARU, you'll benefit from highly-experienced lecturers, including practising strength and conditioning specialists, sport therapists, coaches, health and exercise professionals and world-leading researchers. Our team currently includes a Paralympian World Record holder, Scottish Women's Rugby player, and judo champion. We also host visiting guest speakers as part of our Excellence in Sport seminar series.

## Course Delivery

Our courses are delivered through teaching and learning methods which provide students with the widest possible exposure to a modern and innovative higher education experience.

These methods vary and could include attendance at lectures and seminars, undertaking laboratory exercises or work-based activities, practical work, performances, presentations, field trips, other relevant visits and e-learning through Canvas, our online

learning management system.

Each course is divided into a number of ‘modules’ which focus on particular areas, each of which has a specific approach to its delivery. This information is published to students for each module they take via the Module Definition Form (MDF) and Canvas.

## Assessment

Throughout the course, we’ll use a range of assessment methods to help you measure your progress. These include presentations, practical skills tests, scientific reports, case study critiques, online assessments and a research project. We’ll also encourage you to reflect on your work, and participate in peer assessment.

## Fees

Information about your course fee including any annual fee increases or deposits (if required) can be found in your offer letter.

## Additional Costs

£250 per annum to cover optional external qualifications/professional memberships, sports attire for practical session and miscellaneous study items (i.e. printing).

## Modules

### Core Modules

#### **Year 1: Foundation in Sports Science**

This module will provide students with the necessary skills to begin studying at level 4 in courses related to Sports and Sports Science.

Students will be introduced to the core skills necessary to succeed in higher education, including researching and referencing appropriately, demonstrating appropriate ICT skills, and communicating effectively verbally and in writing.

In addition to these fundamental study skills, students will be introduced to the various scientific disciplines underpinning sports sciences. Fundamental mathematical skills will be covered in order to support students’ other subjects and give them confidence in manipulating data.

Students will be introduced to molecular and cellular biology, and how these fields are applied to real-world investigations. Students will also study the biology of micro and macro organisms, with reference to both human and animal structures.

Students will be introduced to the core concepts of chemistry, with a particular focus on organic chemistry, and will also be given a grounding in the core principles of physics, applied to living organisms.

Students will be introduced to the core principles of psychology and will explore various current applications of psychological theory.

The module is made up of the following 8 constituent elements:

- Interactive Learning Skills and Communication (ILSC)
- Information Communication Technology (ICT)
- Psychology
- Maths for Scientists
- Cellular Biology
- Biology – Physiology
- Chemistry
- Physics for Life Sciences

#### **Year 2: Organisation and Structure of Sport**

All sport practitioners, at whatever level, operate within and around sport organisations, systems, and structures. This broader socio-political organisational environment enables and constrains how sports practitioners operate. Consequently it is important

to appreciate this broader environment in order to understand your role within it and how to navigate it in the most efficient and effective manner. During the module, students will develop an understanding of how sport organised and structured in the UK (and abroad), the dynamic and complex nature of the sport industry, and the role and influence of organisations and various governmental agencies (e.g., Sport England and UK Sport) in overseeing and delivering sport and physical activity. As well as the module specific knowledge you will also further enhance your key employability skills of written communication and your professional credibility by demonstrating your knowledge and understanding of the sports industry.

## **Year 2: Anatomy and Physiology**

The module introduces the fundamental aspects of human anatomy and physiology in order to understand how the body responds and performs to physical activity. The regulation of the human body to stress (exercise) relates to an intricate set of homeostatic events, enabling different systems to increase their overall physiological output to sustain effort. The structure and function of the main organ systems in the body; the musculoskeletal, respiratory, cardiovascular and digestive systems will be examined and reviewed in relation to rest and in response to exercise.

In this module you will study and explore the content through lectures, seminars and laboratory based practical's where the functional and homeostatic principles will be applied and examined under changing conditions. As well as providing you with subject specific knowledge, this module will enable you to develop a number of specific employability skills related to practical (laboratory) techniques and general skills related to data collection, data handling and data presentation.

In addition to the key text identified below, specialist literature will be identified on our [ReadingLists@Anglia](mailto:ReadingLists@Anglia) module site – and will be used to support the learning outcomes.

