Confirmation that this version of the module specification has been approved by the School Learning and Teaching Committee:

(18/2/15)

**MODULE SPECIFICATION**

1. **Title of the module**

SS577 Biomechanical Analysis

1. **School or partner institution which will be responsible for management of the module**

School of Sport and Exercise Sciences

1. **Start date of the module**

Autumn 2016

1. **The number of students expected to take the module**

80

1. **Modules to be withdrawn on the introduction of this proposed module and co9nsultation with other relevant Schools and Faculties regarding the withdrawal**

None

1. **The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])**

I

1. **The number of credits and the ECTS value which the module represents**

15 (ECTS 7.5)

1. **Which term(s) the module is to be taught in (or other teaching pattern)**

Autumn or Spring

1. **Prerequisite and co-requisite modules**

Prerequisite: SS327 Introduction to Biomechanics

1. **The programmes of study to which the module contributes**

BSc Sport and Exercise Science

MSci Applied Sport and Exercise Science

1. **The intended subject specific learning outcomes**

On successful completion of this module, students will be able to:

* 1. Apply Newton’s Laws to whole body and segmental angular motion.
	2. Identify the steps involved in computing resultant joint moments using a two dimensional inverse dynamics procedure and critically discuss methodological issues involved in collecting the necessary data.
	3. Explain the advantages of muscle indeterminacy and the limitations of an inverse dynamics analysis.
	4. Interpret a joint moment-time profile to identify common gait issues.
	5. Recognise a typical stress-strain relationship for biological tissues and the changes in mechanical properties that occur with training, ageing and disuse.
1. **The intended generic learning outcomes**

On successful completion of this module, students will be able to:

* 1. Apply knowledge to the solution of familiar and unfamiliar problems – evidenced via the selection and solution of appropriate equations to gain insight into human movement principles.
	2. Communication, presentation, numeracy and C & IT skills – evidenced via the completion of calculations in seminars and assessments, the use of computer software to aid in the collection and processing of biomechanical data, and the interpretation in worksheets and assessments of this data.
	3. Interactive group skills – evidenced via the collection and analysis of biomechanical data in groups.
	4. Problem solving skills – evidenced via the completion of calculations and data analysis.
	5. Ability to self-appraise and reflect on practice - achieved through the completion of formative online quizzes and the completion of in class exercises.
	6. Ability to plan and manage learning – through completing the extra self-directed study and optional online exercises necessary to successfully complete the required assignments and tasks throughout the module.
1. **A synopsis of the curriculum**

This module is concerned with angular mechanics and the biomechanics of complex movements. Laboratory experimentation will provide the opportunity for students to develop practical skills in the use of a range of analysis equipment such as a force plate and computer-based motion analysis. A range of sport and exercise situations will be used to illustrate the mechanical principles considered. These could include kinematic analysis of walking; the kinetics of weight lifting; the computation of resultant joint moments and gait analysis.

Indicative content includes:

• Definition and computation of angular kinematic quantities.

• Newton's Laws in their angular formulation.

• Methodology: motion analysis, force plates, anthropometry.

• Interpretation of resultant joint moment profiles in gait analysis.

• Basic material properties such as stress and strain and the relationship between these measures and injury.

1. **Indicative Reading List**

Hamill, J. and Knutzen, K.M. (2009) *Biomechanical basis of human movement.* 3rd Ed. London: Lippincott Williams and Wilkins.

Hay, J.G. (1993) *The biomechanics of sports techniques.* 4th Ed. Englewood Cliffs NJ: Prentice-Hall.

McGinnis, P. (2005) *Biomechanics of sport and exercise.* 2nd Ed. Champaign, IL: Human Kinetics.

Nordin, M. and Frankel, V. H. (2001) *Basic biomechanics of the musculoskeletal system.* 3rd Ed. London : Lippincott Williams & Wilkins.

Nigg, B. and Herzog, W. (2007). *Biomechanics of the Musculoskeletal System.* 3rd Ed. Chichester: Wiley & Son.

Winter, D. A. (2009) *Biomechanics and Motor Control of Human Movement.* 4th Ed. Chichester: Wiley & Son

1. **Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended module learning outcomes**

Lecture (All LOs): 11 hours

Seminar / practical (All LOs) 11 hours

Reading (11.1-11.5; 12.1, 12.6) 33 hours

Completion of calculations after seminar or practical (11.1-5; 12.1, 12.2, 12.4-6) 22 hours

Review of online support material and self-test quizzes (11.1-5; 12.1, 12.2, 12.4-6) 33 hours

Completion of assessments (All LOs) 40 hours

TOTAL 150 hours

1. **Assessment methods and how these relate to testing achievement of the intended module learning outcomes**

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| --- | --- | --- |
| Assessment Type | Weighting | Learning Outcomes Assessed |
| Coursework (Extended laboratory report to include independent written data interpretation and methodological criticism from exemplar data) | 100% | 11.1, 11.2, 11.3, 11.4, 11.5; 12.1, 12.2, 12.3, 12.4, 12.5, 12.6 |

1. **Implications for learning resources, including staff, library, IT and space**

The module will be convened by an existing member of the School of Sport and Exercise Sciences. Library and IT resources will be mainly provided by using existing provision given that the Drill Hall Library already contains a good selection of books relevant to the module. Teaching will take place in existing lecture theatres, computer rooms and laboratories. The module makes use of an existing site licence for specialist biomechanics software. A small amount of laboratory consumables will be required and simple demonstration apparatus can be fabricated using existing University workshops.

1. **The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia support service, and specialist support will be provided where needed.**
2. **Campus(es) or Centre(s) where module will be delivered:**

Medway