Subject Description Form

Subject Code	BME31134
Subject Title	**Rehabilitation Engineering and Assistive Technology**
Credit Value	3
Level	3
Prerequisite	BME31121 Fundamentals of Biomedical Instrumentation II
Objectives	This subject provides students with the knowledge of injuries and disability conditions, and to apply biomedical engineering principles to the rehabilitation area. The course will focus on the design and application of rehabilitation engineering and assistive technologies in various areas.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Have basic understanding on the clinical fundamentals of injuries and dysfunctions; b. Understand and apply fundamental knowledge of engineering in rehabilitation of clients suffering from selected injury and body dysfunction; c. Apply analytical skills to assess and evaluate the needs of the end-user requiring rehabilitation and assistive devices; d. Conduct patient/technology evaluation via the use of modern instrumentation; e. Develop self-learning initiatives and integrate learned knowledge for problem solving; f. Apply rehabilitation engineering technology to help individuals with disabilities.
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 and Practice) ▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach, Practice and Measure) ▪ Programme Outcome 7: Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for BME practice. (Teach and Practice)

<table>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>This subject is concerned with the application of engineering solutions for people with disabilities. The contents of this subject cover:
Clinical fundamentals of human dysfunction;
Fundamentals of rehabilitation engineering and the human activity/assistive technology model;
Human–machine interface and sensor applications;
Design considerations of assistive technology devices;
Contemporary developments in rehabilitation robotics as well as orthotic and prosthetic devices;
Considerations in safety and standardizations.</td></tr>
<tr><td>Teaching and Learning Methodology</td><td>There will be lectures, tutorials, labs, and group mini-projects.</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="6">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>e</td><td>f</td></tr>
<tr><td>1. Assignments, lab, quiz, and project</td><td>70%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>2. Final presentation</td><td>30%</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td><td>✓</td></tr>
<tr><td>Total</td><td>100%</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:
Different assignments will be used to guide the students toward the learning objectives of the subject contents. Mini-project is used to facilitate students in applying learned knowledge to solve real-life problems. Students are expected to demonstrate their knowledge through a mid-term and a final quiz.
</td></tr>
<tr><td rowspan="5">Student Study Effort Expected</td><td>Class contact:</td><td></td></tr>
<tr><td>▪ Lectures</td><td>21 Hrs.</td></tr>
<tr><td>▪ Labs</td><td>15 Hrs.</td></tr>
<tr><td>▪ Presentations</td><td>3 Hrs.</td></tr>
<tr><td>Other student study effort:</td><td></td></tr>
</table>

	▪ Self-study	87 Hrs.
	Total student study effort	126 Hrs.
Reading List and References	**Textbooks** ▪ Cooper R.A., Ohnabe H., and Hobson D.A., An Introduction to Rehabilitation Engineering, Taylor & Francis, 2007. ▪ Farina D., Jensen W., and Akay M., Introduction to Neural Engineering for Motor Rehabilitation, John Wiley & Sons, Inc. 2013. **References** ▪ Cook A.M. and Hussey S.M., Assistive Technologies: Principles and Practice, Mosby, 2008. ▪ Chow T. and Fairley J., Paediatric Rehabilitation Engineering: From Disability to Possibility, CRC Press, 2011. ▪ MacLachlan M. and Gallagher P., Enabling Technologies – Body Image and Body Function, Churchill Livingstone, 2004. ▪ Mann W.C. (Ed.), Smart Technology for Aging, Disability, and Independence – The State of the Science, Wiley, 2005. ▪ Muzumdar A., Powered Upper Limb Prostheses – Control, Implementation and Clinical Application, Springer, 2004.	
Date of Last Major Revision	14 July 2014	
Date of Last Minor Revision	2 January 2020	