## **Year 2: Pedagogical Principles in Sport**

This module will introduce the key theoretical and practical concepts that underpin contemporary coaching theory and practice. By the end of the module you will have developed an appreciation of the coaching process in terms of the pedagogical, managerial, behavioural and ethical components which enable good practice. The key areas addressed include the roles, techniques, and planning skills of a good coach. The quality of a coach will be assessed in relation to their adherence to the professional code of conduct, their awareness of health and safety issues and their understanding of how a coaching session should progress.

The skills of a coach will be considered by experiencing coaching practice and evaluating the use of various communication and organisational skills such as time management and problem solving. The techniques used by coaches to deliver a successful session will be identified by examining and experiencing different styles of coaching and guidance. These concepts will be taught using an integrated approach, examining how all of the components link together to achieve success in coaching. The module explores learning and how the ability to learn is dependent on the coach athlete relationship and the approaches adopted by the coach. This module will be of particular interest for those who want to further their understanding of the interdisciplinary nature of coaching and teaching. Standard texts are available via the library and more specialist literature is online.

## **Year 2: Introduction to Human Movement**

This module introduces you to the fundamentals of human movement. The module provides a sound grounding in the fundamentals of human movement and provides the essentials for further study in Biomechanics.

The module will introduce you to the concept of qualitative movement diagnosis (QMD). QMD is an observational approach to analysing human movement. This is a skill which is fundamental to all Sports Coaching, Sport Science, Health and Exercise and Physical Education practitioners. You will also study the types of motion a body can have, including the concepts of distance, speed and time and displacement, velocity and acceleration. These kinematic motion quantities will be explored practically and graphically.

The importance of Newton's laws and the net external force to all movement will be explained, giving you an insight into how limb rotation can produce translational movement. The anatomical quantities of mass, weight and centre of mass will be investigated and the links drawn with the body's kinetic and potential energy.

In this module you will study and explore the content within the context of real sporting actions such as:

standing, walking, running, jumping and throwing and by using the techniques of video analysis, experimental investigation and computer aided data analysis. The module will enable you to develop transferable skills such as IT, numeracy and communication and will encourage you to become an independent thinker with good study habits.

## **Year 2: Exercise Physiology and Nutrition**

Following on from your understanding of human anatomy and physiology, this module aims to provide an overview of the fundamental principles of exercise physiology and nutrition as applied in Sport Science/ Coaching/ Therapy and Strength and Conditioning contexts. The module considers two key areas: energy demands of sport and exercise, and basic exercise assessment. Within the first area (energy demands) you will explore the principles of exercise metabolism as applied to both anaerobic and aerobic exercise. This will lead to discussion around metabolic pathways and energy demands of different types of exercise which will support your learning around training development and adaptations to exercise. An important aspect of this will be the interconnection between nutrition and metabolic demands of exercise, in which you will explore the role and contribution of the main macro-nutrients in our diet to fuel exercise, and how nutrition supports exercise adaptations.

The second main area explored within this module is the concept of basic exercise assessment. By the end of the module you will have developed practical skills relevant to undertaking a basic 'fitness' assessment on a client (as typically used in health and applied sport settings). As part of this, you will be expected to collate logbook material related to all practical sessions and develop team-work skills relevant to working within a multi-disciplinary team setting.

The content of this module will be covered through weekly lecture sessions followed by aligned practical laboratory sessions. The practical sessions are designed to progressively build a collection of exercise-testing skills pertinent to both the logbook and the final team-based practical assessment. As well as providing you with fundamental subject specific knowledge pertinent to your respective degree, this module will develop various employability skills associated with data collection, evaluation and interpretation of results, working within team settings and applied testing skills.

