

## Subject Description Form

<b>Subject Code</b>	BME31125
<b>Subject Title</b>	<b>Biomechanics</b>
<b>Credit Value</b>	3
<b>Level</b>	2
<b>Prerequisite</b>	BME21119 Fundamentals of Biomechanics
<b>Objectives</b>	Biomechanics is one of the most important supporting subjects for the principles and practices of health technology. This subject aims to apply the mechanical principles extensively in the biomechanical context.
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. Apply statics, kinematics, and kinetics to load and motion analysis for human body supports and musculoskeletal system;</li> <li>b. Explain how our bodies, in particular the musculoskeletal system, function;</li> <li>c. Demonstrate understanding of tissue properties, especially viscoelasticity;</li> <li>d. Describe the structure–property–function relationship of biological tissues.</li> </ol>
<b>Contribution to Programme Outcomes (Refer to Part I Section 10)</b>	<ul style="list-style-type: none"> <li>▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach and Practice)</li> <li>▪ Programme Outcome 3: Demonstrate an ability to design a system, component, or process relevant to BME to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability. (Teach)</li> <li>▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach)</li> <li>▪ Programme Outcome 11: Demonstrate an ability to communicate effectively and advise clients, professional colleagues, and other members of the community. (Practice)</li> </ul>
<b>Subject Synopsis/ Indicative Syllabus</b>	Fundamentals of mechanics; inverse dynamics; human joint load analysis; fundamentals of human movement analysis; application to musculoskeletal system and body support system; mechanical properties of biological tissues (bone, muscle, tendon, ligament, and other connective tissues); viscoelasticity; bone fracture and fixation; responses of biological tissues to their mechanical environment; and stress–strain relationship, fundamentals of mechanobiology and cellular mechanics.

<b>Teaching and Learning Methodology</b>	There will be lectures and tutorials dealing with fundamental mechanics and application examples on human body. Students' knowledge is tested by home assignments, lab report, midterm quiz, and final examination.										
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)								
			a	b	c	d					
	Continuous assessment (including home assignments and class quiz)	40%	√	√	√	√					
	Final examination	60%	√	√	√	√					
	Total	100%									
<p>Note: To pass this subject, students must obtain grade D or above in both continuous assessment and final examination</p> <p><i>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</i></p> <p>All the continuous assessments and final examination will be designed to assess the 3 outcomes.</p>											
<b>Student Study Effort Required</b>	Class contact:										
	▪ Lecture										33 Hrs.
	▪ Tutorial/lab										6 Hrs.
	Other student study effort:										
	▪ Self-study										54 Hrs.
	▪ Assignments and preparation for presentation										39 Hrs.
	Total student study effort										135 Hrs.
<b>Reading List and References</b>	<ul style="list-style-type: none"> <li>▪ Nordin M and Frankel VH, ed., Basic Biomechanics of the Musculoskeletal System, Lea &amp; Febiger, Philadelphia, 1989 or 2001.</li> <li>▪ Ozkaya N and Nordin M, Fundamentals of Biomechanics: Equilibrium,</li> </ul>										

	<p>Motion, and Deformation, Van Nostrand Reinhold, New York, 1999.</p> <ul style="list-style-type: none"> <li>▪ Nigg BM and Herzog W, Biomechanics of the Musculoskeletal System, Wiley, New York, 2008.</li> <li>▪ Mow VC and Hayes WC, Basic Orthopaedic Biomechanics, Raven Press, New York, 1991.</li> <li>▪ Riley WF, Sturges LD and Morris DH, Statics and Mechanics of Materials, John Wiley &amp; Sons Inc., 1996.</li> </ul>
<b>Date of Last Major Revision</b>	14 Aug 2017
<b>Date of Last Minor Revision</b>	