

MODULE DESCRIPTOR

Module Title

Principles of Biomechanics and Instrumentation

| | | | |
|-----------|--------------|-------------|---------|
| Reference | ENM402 | Version | 2 |
| Created | October 2023 | SCQF Level | SCQF 11 |
| Approved | June 2022 | SCQF Points | 15 |
| Amended | January 2024 | ECTS Points | 7.5 |

Aims of Module

To provide students with an advanced base for examining the biomechanical aspects of human movement, including 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 current theory behind biomechanical measurements and instrumentation.
- 3 Critically analyse biomechanical data using a range of measurement tools considering its reliability.
- 4 Make informed judgement of the kinematics and kinetics of the movement in a clinical or sport related setting using the numerical data.

Indicative Module Content

Newton's Laws applied to human kinetics and kinematics including the effect of friction. Impulse, momentum, work and energy in biomechanics. Free body diagrams, planes, axes, effects of gravity, levers of musculoskeletal system. Calculation of joint forces, moments and powers. 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, electromyography, Physiological Cost Index, VO₂max analyser. Measurement protocols, validity, reliability, repeatability and reproducibility.

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 |
| <i>Actual Placement hours for professional, statutory or regulatory body</i> | | |

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: | Written examination. | | | | |

MODULE PERFORMANCE DESCRIPTOR**Explanatory Text**

Written examination comprises 100% of the module grade. To pass the module, a minimum D grade is required.

| Module Grade | Minimum Requirements to achieve Module Grade: |
|--------------|--|
| A | A |
| B | B |
| C | C |
| D | D |
| E | E |
| F | F |
| 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.