## **Year 2: Applied Sport Pedagogy**

This module will develop and apply the key theoretical and practical concepts that underpin contemporary coaching theory and practice. By the end of the module you will have developed an understanding of the coaching process in terms of the pedagogical, managerial, behavioural and ethical components which enable good practice. The key areas addressed include the roles, techniques, and planning skills of a good coach. You will begin to assess the quality of your own and others' coaching and teaching in relation to adherence to professional codes of conduct, awareness of health and safety issues and understanding of how a session should progress. The skills of a coach/teacher will be considered by experiencing coaching practice and evaluating the use of various communication and organisational skills such as time management and problem solving. The techniques used by coaches to deliver a successful session will be developed by experiencing and examining coaching and feedback. The module explores the idea of enhancing athletes' learning through adopting different approaches and relationships as a coach.

These concepts will be taught using an integrated approach, examining how all of the components link together to achieve success in coaching. The module will help develop key transferable and employable skills in communication, organisation and analysis of coaching practice, which will be assessed by a variety of coursework methods including a portfolio of reflections on practice and computer based assessments. This module will be of particular interest for those who want to further their applied understanding of the interdisciplinary nature of coaching and teaching. Standard texts are available via the library and more specialist literature is online.

## **Year 2: Research Methods for Sport and Exercise**

This module will provide an introduction to the core skills required for research in the area of sport science and sports coaching set in the context of a higher education environment. The module will act as key foundation within the degree programme providing wider skills for study and research. The module will seek to develop the skills and attributes required to initiate an understanding of the research process and stages associated with it and also an appreciation of different types of research. You will also develop an understanding of the different types of data that can be collected within your course area. The module will seek to develop a good awareness of the data analysis process, utilising different IT skills and IT programs. Finally, academic best practice will be discussed and evaluated which will cover themes such as writing skills and plagiarism. Key employability skills will be developed throughout this module – particularly how to construct oral and written reports using appropriate formatting, language and citations.

## **Year 2: Sport and Exercise Psychology**

An appreciation of the psychological aspects of sport and exercise participation is vital to the holistic understanding of the participant. The primary focus of this module is to introduce you to key topics within Sport, Exercise and Performance Psychology and aims to give you an understanding of the psychological factors which may enhance, or inhibit sports performance and exercise participation. Such factors could include pre-competition nerves, attention control, self-confidence and motivation. You will be encouraged to reflect upon your own experiences in relation to these psychological factors and to consider the varying psychological demands of different sports and levels of participation. The module will be delivered through weekly three hour sessions combining lecture, seminar and tutorial elements.

Lectures will involve discussion and analysis of the current state of knowledge in specific key topic areas of sport, exercise and performance psychology. The seminar and tutorial sessions centre on group and individual tasks designed to support the lecture content and assessment elements. As well as providing you with subject specific knowledge, this module helps develop a number of transferable skills including those relevant to general employment including team work and report writing.

## **Year 2: Professional Development - Level 4**

At Anglia Ruskin University we strive to ensure that students receive an outstanding Academic Education and Student Experience and understand that, whilst embedding employability skills within the credit-bearing curriculum is important, it is only part of the set of achievements needed in order to obtain career employment.

This 0-Credit module will be used to track and verify the progress students have made with respect to key employability skills and endeavour. Students will work closely with their personal tutor, SU Volunteering Service, Study Skills Plus, and the Faculty Employability Advisor to engage with co-curricular and extracurricular opportunities and activities to enhance their personal attributes.

## **Year 3: Applied Research Skills**

This module follows, and expands upon the knowledge and experience gained from the Level 4 module Research Methods for Sport and Exercise. The primary purpose of this module is to develop the knowledge-base and applied skills required to produce a substantive independent report supported by research and data interpretation. As such this module focuses on two interrelated areas of study; applied data collection and interpretation with respect to the research process. These two areas will be delivered with recognition of the two paradigms of research – Quantitative and Qualitative research designs. It is well recognised that both of these research paradigms provide different, but complementary, opportunities to collect and evaluate coaching, health, and sports science data for a perspective or objective review of scientific evidence and applied practice.

This module will provide opportunities to apply knowledge and key employability skills related to research design and presentation in a safe environment, and allow students the opportunity to evaluate which research designs would best suit their choice of Level 6 module (Undergraduate project or Advanced Work Placement).

In addition to the key text identified below, specialist literature will be identified on our [ReadingLists@Anglia](#) module site – and will be extensively used to support the learning outcomes.

