

## Subject Description Form

<b>Subject Code</b>	BME5324
<b>Subject Title</b>	<b>Smart Materials for Sports Technology</b>
<b>Credit Value</b>	3
<b>Level</b>	5
<b>Pre-requisite/ Co-requisite/ Exclusion</b>	Nil
<b>Objectives</b>	<p>This subject aims to enable students to:</p> <ol style="list-style-type: none"> <li>1. understand the role of smart materials in enhancing sports performance and injury prevention;</li> <li>2. learn the diverse applications of smart materials in various sports contexts; and</li> <li>3. gain hands-on experience in the development and testing of smart materials for sports equipment.</li> </ol>
<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 the basic principles and key functions of various smart materials used in sports technology.</li> <li>b. Recognize the demand and importance of smart materials in improving sports performance and safety across different sports.</li> <li>c. Comprehend the basic operations involved in the development, testing, and implementation of smart materials in sports equipment.</li> <li>d. Critically appraise the strengths and limitations of current smart materials used in sports and predict future trends in this area.</li> </ol>
<b>Contribution to Programme Outcomes (Refer to Part I Section 2)</b>	<p>Program Learning Outcome (a) Acquire and apply advanced levels of knowledge and skills in the sports technology and management discipline. (Teach, Measure)</p> <p>Programme Learning Outcome (c) Demonstrate a higher level of professional competence to cope with the rapid changes in practice in the sports technology and management discipline. (Teach, Practice, Measure)</p>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p>This subject will first introduce the fundamental principles of smart materials and their applications in sports technology, followed by an overview of the basic properties and functionalities of smart materials, such as shape-memory alloys, piezoelectric materials, and electroactive polymers, and their roles in enhancing sports equipment performance and safety.</p> <p>Various sports applications, including impact protection, performance monitoring, and adaptive equipment, will be explored to illustrate the practical use of smart materials. Students will learn about the development and testing processes for integrating smart materials into sports equipment, including material selection, fabrication techniques, and performance evaluation.</p> <p>Case studies of specific sports technologies, such as smart apparel, responsive footwear, and intelligent protective gear, will be used to demonstrate the real-world impact of smart materials.</p> <p>The course will also address contemporary issues related to the design, development, and marketing of smart materials in sports technology, alongside discussions on the opportunities and challenges faced by the industry. The subject will culminate with a critical appraisal of current smart materials used in sports and an exploration of future trends and innovations in this rapidly evolving field.</p>

<b>Teaching/Learning Methodology</b>	Lectures and seminars:						
	Teaching/ learning methodology	Intended subject learning outcomes					
		a	b	c	d		
	1. Lectures	✓	✓	✓			
2. Seminars		✓	✓	✓			
<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed				
			a	b	c	d	
	1. Assignment	30%	✓	✓	✓		
	2. Quiz	30%	✓	✓			
	3. Individual report and presentation	40%	✓	✓	✓	✓	
Total	100 %						
<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Continuous assessment will include homework assignments, quiz, individual report and presentation.</p> <p>Homework assignments and quiz will be designed to test how the students know the most recent developments in smart materials in different application areas of sports for outcomes a, b, and c. Then, the students will be required to choose one topic related to smart materials for sports technology. Several students will be grouped together for the indicated topic and each will finish one part of the group project. The students will deliver the oral presentation as a group and turn in their individual project reports.</p>							
<b>Student Study Effort Expected</b>	Class contact:						
	▪ Lectures						36 Hrs.
	▪ Seminars						3 Hrs.
	Other student study effort:						
	▪ Self-study						45 Hrs.
	▪ Assignments and preparation for presentation						33 Hrs.
	Total student study effort						117 Hrs.
<b>Reading List and References</b>	<ul style="list-style-type: none"> <li>• Ozkaya, N., &amp; Nordin, M. (2012). <i>Fundamentals of Biomechanics: Equilibrium, Motion, and Deformation</i> (4th ed.). Springer.</li> <li>• Liu, Y., &amp; Du, H. (2014). <i>Smart Materials and Structures</i>. Springer.</li> <li>• Schwartz, M. (2009). <i>Smart Materials</i>. CRC Press.</li> </ul>						
<b>Date of Last Major Revision</b>	20 August 2025						
<b>Date of Last Minor Revision</b>	20 August 2025						