

## Subject Description Form

<b>Subject Code</b>	BME31134
<b>Subject Title</b>	<b>Rehabilitation Engineering and Assistive Technology</b>
<b>Credit Value</b>	3
<b>Level</b>	3
<b>Prerequisite</b>	BME31125 Biomechanics
<b>Objectives</b>	This subject introduces the knowledge of rehabilitation engineering and assistive technology in management of disability-related impairments. The subject focuses on the design principles and application of rehabilitation engineering and assistive technologies to improve body functions and activities.
<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. Understand fundamental knowledge of rehabilitation engineering and assistive technology in assisting the individuals with disabilities;</li> <li>b. Apply knowledge and skills to assess and evaluate the needs of individuals requiring rehabilitation and assistive devices;</li> <li>c. Identify / modify / develop appropriate solutions of rehabilitation engineering and assistive technologies, and apply them to help individuals with disabilities;</li> <li>d. Evaluate the function of the prescribed rehabilitative and assistive devices in addressing the needs of the individuals.</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 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach, Practice and Measure)</li> <li>▪ Programme Outcome 6: Demonstrate an ability to evaluate research and professional literature, and understand the principles and practice of conducting research in clinical and industrial environments relevant to BME. (Teach and Practice)</li> <li>▪ Programme Outcome 7: Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for BME practice. (Teach and Practice)</li> <li>▪ Programme Outcome 10: Demonstrate an understanding of professional and ethical responsibility. (Teach)</li> <li>▪ Programme Outcome 11: Demonstrate an ability to communicate effectively and advise clients, professional colleagues, and other members of the community. (Teach and Practice)</li> </ul>

<b>Subject Synopsis/ Indicative Syllabus</b>	<p>The contents of this subject cover:</p> <ul style="list-style-type: none"> <li>▪ Introduction to rehabilitation engineering and assistive technology principles</li> <li>▪ Patient-centered communication and assessment</li> <li>▪ Ethical issues and considerations</li> <li>▪ Rehabilitation psychology</li> <li>▪ Orthopaedics: amputation, congenital orthopaedic disorders, regional deformities, osteopathy (osteopetrosis, osteoporosis, bone tumor)</li> <li>▪ Traumatology: fractures, injuries in joints &amp; spine</li> <li>▪ Neuromuscular disorders: brain trauma, spinal cord injuries, cerebral palsy, poliomyelitis, cerebral vascular accidents &amp; muscular dystrophies</li> <li>▪ Interventions to sensory impairments and communication disorders</li> <li>▪ Special seating and mobility technology</li> <li>▪ Assistive robotics for rehabilitation</li> </ul>																																													
<b>Teaching and Learning Methodology</b>	<p>There will be lectures, workshops / labs / tutorials / seminars, and group presentation.</p>																																													
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	<table border="1" data-bbox="443 1052 1448 1591"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th rowspan="2">% weighting</th> <th colspan="4">Intended subject learning outcomes to be assessed (Please tick as appropriate)</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>1. Mid-term quiz</td> <td>20%</td> <td>✓</td> <td></td> <td></td> <td></td> </tr> <tr> <td>2. Individual written report</td> <td>20%</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>3. Group presentation</td> <td>20%</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>4. Final examination</td> <td>40%</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> </tr> </tbody> </table> <p><i>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</i></p> <p>Multiple assessments will be used to guide the students toward the learning objectives of the subject contents. Students are expected to demonstrate their knowledge through a mid-term quiz and a final examination. Individual written report and group presentation are used to facilitate students in applying the learned knowledge to solve real-life problems and the active learning.</p>						Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				a	b	c	d	1. Mid-term quiz	20%	✓				2. Individual written report	20%		✓	✓	✓	3. Group presentation	20%		✓	✓	✓	4. Final examination	40%	✓				Total	100%				
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<b>Student Study Effort Expected</b>	Class contact:	39 Hrs.
	▪ Lectures	24 Hrs.
	▪ Workshops / Labs / Tutorials / Seminars	12 Hrs.
	▪ Presentations	3 Hrs.
	Other student study effort:	
	▪ Self-study	78 Hrs.
	Total student study effort	117 Hrs.
<b>Reading List and References</b>	<p><b><u>Textbooks</u></b></p> <ul style="list-style-type: none"> <li>▪ Encarnacao P., Polgar, J.M., and Cook A.M. (5th Eds.). (2020). <i>Assistive Technologies: Principles and Practice</i>. Elsevier Health Sciences.</li> </ul> <p><b><u>References</u></b></p> <ul style="list-style-type: none"> <li>▪ Roberto Colombo and Vittorio Sanguineti. (2018). <i>Rehabilitation robotics : technology and application</i>. Elsevier Academic Press.</li> <li>▪ Pablo Diez. (2018). <i>Smart Wheelchairs and Brain-computer Interfaces: Mobile Assistive Technologies</i>. Elsevier Academic Press.</li> <li>▪ Shay, A. (Ed.). (2019). <i>Assistive Technology Service Delivery: A Practical Guide for Disability and Employment Professionals</i>. Elsevier Academic Press.</li> <li>▪ Cooper, R. A., &amp; Cooper, R. (2019). Rehabilitation engineering: a perspective on the past 40-years and thoughts for the future. <i>Medical engineering &amp; physics</i>, 72, 3-12.</li> <li>▪ DiGiovine, C. P., Donahue, M., Bahr, P., Bresler, M., Klaesner, J., Pagadala, R., ... &amp; Grott, R. (2018). Rehabilitation engineers, technologists, and technicians: Vital members of the assistive technology team. <i>Assistive Technology</i>, 1-12.</li> <li>▪ Satpute, S., Cooper, R., Dicianno, B. E., Joseph, J., Chi, Y., &amp; Cooper, R. A. (2021). Mini-Review: Rehabilitation Engineering: Research Priorities and Trends. <i>Neuroscience Letters</i>, 136207.</li> </ul>	
<b>Date of Last Major Revision</b>	14 July 2023	
<b>Date of Last Minor Revision</b>	14 July 2023	