## **Year 3: Physiological Profiling for Endurance**

Aerobic physiology and functioning are the linchpins to all athletic and health-based activities, it from this starting point that this module will begin. Accordingly this module will study the process of profiling aerobic endurance performance and health from a physiological and analytical perspective. The philosophy behind this module is the notion of validity and reliability in test selection. As such the module will address the protocols and limitations associated with the assessment of maximum aerobic power ( $\text{VO}_{2\text{max}}$ ), while aerobic capacity will be addressed in the context of maximal lactate steady state, lactate minimum, individual anaerobic threshold, onset of blood lactate accumulation (OBLA) and DMax and the ventilatory threshold.

The relevance of performance economy as a diagnostic tool will be considered and projected to show how this simple concept of sub-maximal oxygen uptake can be used to establish the performance indicator termed velocity at  $\text{VO}_{2\text{max}}$  ( $v\text{VO}_{2\text{max}}$ ). Consideration will be given to the dynamics of oxygen supply and utilisation at the onset of exercise through a reflection of oxygen uptake kinetics. These concepts will all be used to explore exercise intensity domains and how the role of critical power and the  $W'$  can be used to provide an objective measure of an integrated response to exercise. Clinical skills will also be considered through the application of such techniques as ECG, thoracic impedance, respiratory flow loops and cardiopulmonary

exercise testing. This module will help to develop a series of transferable skills including practical (laboratory) techniques and skills relevant to general employment including report writing, data collection, handling and presentation and will be of particular interest to individuals wishing to apply their exercise physiology knowledge and work within a Sports Science Support environment.

### **Year 3: Functional Rehabilitation**

Strength and conditioning coaches and sports therapist are often responsible for large portions of the rehabilitation of athletes from injury. In this module students will be introduced to rehabilitation theory and will gain the knowledge and understanding to plan, implement and deliver progressive exercise programmes. Specifically, this module focusses on the early and intermediate stages of recovery from injuries sustained in sports and exercise setting. From the acute inflammatory stage where students will learn to manage the injury, through to the recovery of functional losses, students will cover rehabilitation of upper and lower limbs and spine. Moving from non-weightbearing to weight-bearing exercise, students will learn how to increase strength, endurance, range of motion and proprioception. Students will also be taught the use of ambulation aids (such as crutches), gait retraining, taping, strapping and compression bandaging.

At the end of this module the patient will be beginning to progress towards sport-specific conditioning/reconditioning and higher velocity movement, this will lead the student to further apply the basic concepts learnt in a follow-on level 5 module. This module supports the learning at level 6 covering late stage rehabilitation and return to play, closing the rehabilitation loop.

### **Year 3: Practical Competencies in Biomechanics**

From undertaking Introduction to Human Movement and Anatomy and Physiology modules, you (the student) will have developed a basic understanding of how the human is able to move (Anatomy) and the different types of motion a body can have (Human Movement). The module Practical Competencies in Biomechanics advances your understanding of Biomechanics through developing an understanding of how to measure, record and analyse a sporting performer using a variety of approaches commonly used by biomechanists.

Upon successful completion of the module, you will have a theoretical and practical understanding of the key competencies within the discipline of Biomechanics. Following the British Association of Sport and Exercise Science (BASES) 'guidelines' for biomechanics, this module will cover the following key areas;

- Motion analysis in both 2D and 3D perspectives
- Electromyography (EMG), its use and practical application
- Dynamometry
- Kinanthropometry in Biomechanics and Centre of Mass (CoM) modelling
- Centre of pressure & postural control
- Introduction to Force plates

This is an applied module. You will be taught the key theoretical underpinning and then be expected to engage in the practical application of the topic; which will take the form of seminar, lab practical or computer session. Your ability to proficiently complete a range of practical competencies relevant to the discipline of Biomechanics will form the key assessment within the module.

In this module you will study and explore the content within the context of real sporting actions such as: standing, walking, running, jumping and throwing and by using the techniques of video/motion analysis, experimental investigation and computer aided data analysis. The module will enable you to develop transferable skills such as IT, numeracy and communication and will encourage you to become an independent thinker with good study habits.

