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MODULE DESCRIPTOR

Module Title

Principles of Biomechanics and Instrumentation

Reference	ENM402	Version	1
Created	May 2022	SCQF Level	SCQF 11
Approved	June 2022	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

To provide students with an advanced theoretical and practical base for examining the biomechanical aspects of human movement and to critically evaluate the underpinning theory and practical use of objective measurement tools in a variety of clinical or sports settings.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Critically analyse the biomechanical components of selected activities.
2	Evaluate the theory and relevant literature behind biomechanical measurement and instrumentation.
3	Collect and critically analyse experimental data using a range of measurement tools and evaluate their reliability and use.
4	Design and critique relevant research methods for biomechanical analysis of sports-related performance.

Indicative Module Content

Translation and rotational systems, friction, mass moment of inertia, kinetics of rigid bodies, concepts of muscle force, work, power and energy. Vector analysis. Forces, moments, gravity and equlibrium. Forms of motion, to include gait, running, jumping, sit-to-stand, lifting and others. Rectilinear and curved path motion of particles including non-constant acceleration case. Newton's Laws applied to rigid body kinetics of linear and circular motion systems including the effect of friction. Mass moment of Inertia. Impulse and momentum. Work and Energy. Free body diagrams, planes, axes, effects of gravity, levers. Calculation of joint forces, moments and powers. Mechanical work, energy and power. Interpretation and analysis of motion data. Measurements of motion, force, pressure, muscle activity, physiological cost index, oxygen consumption. Physical properties of selected pieces of instrumentation: 3-D optical and magnetic motion capture systems, temporal/spatial motion measurements, force plates, foot switches, electromyography, Physiological Cost Index, VO2max analyser. Measurement protocols, validity, reliability, repeatability and reproducibility.

Module Ref:	ENM402 v1

Module Delivery

This module is delivered by laboratory sessions, lectures, practicals and workshops, guided self-study and is integrated with applications within the laboratory.

Indicative Student Workload	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	120	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Examination	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4
Description:	Essay/lab report.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

Component 1 comprises 100% of the module grade. To pass the module, a D grade is required.

Module Grade	Minimum Requirements to achieve Module Grade:
A	A in Component 1.
B	B in Component 1.
C	C in Component 1.
D	D in Component 1.
E	E in Component 1.
F	F in Component 1.
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None, in addition to course entry requirements
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1. WINTER, D.A., 2009. Biomechanics and Motor Control of Human Movement. John Wiley & Sons, Inc.
2. ALLARD P., CAPPOZZO A., LUNDBERG A., VAUGHAN C., 1998. Three Dimesional Analysis of Human Locomotion. John Wiley & Sons, Inc.
3. ZATSIORSKY, V.M., 2002. Kinetics of Human Motion. Human Kinetics.
4. RICHARDS, J., 2008. Biomechanics in Clinic and Research: An interactive teaching and learning course. Elsevier/Butterworth Heinemann.