Subject Description Form

Subject Code	BME5180
Subject Title	Sports-related Technologies
Credit Value	3
Level	5
Responsible staff & Department/School	Dr Tony CHEN (BME)
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	The objective of this course is to 1. Provide students with a comprehensive understanding of sports-related technology and its latest evolvement / application in modern sports events; 2. Foster a creative and innovative mindset of transferring the knowledge into solution-oriented practices in academic and industrial settings among the students; 3. Encourage interdisciplinary collaboration that enables students to integrate practical skills and technological principles with sports science, engineering, and marketing.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Demonstrate foundational knowledge of various technologies used in sports, including data analytics, biometrics, performance gears, training platform, and virtual effects / simulations. b. Design and execute research projects that explore the intersection of sports and technology, contributing to academic advancement in the field. c. Evaluate and select appropriate technology solutions for the development of innovative sports technology products and services for commercial use. d. Communicate effectively with sports professionals, stakeholders, and the broader community regarding the utility and prospects of sports-related technology.
Contribution to Programme Outcomes	Programme Learning Outcome (a): Acquire and apply advanced levels of knowledge and skills in BME discipline. (Teach, Practice, and Measure) Program Learning Outcome (b): Apply critical analysis and problem-solving skills for evidence-based practice in BME discipline. (Teach, Practice, and Measure) Program Learning Outcome (d): Develop research skills that will help incorporate evidence-based practice in the delivery of healthcare services and industry. (Teach, Practice, and Measure)
Subject Synopsis/ Indicative Syllabus	Opening: ▪ Introduction: scope, significance, and historical context. ▪ Ethical considerations and societal impact of technology in sports. ▪ Emerging trends and prospects in sports technology. Technology for sports assessment ▪ On-field data collection and analysis methods for real-time sports performance evaluation. ▪ Sensor technologies for measuring on-field human kinematics, kinetics, biometrics, and other health / performance variables amid sports activities.

	Technology for sports performance enhancement
	- Integrating sports analytics and technology to optimize team strategies, including AI-based tools and virtual reality. - Sports-specific devices and instruments for performance improvement Technology for sports injury prevention / rehabilitation - Nutrition, hydration monitoring, and recovery / regeneration technology. - Injury risk assessment and prevention through technology-driven approaches. Technology for sports promotion / marketing - In-game analytics and data-driven match reference. - Digital marketing strategies for sports events, athletes, and teams. - Fan engagement through social media, virtual experiences, and gamification. Research conceptualization, design, and presentation to demonstrate and reinforce the relevant knowledge.

Teaching/Learning Methodology

Students will learn the knowledge in lectures and labs. They are exposed to various sports performance assessment approaches and equipment. They are also provided with the latest research outcomes and data analyses from research teams in related fields. Students are given assignments and need to make presentations.

Teaching/learning methodology	Intended subject learning outcomes					
	a	b	c	d		
1. Lectures	√	√	√	√		
2. Labs		√	√			
3. Group project presentations	√	√	√			

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. Assignments (including assignments, working sheet, and class quiz)	50 %	√	√	√	√		
2. Lab report	20 %		√	√			
3. Group project presentations	30 %		√	√			
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Assignments:
To assess the students' level of understanding regarding the essential concepts and knowledge delivered and discussed in the lectures.

	Lab report: To allow the students to gain hands-on experience with the lab instruments and measurement devices, preparing them for experimental activities and group projects. Group project presentations: To provide students with an opportunity to demonstrate their research work. Students are required to critically review literature in the related field, perform conceptualization, conduct experiments, and summarize the major outcome.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	33 Hrs.
	▪ Seminars	3 Hrs.
	▪ Group project presentations	3 Hrs.
	Other student study effort:	
	▪ Self-study	20 Hrs.
	▪ Group project preparation	58 Hrs.
	Total student study effort	117 Hrs.
Reading List and References	▪ Rossi RM. High-performance sportswear. In: McLoughlin J, Sabir T, editors. High-Perform. Appar., Woodhead Publishing; 2018, p. 341–56. https://doi.org/10.1016/B978-0-08-100904-8.00017-1. ▪ Perin C, Vuillemot R, Stolper CD, Stasko JT, Wood J, Carpendale S. State of the Art of Sports Data Visualization. Comput Graph Forum 2018;37:663–86. https://doi.org/10.1111/cgf.13447. ▪ Neumann DL, Moffitt RL, Thomas PR, Loveday K, Watling DP, Lombard CL, et al. A systematic review of the application of interactive virtual reality to sport. Virtual Real 2018;22:183–98. https://doi.org/10.1007/s10055-017-0320-5. ▪ van der Kruk E, Reijne MM. Accuracy of human motion capture systems for sport applications; state-of-the-art review. Eur J Sport Sci 2018;18:806–19. https://doi.org/10.1080/17461391.2018.1463397. ▪ Adesida Y, Papi E, McGregor AH. Exploring the Role of Wearable Technology in Sport Kinematics and Kinetics: A Systematic Review. Sensors 2019;19:1597. https://doi.org/10.3390/s19071597. ▪ Schmidt SL, editor. 21st Century Sports: How Technologies Will Change Sports in the Digital Age. 1st ed. 2020 edition. Cham, Switzerland: Springer; 2020. ▪ Ross S. Sports Technology. MMS Gold; 2010. ▪ Manshahia M, Das A. High active sportswear – A critical review. Indian J Fibre Text Res IJFTR 2014;39:441–9. https://doi.org/10.56042/ijftr.v39i4.7733. ▪ Routledge Studies in Sports Performance Analysis 2014–2023. http://www.amazon.com/Routledge-Studies-in-Sports-Performance-Analysis-6-book-series/dp/B08WJ58N9B?ref=dbs_m_mng_rwt_0000_share (accessed August 13, 2023).	
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