### **Year 3: Applied Research and Employability**

This module follows on from applied experiences gained from the Level 5 Applied Research Skills with the primary purpose of this module to develop the key competencies that support independent learning and exploration. Within the defined guidelines of creating a research project proposal or a proposal for suitable work experience, this module will enable students to act with

increasing autonomy through the reduced need for supervision and direction. Finally the module will evaluate the ethical and legal issues related to being an applied research or practitioner with Sport and Exercise Sciences.

Key employability skills related to planning and organisation, self-management and problem solving will be delivered by the University's Employability Service to support students through this module.

In addition to the key text identified below, specialist literature will be identified on our [ReadingLists@Anglia](#) module site – and will be extensively used to support the learning outcomes.

### **Year 3: Strength and Conditioning**

This role of the applied strength and conditioning (S&C) coach at all levels of sport has progressed in recent years and is now a fundamental role within the sport science support team. The module will provide within an in-depth exploration of safe and effective S&C practice. You will develop an evidence based applied rationale for the role of S&C work in relation different performance athletes. You will be introduced to the fundamental techniques and principles of athlete assessment, evaluation and consultation. These applied modes will be discussed in conjunction with a recognition of the use of an athlete needs analysis. Although the generic term "S&C" is applied to this training domain you will address the wider implications in relation the components of fitness: endurance, speed, strength, agility (or equiv areas). You will also explore the rationale for approaches used in relation to training programme design which will be under-scored by the issues of physiological and anatomical adaptation. As well as the module specific principles you will also further enhance your key employability skills of communication, presentation, IT and data handling.

### **Year 3: Applied Teaching and Coaching**

This module aims to bridge the gap between academic theory and practice. The students will practically plan, deliver and evaluate real life coaching sessions with the help of a mentor.

By the end of the module the student will have direct coaching/teaching experience and will have generated a portfolio of practical hours of coaching/teaching. The module will develop an appreciation of mentoring, coaching/teaching and reflection, whilst also developing valuable employability skills such as working in a team, communication and professionalism. The key areas addressed will be those regarding the 'job' of the coach/teacher, from collecting real time information from their athletes/children, through to relating this into a structured plan and delivering this plan via several linked sessions. Finally, evaluating these sessions and then writing a reflection on this process will complete the coaching/teaching cycle. Other employment skills such as time management, administration, organisation, peer feedback and important health and understanding safety requirements of the sector will be addressed.

This module will be beneficial to those wanting to enhance their practical coaching/teaching experience and generate a greater volume of coaching/teaching hours.

### **Year 3: Professional Development - Level 5**

At Anglia Ruskin University we strive to ensure that students receive an outstanding Academic Education and Student Experience and understand that, whilst embedding employability skills within the credit-bearing curriculum is important, it is only part of the set of achievements needed in order to obtain career employment.

This 0-Credit module will be used to track and verify the progress students have made with respect to key employability skills and endeavour. Students will work closely with their personal tutor, SU Volunteering Service, Study Skills Plus, and the Faculty Employability Advisor to engage with co-curricular and extracurricular opportunities and activities to enhance their personal attributes.

### **Year 4: Talent Identification and Development in Sport**

This module examines the processes involved in talent identification in sport and the subsequent models of athlete development. A critical understanding will be developed of holistic the development of children and adolescents with a particular emphasis on the importance of adopting a long-term, athlete-centred approach to developing performers. The importance of physical literacy and role of fundamental movement skills are highlighted as essential components for enabling individuals to maximise their athletic potential and also to encourage lifelong participation in sport and physical activity.

## **Year 4: Rehabilitation for Performance**

In a competitive sporting environment, it is not enough just to regain function (e.g. walking or running). To be prepared to withstand the rigors of competitive sport an athlete must be reconditioned, and the risk of re-injury reduced before returning to play. Building on the early and intermediate stages of rehabilitation, functional movement and strength and conditioning covered earlier in the course, this module deals with the late and predischarge stages of rehabilitation. Having gone through the early and intermediate stages of rehabilitation and

regained function, this module starts the conditioning of the patient for return to play. Students will learn to create progressive, sport-specific exercise programmes covering flexibility/Range of Motion (ROM), endurance, strength, speed, skill and coordination. Students will progress from non-contact to full contact training, more advanced movements such as change of direction, and the introduction of elements of spontaneity. Students will also learn the principles and practices of pre-discharge examinations, and the psychological aspects of the injury and rehabilitation process.

