

The Hong Kong Polytechnic University

Subject Description Form

Please read the notes at the end of the table carefully before completing the form.

Subject Code	BME5133
Subject Title	Modern Rehabilitation Engineering and Robotics
Credit Value	3
Level	5
Pre-requisite	Nil
Objectives	This subject aims to provide students a good background on advanced engineering solutions and automation in applications for persons who suffer from physical or sensory impairments.
Intended Learning Outcomes <i>(Note 1)</i>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. Apply fundamental knowledge of engineering in rehabilitation b. Apply analytical skills to assess and evaluate the need of the end-user c. Conduct patient/technology evaluation via the use of modern instrumentation d. Develop self-learning initiatives and integrate learned knowledge for problem solving
Subject Synopsis/ Indicative Syllabus <i>(Note 2)</i>	<p>This subject is on the rehabilitation with modern engineering solutions for people with sensorimotor disabilities, underpinned with the advances in neuroscience, engineering, and clinical practice. It is multi-disciplinary in nature. Team approach is the preferred clinical approach in the provision of rehabilitation engineering devices, e.g., robots, in long-term automatic services. This subject is appropriate for professionals concerned with rehabilitation.</p> <p>The contents of this subject covers:</p> <ul style="list-style-type: none"> - Quantitative neural coding techniques - Human-machine interface and robotic design - Sensory aids for hearing and visual impairments - Assistive technology in balance - Prosthetics and orthotics technology - Evaluation and training technology - Emerging technologies

<p>Teaching/Learning Methodology (Note 3)</p>	<p>Lecture, laboratories and/or presentations</p> <table border="1" data-bbox="523 286 1377 656"> <thead> <tr> <th rowspan="2">Specific assessment methods/tasks</th> <th colspan="4">Intended subject learning outcomes</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>1. Lectures</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> </tr> <tr> <td>2. Labs</td> <td></td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>3. Group project</td> <td>√</td> <td>√</td> <td>√</td> <td></td> </tr> </tbody> </table>					Specific assessment methods/tasks	Intended subject learning outcomes				a	b	c	d	1. Lectures	√	√	√	√	2. Labs		√	√		3. Group project	√	√	√																	
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<p>Assessment Methods in Alignment with Intended Learning Outcomes (Note 4)</p>	<table border="1" data-bbox="523 768 1377 1339"> <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</th> </tr> <tr> <th>a</th> <th>b</th> <th>c</th> <th>d</th> </tr> </thead> <tbody> <tr> <td>1. Assignments</td> <td>30%</td> <td>√</td> <td></td> <td></td> <td>√</td> </tr> <tr> <td>2. Lab report</td> <td>10%</td> <td></td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>3. Group project presentations</td> <td>30%</td> <td>√</td> <td>√</td> <td>√</td> <td>√</td> </tr> <tr> <td>4. Quiz</td> <td>30%</td> <td>√</td> <td>√</td> <td>√</td> <td></td> </tr> <tr> <td>Total</td> <td>100 %</td> <td colspan="4"></td> </tr> </tbody> </table> <p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Different assignments and lab experience and/or presentations were used to guide the students towards the learning objectives of this course. Students are expected to demonstrate their learned knowledge through the quiz.</p>					Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				a	b	c	d	1. Assignments	30%	√			√	2. Lab report	10%		√	√		3. Group project presentations	30%	√	√	√	√	4. Quiz	30%	√	√	√		Total	100 %				
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<p>Student Study Effort Expected</p>	<p>Class contact:</p>																																												
	<ul style="list-style-type: none"> ▪ Lectures/Tutorial/Seminar 		<p>33 Hrs.</p>																																										
	<ul style="list-style-type: none"> ▪ Laboratories 		<p>6 Hrs.</p>																																										
	<p>Other student study effort:</p>																																												
	<ul style="list-style-type: none"> ▪ Self-study 		<p>38 Hrs.</p>																																										
	<ul style="list-style-type: none"> ▪ Assignments and laboratory reports 		<p>40 Hrs.</p>																																										

	Total student study effort	117 Hrs.
Reading List and References	<ol style="list-style-type: none"> 1. Dejan Popovic and Thomas Sinkjaer, Control of Movement for the Physically Disabled, Springer, 2000. 2. MacLachlan M. and Gallagher P. Enabling Technologies – Body Image and Body Function, Churchill Livingstone, 2004. 3. Scherer M.J., Assistive Technology: Matching Device and Consumer for Successful Rehabilitation, American Psychological Association (APA), 2002. 4. Teodorescu H.L. and Jain L.C., Intelligent systems and technologies in rehabilitation engineering, CRC Press, 2001. 5. Daniel J. DiLorenzo, Joseph D. Bronzino, Neuroengineering, 2007. 6. Bruce F. Katz, Neuroengineering the Future: Virtual Minds and the Creation of Immortality, 2008. 7. Akay M (Editor), Handbook of Neural Engineering, Wiley, 2007. 8. Webster JG (Editor), Bioinstrumentation, John Wiley & Sons, 2009. 9. Hu Xiaoling, Intelligent Biomechatronics in Neurorehabilitation, Elsevier, 2019. 	

Note 1: Intended Learning Outcomes

Intended learning outcomes should state what students should be able to do or attain upon subject completion. Subject outcomes are expected to contribute to the attainment of the overall programme outcomes.

Note 2: Subject Synopsis/Indicative Syllabus

The syllabus should adequately address the intended learning outcomes. At the same time, overcrowding of the syllabus should be avoided.

Note 3: Teaching/Learning Methodology

This section should include a brief description of the teaching and learning methods to be employed to facilitate learning, and a justification of how the methods are aligned with the intended learning outcomes of the subject.

Note 4: Assessment Method

This section should include the assessment method(s) to be used and its relative weighting, and indicate which of the subject intended learning outcomes that each method is intended to assess. It should also provide a brief explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes.

(Form AR 140) 8.2020