

Module Specification

Module Summary Information

1	Module Title	Biomechanics for Biomedical Engineers
2	Module Credits	20
3	Module Level	6
4	Module Code	ENG6080

5	Module Overview
<p>Rationale:</p> <p>This module will build upon the common engineering science / skills that you have developed earlier as part of this programme. It is intended that by engaging in this module, you will be able to develop a sound understanding of the physical principles and concepts underpinning the mechanics of living system and human body, which is the basis of movement science. This involves being able to:</p> <ul style="list-style-type: none"> • Explain the principles of mechanics pertaining to the cells and soft tissues of our human body • Apply such principles while establishing a relationship between the physiological systems • Justify or rationalise any decisions related to your application of knowledge in Biomechanics while addressing technical issues and engaging in research and development of assistive technologies. <p>Alignment with Programme Philosophy and Aims</p> <p>This programme aims to enrich both your technical and transferrable skills to address the upcoming challenges in the design and development of medical devices, commonly known as assistive technologies, in the context of 'Movement Science or Rehabilitation Engineering'. As part of professional development and or with a keen interest in research and development, you as a biomedical engineer, may engage in a collaborative partnership working with professionals from a rehabilitation unit within a health care or a medical device sector. Therefore, undertaking this module at level 6 will not only enable you to engage as part of the team to analyse the impact of force and motion on biological systems but it will also allow you to design engineering or technological solutions for the use of prevention, diagnosis and treatment, to the characterisation of tissue.</p> <p>This module has therefore been carefully designed to allow you to enhance your knowledge base / technical skills and prepare yourself to meet such demands in a work setting in a global market and equip you to work towards achieving membership in one of the well esteemed professional society - 'International Society of Biomechanics'.</p> <p>Despite being a specialised module, the module will facilitate inter-professional teaching and will involve specialist or guest lectures from potential employers on various occasions to enhance your knowledge and to enable you apply your problem-solving skills which will certainly be a part of your profession in your near future.</p> <p>Learning and Teaching Strategy</p> <p>This Biomechanics module will have its own Moodle page which you will have to access to. This page will contain resources and activities that are specific to the module such as the key note lectures; supporting materials and activities; assessment details and important notices. It is important that you access the site regularly as part of your learning will be to undertake sessional preparatory activities for each session followed by attempting short online formative activities to help with your learning. As part</p>	

of this module, various workshops will be facilitated to encourage peer –learning or group activities and example questions will be used during these sessions.

Assessment Strategy

Assessment will be via a 30 minute Viva Voce.

6 Indicative Content

Session 1a. Module and Assessment Launch (1 Hour).

Session 1b: Statics of the musculoskeletal system. Lecture: 2 hours & Workshop: 2 hours.

Session 2: Analysis of overall motion; walking and running. Lecture: 2 hours & Lab: 2 hours.

Session3a: Kinematics of linkage systems applied to the human body; link-segment models of the human body. Lecture: 2 hours & Workshop: 2 hours.

Session 3b: Plenary / Consolidation: 2 hours.

Session 4: Dynamics of the musculoskeletal system - Lecture: 2 hours & Lab: 2 hours.

Session 5: Synthesis of movement analysis - Lecture: 2 hours & Lab: 2 hours.

Session 6: Stress analysis applied to hard tissue mechanics - Lecture: 2 hours & Workshop: 2 hours.

Session 7: Stress analysis applied to Soft tissue mechanics - Lecture: 2 hours & Workshop: 2 hours.

Session 8: Significance of soft tissue mechanics in specific ailments – Pressure ulcers / Wound Management. (Guest) Lecture: 2 hours & Lab visit 2 hours.

Session 9a: Vascular structure and Fluid Mechanics - Lecture: 2 hours & Workshop: 2 hours.

Session 9b: Vascular structure and Fluid Mechanics - Lecture: 2 hours & Workshop: 2 hours.

Session 10: Emerging trend in Biomechanics – Research and Development areas
Workshop – 2 hours.

Session 11: Consolidation - Tutorials: 2 hours & Module feedback: 30 minutes.

7 Module Learning Outcomes

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

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| 1 | Evaluate and apply biomechanical models for analysing various movements pertaining to the activities of daily living. |
| 2 | Apply, analyse and calculate various static analysis methods to determine the forces / moments in various joints, bones and muscles using engineering principles and technologies. |
| 3 | Explain different types of loading and fracture patterns and analyse their impact on hard and soft tissue mechanics (including viscoelasticity and non-linear elasticity) and thereby its significance or application in medical conditions such as Pressure Ulcers / Wound Management. |
| 4 | Explain the concept of microcirculation, the principle underpinning bio-fluid as well as apply the concept of hydraulic resistance to the vascular system based on their mechanical characteristics. |

8 Module Assessment			
Learning Outcome			
	Coursework	Exam	In-Person
1,2,3,4			X

9 Breakdown Learning and Teaching Activities	
Learning Activities	Hours
Scheduled Learning (SL) includes lectures, practical classes and workshops, peer group learning, Graduate+, as specified in timetable	47
Directed Learning (DL) includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning, as directed on VLE	N/A
Private Study (PS) includes preparation for exams	153
Total Study Hours:	200