## **Year 4: Developing Performance**

Performance sport is an area many students would like to work in but is highly competitive and high pressured. This module will consider working in this type of environment and the pressures that coaches and performance directors face when making systems/structures that balance the needs of the funding agencies against the needs of the athletes.

Following on from the trimester one module MOD005676 Long-Term Athlete Development, this module will consider athlete development from a performance perspective. The module will consider developing and managing the daily training environment, assessing athletes, Talent Identification/Detection and designing training programmes from an athlete centred, coach led perspective.

When considering the above factors student will be expected to draw upon knowledge developed in previous and co-existing modules to appreciate the multi-faceted nature of performance sport.

By the end of this module students should be able to identify talented athletes, understand the process of creating a daily training environment, design, assess athletes training needs and create a periodised plan. Key employability skills will include planning skills, the use of Microsoft office, and an ability to present.

## **Year 4: Advanced Strength and Conditioning**

This module provides the opportunity to build on wider exercise science and previous learning to investigate the latest evidence based practice on Strength and Conditioning (S&C). You will learn, experience and analyse free weight lifting techniques with specific focus on more complex lifts and the derivatives associated with them. You will learn to coach performers through this process and also consider the value (of these lifts) within the training cycle. Through observation of performers, you will understand the coaching cues in order to identify ineffective movement patterns. You will also develop a high level of knowledge to enable you to practically suggest and present appropriate interventions for a performer of varying ability. The use of technology/micro technology for monitoring performance will be investigated and you will review the value of this method of data collection for the exercise and conditioning professional. You will investigate how training may change when working with different performers with varying abilities. Being able to change your professional practice relative to the specific population you are working with is a critical skill for the conditioning coach. Learning about the needs and issues to consider when training special populations will permit you to be a more proficient in the area.

## **Optional Modules**

*(Subject to availability)*

## **Year 2: Gym Instructor (REPs Levels 2)**

The Register of Exercise Professionals (REPs) is the independent, public register that recognises qualifications and expertise in the health and fitness industry. Gaining entry to REPs give employers and the public assurance of competence in the chosen vocational area. This module gives the student the opportunity to combine the knowledge they have gained during the other level 4 modules and start the process of gaining entry to REPs at Level 2. They will combine learning from other level 4 modules with knowledge and skill specific to gym instruction. This will include: devising and delivering basic exercise programmes and delivering an exercise session.

In this module, the student will collate and be assessed on the Core Knowledge requirements and required National Occupational Standards for Exercise and Fitness (SKAEF1-4) for entry onto the register.

### **Year 3: Biomechanics: Analysis of Motion**

This module builds upon the knowledge and understanding gained from the modules Anatomy and Physiology, and Introduction to Human Movement, taken in Level 4. This module also extends the L5 module Practical Competencies in Biomechanics.

This module further develops your understanding of force plates (gained in Practical Competencies in Biomechanics module) for data capture and analysis, and extends your understanding of motion analysis. The content is therefore appropriate for a student wanting to specialise in Biomechanics or add a more Biomechanical focus to their Sports Coaching and Physical Education degree.

The module content is focused on the initiation and development of motion in terms of both the internal forces produced by the musculoskeletal system and the external forces acting on the body. In order to understand human movement, you will explore the ground reaction force in depth. You will then see how the concepts of internal forces, the external net force and mass and acceleration are used to explain movement patterns. That will enable you to appreciate the importance of torque, momentum and impulse and to use these quantities to critically analyse a sporting action.

This module content will also focus on the analysis of gait, a key skill that all Biomechanists should possess. The fundamental principles of gait analysis will be explored in a theoretical and practical manner. You (the student) will also gain sufficient experience to recognise differences in gait (and force) patterns between normal and pathological gaits.

Throughout the module you will use force plates and motion analysis to investigate, analyse and appraise human movement. This will form a key part of your assessment within this module.

