Subject Description Form

<table>
<tr><td>Subject Code</td><td>BME5124</td></tr>
<tr><td>Subject Title</td><td>Biomaterials and Tissue Engineering</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Responsible staff & Department/School</td><td>Dr Youhua TAN (BME)</td></tr>
<tr><td>Pre-requisite / Co-requisite/ Exclusion</td><td>Nil</td></tr>
<tr><td>Objectives</td><td>The objective of this course is to prepare the students with the knowledge of biomaterials and to introduce the concepts and applications of tissue engineering for the repairing of damaged or lost tissues and to substitute the biological functions of injured organs by making use of cells with high proliferation and differentiation potential.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. Evaluate the properties of biomaterials that have been successfully developed and used in human bodies
b. Integrate the basic knowledge with the most recent developments in biomaterials and tissue engineering
c. Apply knowledge of biomaterials on interconnecting issues in biomaterials research and development
d. Develop the appropriate techniques and right strategies through case studies in the successful development of new biomaterials for medical applications</td></tr>
<tr><td>Contribution to Programme Outcomes (Refer to Part I Section 2)</td><td>Programme Learning Outcome (a): Acquire and apply advanced levels of knowledge and skills in BME professions (Teach and Measure)

Programme Learning Outcome (c): Demonstrate a higher level of professional competence to cope with the rapid changes in practice (Teach, Practice, and Measure)</td></tr>
<tr><td>Subject Synopsis/ Indicative Syllabus</td><td>Introduction to Biomaterials; Biopolymers; Biomaterial Surface Properties; Protein-Surface Interactions; Cell-Biomaterial Surface Interaction; Introduction to Tissue Engineering; Tissue Engineering Approaches; Tissue, Cell & Cytoskeleton; Cell and Tissue Mechanics; Stem Cells.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>Students will learn the knowledge in lectures and seminars. They are exposed to various facets of biomaterials research and development. They are also provided with the latest development in the recently emerged field of tissue engineering. Students are given assignments and need to make presentations.
<table>
<tr><td rowspan="2">Teaching/learning methodology</td><td colspan="4">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td><td>d</td></tr>
<tr><td>1. Lectures</td><td>√</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Seminars</td><td></td><td>√</td><td>√</td><td>√</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed					
		a	b	c	d		
1. Continuous assessment: a. Assignments	20%	√	√	√	√		
b. Quiz	20%	√	√	√	√		
c. Project report	20%	√	√	√	√		
2. Final examination	40%	√	√	√	√		
Total	100 %						

Continuous assessment will include homework assignments, quiz, project report. Homework assignments will be designed to test how the students know the most recent development in biomaterials and tissue engineering in different research areas for the outcomes a, b c and d. Then, the students will be required to choose one topic for the recent development of one biomaterial in tissue engineering and turn in their individual project reports.

Final exam will test the understanding of students to the fundamental concepts regarding to various types of biomaterials and the related applications in tissue engineering, and their ability to utilize this knowledge to solve the healthcare-related problems.

Student Study Effort Expected

Class contact:	
▪ Lectures	36 Hrs.
▪ Seminars	3 Hrs.
Other student study effort:	
▪ Self study	47 Hrs.
▪ Assignments and preparation for presentation	31 Hrs.
Total student study effort	117 Hrs.

Reading List and References

- Biomaterials, London, England: Wiley, 2014
- Extracellular matrix for tissue engineering and biomaterials, Cham, Switzerland : Humana Press ; 2018
- Nanoengineering of Biomaterials : Drug Delivery and Biomedical Applications. Newark : John Wiley & Sons, Incorporated ; 2022
- Tissue engineering, London, England : Academic Press ; 2015 ; 2nd edition

Date of Last Major Revision

5 May 2021

Date of Last Minor Revision

14 July 2023