Subject Description Form

Subject Code	BME31125
Subject Title	**Biomechanics**
Credit Value	3
Level	2
Prerequisite	BME21119 Fundamentals of Biomechanics
Objectives	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.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Apply statics, kinematics, and kinetics to load and motion analysis for human body supports and musculoskeletal system; b. Explain how our bodies, in particular the musculoskeletal system, function; c. Demonstrate understanding of tissue properties, especially viscoelasticity; d. Describe the structure–property–function relationship of biological tissues.
Contribution to Programme Outcomes (Refer to Part I Section 10)	▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach and Practice) ▪ 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) ▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach) ▪ Programme Outcome 11: Demonstrate an ability to communicate effectively and advise clients, professional colleagues, and other members of the community. (Practice)
Subject Synopsis/ Indicative Syllabus	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.

<table>
<tr><td>Teaching and Learning Methodology</td><td>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.</td></tr>
<tr><td>Assessment Methods in Alignment with Intended Learning Outcomes</td><td>
<table>
<tr><td rowspan="2">Specific assessment methods/tasks</td><td rowspan="2">% weighting</td><td colspan="8">Intended subject learning outcomes to be assessed (Please tick as appropriate)</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Continuous assessment (including home assignments and class quiz)</td><td>40%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Final examination</td><td>60%</td><td>√</td><td>√</td><td>√</td><td>√</td><td></td><td></td><td></td><td></td></tr>
<tr><td>Total</td><td>100%</td><td colspan="8"></td></tr>
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Note: To pass this subject, students must obtain grade D or above in both continuous assessment and final examination

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

All the continuous assessments and final examination will be designed to assess the 3 outcomes.
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<tr><td>Student Study Effort Required</td><td>
<table>
<tr><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lecture</td><td>33 Hrs.</td></tr>
<tr><td>▪ Tutorial/lab</td><td>6 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
<tr><td>▪ Self-study</td><td>54 Hrs.</td></tr>
<tr><td>▪ Assignments and preparation for presentation</td><td>39 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>135 Hrs.</td></tr>
</table>
</td></tr>
<tr><td>Reading List and References</td><td>▪ Nordin M and Frankel VH, ed., Basic Biomechanics of the Musculoskeletal System, Lea & Febiger, Philadelphia, 1989 or 2001.
▪ Ozkaya N and Nordin M, Fundamentals of Biomechanics: Equilibrium,</td></tr>
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	Motion, and Deformation, Van Nostrand Reinhold, New York, 1999. ▪ Nigg BM and Herzog W, Biomechanics of the Musculoskeletal System, Wiley, New York, 2008. ▪ Mow VC and Hayes WC, Basic Orthopaedic Biomechanics, Raven Press, New York, 1991. ▪ Riley WF, Sturges LD and Morris DH, Statics and Mechanics of Materials, John Wiley & Sons Inc., 1996.
Date of Last Major Revision	14 Aug 2017
Date of Last Minor Revision	