You will study and explore the content of the module in a series of lectures, seminars and experimental sessions. This will enable you to further develop both your scientific skills and your transferable skills such as IT, numeracy and communication.

### **Year 3: Physiological Profiling for Strength and Power**

The production of force and power across a range of motion and in conjunction with the body dimensions are crucial to both everyday living and athletic performance. Accordingly this module will study the process of profiling aerobic endurance performance and health from a physiological and analytical perspective. The philosophy behind this module is the notion of validity and reliability in test selection. To this end, this module will explore the means of assessing anaerobic power through such means as the Wingate cycle test and Margaria Stair test while anaerobic capacity will be evaluated in the context of accumulated oxygen deficit tests as well as lactate and constant load tests. The determination of strength will address measures of isometric, isotonic and isoinertial force production using conventional 'gym-based' approaches to more clinically relevant measures such as the Reactive Strength Index. These will be compared to the laboratory controlled assessment of strength (torque) using isokinetic dynamometry. Body composition will be considered through the use of both callipers and skinfold assessments through to hydro-densitometry. Flexibility and the determination of range of motion (ROM) will be considered in the context of indirect measures such as Sit-and-Reach through to more applied approaches using flexometers and goniometers. This module will help to develop a series of transferable skills including practical (laboratory) techniques and skills relevant to general employment including report writing, data collection, handling and presentation and will be of particular interest to individuals wishing to apply their exercise physiology knowledge and work within a Sports Science Support environment.

### **Year 3: Personal Trainer (REPs Levels 3)**

The Register of Exercise Professionals (REPs) is the independent, public register that recognises qualifications and expertise in the health and fitness industry. Gaining entry to REPs gives employers and the public assurance of competence in the chosen vocational area. This module gives the student the opportunity to combine the knowledge they have gained during the other level 5 modules and complete the process of gaining entry to REPs at Level 3. In this module, the student will prepare for and be assessed on the practical competencies required for entry on to the register.

Upon completion of this module, students will have satisfied all requirements of entry onto REPs and will be eligible to apply for membership as a Level 3 Personal Trainer.

This course is only open to students who have a pre-existing Level 2 REPs Qualification.

## **Year 4: Physiological Basis of Training**

This module will delve into the fascinating but sometimes controversial domain of training science and explore the nature training programme design, athlete development and limitations to the success of the athlete. To this end the module will commence with an exploration of what constitutes performance, examining the physiological and metabolic demands of sports. The major component of this module will though address the principles of training application and design. Consideration will be given to the laws of training in the context of the developing athlete and how these are linked to the of one-factor and two-factor theories of super-compensation. Time will be devoted to the nature of fatigue both as a prerequisite to the training adaptation but also as a function of the training load examining the peripheral and central manifestations of this key training mechanism. Fatigue will also be explored in the context of recovery and methods of recovery. In the context of fatigue and training adaptation the role of cellular messengers such as PGC-1 $\alpha$  and mTOR will be considered to show how an adaptation manifests. The notion of fatigue, training and recovery will lead into the evaluation of under-performance syndrome addressing both what this is as psychobiological construct but also how this can be both monitored and avoided. These elements will all be brought together to evaluate the programming of training using an array of approaches including linear and non-linear periodisation and block training models and how these programmes can either through the use of a taper lead to an athletic peak or through the application of undulating loads lead to a maintenance of performance. The module will further reinforce your key transferable skills of IT, numeracy and communication and will be of particular interest to those who wish to develop a critically applied scientific understanding of the physiological mechanisms of training.

## **Year 4: Theoretical Aspects of Biomechanics**

This module concludes the study of the basic building blocks of Biomechanics with a look at applied linear and angular kinematics and kinetics concepts, centre and the calculation of joint moments. It introduces another piece of technology, widely used in wearable devices: the inertial measurement unit (IMU).

The module builds on all the concepts previously studied in Level 4 and 5. This includes: motion, (displacement, velocity, acceleration), force and momentum (the ground reaction force, the net force on the human, free-body diagrams and force vector diagrams), lever systems and the musculo-skeletal system, muscle contraction types and the production of force, the centre of mass, projectile science and work, energy and power.

