Subject Description Form

Subject Code	BME31125
Subject Title	**Biomechanics**
Credit Value	3
Level	2
Prerequisite	Nil
Objectives	Biomechanics is one of the most important supporting subjects for the principles and practices of biomedical engineering. 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. Get familiar with the structure and function of the major bones, joints, muscles and connective structures of the human musculoskeletal system; b. Apply statics, kinematics, and kinetics to load and motion analysis for human body supports and musculoskeletal system; c. Explain how our bodies, in particular the musculoskeletal system, function; 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, Practice and Measure) ▪ 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 and Measure) ▪ 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	Anatomy and functions of human musculoskeletal system, bones, major joints, major muscles and connective tissues; Fundamentals of mechanics; inverse dynamics; human joint load analysis; human movement analysis; application to musculoskeletal system, and body support system for orthopaedics, rehabilitation engineering and sport.

<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. The lab will be conducted to practice how to measure kinematic and kinetic data. 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="4">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></tr>
<tr><td>Continuous assessment (including home assignments, lab report and class quiz)</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Final examination</td><td>50%</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>Total</td><td>100%</td><td colspan="4"></td></tr>
</table>
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 4 outcomes.
</td></tr>
<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>39 Hrs.</td></tr>
<tr><td>▪ Assignments and preparation for presentation</td><td>39 Hrs.</td></tr>
<tr><td>Total student study effort</td><td>117 Hrs.</td></tr>
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Reading List and References	▪ Nordin M and Frankel VH, ed., Basic Biomechanics of the Musculoskeletal System, Lea & Febiger, Philadelphia, 5th Edition, 2021. ▪ Ozkaya N and Nordin M, Fundamentals of Biomechanics: Equilibrium, Motion, and Deformation, Van Nostrand Reinhold, New York, 4th Edition, 2017. ▪ Nigg BM and Herzog W, Biomechanics of the Musculoskeletal System, Wiley, New York, 2008. ▪ Manocchia Pat, Anatomy of Exercise: A Trainer's Inside Guide to Your Workout, Firefly Books Ltd, Ontario, Canada, 2020
Date of Last Major Revision	28 December 2021
Date of Last Minor Revision	28 December 2022