HUMAN MOVEMENT AND REHABILITATION - 2024/5

Module code: ENGM260

Module Overview

Through this module, students will develop an advanced understanding of human movement, biomechanics and their real-world significance. Students will focus on aspects not previously covered on the programme and develop important practical skills.

Students will broaden and deepen their knowledge of movement analysis in lectures and tutorial sessions that focus on the state-of-the-art. Practical data acquisition in the laboratory will require students to take ownership of the whole workflow in collecting/analysing biomechanics data that will feed into a single coursework assignment.

Students will work together to collect movement data using a clinically derived approach. Using industrially relevant software, students have the opportunity to process and analyse captured data and link this to the concepts that have been delivered in lectures and tutorial sessions. State-of-the art equipment will also be used to allow students to explore approaches that are more common for research and developing applications of biomechanics.

Module provider

Mechanical Engineering Sciences

Module Leader

OLDFIELD Matthew (Mech Eng Sci)

Number of Credits: 15

ECTS Credits: 7.5

Framework: FHEQ Level 7

Module cap (Maximum number of students): N/A

Overall student workload

Independent Learning Hours: 79

Lecture Hours: 23

Tutorial Hours: 6

Laboratory Hours: 13

Guided Learning: 6

Captured Content: 23

Module Availability

Semester 2

Prerequisites / Co-requisites

NA

Module content

Indicative content includes:

- Motor control and development of human movement skills.
- Gait analysis; a brief review of the gait cycle including the determinants of gait; the main classes of measurement (e.g. spatial and temporal, kinematic, kinetic and neurophysiology).
- Technical descriptions and review of tools used in movement analysis, for example: body-worn inertial sensors, force plates and platforms, goniometry, observational gait tools, passive/active marker detection, plantar pressure systems, in-vivo force transducers and EMG.
- Foundations of three-dimensional gait analysis and their practical implications.
- Gait patterns associated with pathology and the underpinning biomechanics principles of movement compensation.
- Upper limb movement and its kinematic analysis.
- Related topics such as methods used in sports performance analysis and injury prevention strategies.
- Practical laboratory-based 3D gait measurement, using state of the art motion capture and kinetic measurement systems.
- First-hand analysis of experimental 3D data sets. This includes training in gait analysis software and its application to movement coordination.

Assessment pattern

Assessment type	Unit of assessment	Weighting
Coursework	HUMAN MOVEMENT AND REHABILITATION COURSEWORK	100

Alternative Assessment

NA

Assessment Strategy

The assessment strategy provides students with the opportunity to demonstrate:

- Understanding of the methods used in conducting movement analysis and the limitations of measurement and analysis technique.
- Ability to apply their understanding of movement analysis techniques by capturing, processing and analysing movement data; and to present their findings in a clear and coherent manner.
- Understanding and application of concepts covered during the course to clinical and/or human performance scenarios.

Summative Feedback

Thus the summative assessment consists of: Coursework (Learning outcomes 1-5).

Formative Assessment and Feedback

Formative feedback will be provided during laboratory sessions. Continuous feedback is part of the question and answer process during lectures and tutorial sessions.

Module aims

- Provide an understanding of the basis of human movement and functional ability.
- Provide an understanding of the scope and limitations of current methods used to measure and analyse human movement.
- Grow the skills required to evaluate and interpret movement data based on the methods used and intended applications.
- Develop the acquisition of first-hand practical skills in collecting, measuring and analysing movement using state of the art equipment and associated software.

Learning outcomes

		Attributes Developed	
Ref			
001	Demonstrate a breadth of knowledge of the issues underpinning human movement analysis and their real-world relevance.	K	M1, M5, M8, M11
002	Reflect on and critically evaluate the measurement and analysis tools used in movement analysis and their appropriateness for different applications.	CP	M3, M13
004	Demonstrate practical skills in gait analysis.	P	M12, M18
005	Deal with complex issues related to human movement and make sound conclusions based on a complete movement data set and an appreciation of the limitations of current tools.	KCP	M1, M2, M3, M5, M12, M13, M17

Ref		Attributes Developed	
003	Independently continue to advance knowledge of the subject from the body of literature in order to tackle new and emerging problems.	CT	M4

Attributes Developed

C - Cognitive/analytical

K - Subject knowledge

T - Transferable skills

P - Professional/Practical skills

Methods of Teaching / Learning

The learning and teaching strategy is designed to:

- Provide students with knowledge of the fundamental concepts involved in analysing movement and their application.
- Provide students with hands-on experience in collecting, processing and analysing movement data.

The learning and teaching methods include lectures, laboratory-based practical work including hands-on processing of movement data, and independent study.

Indicated Lecture Hours (which may also include seminars, tutorials, workshops and other contact time) are approximate and may include in-class tests where one or more of these are an assessment on the module. In-class tests are scheduled/organised separately to taught content and will be published on to student personal timetables, where they apply to taken modules, as soon as they are finalised by central administration. This will usually be after the initial publication of the teaching timetable for the relevant semester.

Reading list

https://readinglists.surrey.ac.uk
Upon accessing the reading list, please search for the module using the module code: ENGM260

Other information

The School of Mechanical Engineering Sciences is committed to developing graduates with strengths in Employability, Digital Capabilities, Global and Cultural Capabilities, Sustainability, and Resourcefulness and Resilience. This module is designed to allow students to develop knowledge, skills, and capabilities in the following areas:

Digital Capabilities:

Students will use state-art-software to capture experimental data, process experimental data and analyse that data. The software is specific to biomechanical analysis and its output will be integrated with more general software skills that students have acquired throughout the programme.

Employability:

Students will apply the theory of biomechanics to real-world scenarios. Case studies using clinical data, protocols developed in NHS clinics and tools used in movement laboratories will be a focus of students' learning.

Global and Cultural Capabilities:

Students will be made aware of the issues surrounding individuals visiting clinics and the need to treat those individual with discretion and sensitivity. Various medical conditions are introduced as case studies and students will build an awareness of the need to link technical considerations with an understanding of the concerns of patients. Students will also develop skills and awareness of language used and modifications to protocols that are tailored to individuals and their needs.

Resourcefulness and Resilience:

Students will work collaboratively in collecting experimental data. This will encourage cooperation and communication to ensure that the goals of laboratory sessions are met. Tutorials sessions will allow students to debate and discuss critical concepts in human movement and its practical/clinical implementation.

Programmes this module appears in

Programme	Semester	Classification	Qualifying conditions
Biomedical Engineering MEng	2	Optional	A weighted aggregate mark of 50% is required to pass the module