Students will be expected to apply all the scientific and computing skills gained during the previous two years including; motion-analysis, force plate data analysis, scientific report writing, graphical and statistical analysis, vector analysis and mathematical problem solving. Also, during the lectures and computer/laboratory sessions, students will develop an understand of rotational motion concepts and use important terminology associated with topics such as the body and segmental planes and axes (the transverse, sagittal and frontal planes and the longitudinal, medio-lateral and antero-posterior axes).

In addition, to learning about theoretical biomechanics, key employability skills related to effective communication will be gained.

## **Year 4: Applied Biomechanics**

An effective support team makes use of various sports and exercise sciences, such as physiology, biomechanics and psychology, to help improve the performance of an athlete, team or the quality of life of the general public. This module takes the theoretical knowledge and understanding of biomechanics that has been gained throughout 5 terms of study and concentrates on the application of biomechanics to improve technique and reduce predisposition to injury for sport or clinical populations. The aim of the module is to provide the knowledge and skills to successfully prescribe and/or deliver sport and exercise biomechanics interventions as a coach or sport scientist.

The module take concepts previously studied biomechanics modules at levels 4, 5 and 6 and provides students with the opportunity to learn and to develop methods of applying biomechanics to practice.

During lecture and laboratory sessions students will work develop the skills to undertake their own biomechanics intervention. They will then carry out this intervention with an external member and write a report to document the intervention.

## **Year 4: Physiological Responses to Training**

The aim of this module is to critically evaluate the methods used in training and to reflect on the array of physiological, metabolic and biochemical adaptations that arise. As such the key components of fitness will be addressed (aerobic and anaerobic endurance, strength, power, flexibility and speed). Within each of these domains the application of training approaches will be

explored in the context of intensity, frequency and duration thus reflecting training loads. Analysis will made of how these approaches are associated with the developmental status of the athlete, phase of the training cycle and anticipated training outcome. Training adaptations will be critically evaluated reflecting on the in approaches used to both derive the data and conclusions that were drawn. Key adaptation responses to consider will include: myocardial, haematological, immunological, enzymatic, cellular, substrate, metabolite, neurological and muscular. Additionally training environments will be considered reflecting on the application and manifestation of key approaches such as: altitude, heat, pollution, menstruation, age and disability. The module will further reinforce your key transferable skills of IT, numeracy and communication and will be of particular interest to those who wish to develop a critically applied scientific understanding of the physiological mechanisms of training.

#### **Year 4: Undergraduate Research Project**

The module provides the student with the opportunity to select an area within Sport and Exercise Sciences or Sports Coaching and Physical Education and to determine and apply ethical standards, undertake an in-depth review of the literature, and create a research questions derived from the review. Furthermore this module provides an opportunity to develop, conceptualise, execute, analyse and reflect upon their own independent research.

The module is supported by 4 x 1 hour taught sessions where project management and development will be addressed. Additionally a nominal 12 hours are allocated for personal supervision during the module.

#### **Year 4: Advanced Work Placement**

This Sport and Exercise Sciences Advanced Work Placement module provides the student with the opportunity to develop, conceptualise, execute, analyse and reflect upon their own learning experiences linked to a vocationally relevant graduate aligned placement. It provides the student with the opportunity to focus their career aspirations in the final year of undergraduate study allowing them to immerse themselves, learning within a workplace and critically reflecting on the experience. The module will build on the employability theme which is embedded within the course and specifically from a level 5 Applied Research and Employability Skills module. The module requires the student to independently select an appropriate work related experience within the broad area of Sport and Exercise Sciences. They will undertake an in-depth review of the literature linked to the industry contextualising the profession, creating a plan of work to follow considering the organisation's needs, aims or objectives. They will also identify and reflect on specific professional standards, legal and/or health and safety requirements as required. Upon completion of the work experience, students will be required to critically reflect on their experience linking the academic research to the vocational learning experience, compiling a theoretically informed piece of data driven work. The module is supported by 4 x 1 hour taught sessions where project management and development will be addressed. Additionally a nominal 12 hours are allocated to personal supervisor from the academic lead supervising the project.