Subject Description Form

Subject Code	BME21163
Subject Title	**Functional Human Anatomy for Rehabilitation Engineering and Sports Science**
Credit Value	3
Level	2
Co-requisite	ABCT2333 Human Physiology
Objectives	This course aims to nurture students with the knowledge and skills in the structure, organization, and function of the human body in relation to rehabilitation engineering and sports science. Different body systems will be included with an emphasis on the integration of neuromusculoskeletal system.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the basic anatomical structures of the human body. b. Familiarize anatomical terminology of the human body. c. Recognise the major bones, joints and muscle groups of the human body. d. Identify and locate anatomical landmarks through surface anatomy. e. Explain the relationship between the structures and functions of the major components of the neuromusculoskeletal system. f. Describe and analyse muscle role and function in human movements.
Contribution to Programme Outcomes (Refer to Part I Section 2)	Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Sports Science and Technology (SST) discipline. (Teach, Practice, Measure) Programme Outcome 3: Demonstrate an ability to design a system, component, or process relevant to SST to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability. (Teach) Programme Outcome 5: Demonstrate an ability to understand the impact of SST solutions in a global and societal context, especially care about the importance of health, safety, and environmental considerations for the benefit of society. (Teach) Programme Outcome 9: Demonstrate an ability to function in multi-disciplinary teams and contribute to effective teamwork and positive group dynamics. (Practice)
Subject Synopsis/ Indicative Syllabus	The content of the course will be discussed in the following modules: **Module 1: Overview of the major anatomical systems of the human body** ▪ Basic anatomical terminologies and reference systems ▪ Structural organization of the human body ▪ Anatomy of the cardiopulmonary, digestive, and urogenital systems **Module 2: Skeletal system and surface anatomy** ▪ Axial and appendicular skeleton ▪ Palpation and surface landmark

Module 3: Joint articulations and ligaments
- Joint types and structure
- Major ligaments (spine, shoulder, elbow, wrist, hip, knee, ankle)

Module 4: Muscular system
- Anatomical terminologies in muscle naming
- Major axial and appendicular muscles (origins, insertions, functions)

Module 5: Nervous system
- Divisions of the nervous system
- Central and peripheral nervous systems
- Major nerves and their innervations

Module 6: Circulation system for rehabilitation engineering (P&O)
- Vascular arrangement in the upper and lower limbs
- Spinal cord circulation

Module 7: Functional anatomy: human movements and coordinated patterns
- Muscle roles in fundamental movements and sports activities
- Neuromuscular control
- Functional movement analysis
- Role of kinetic chain in sports performance and injury risk

Teaching/Learning Methodology

Lectures, flipped learning, and practical sessions.

Teaching/ learning methodology	Intended subject learning outcomes					
	a	b	c	d	e	f
1. Lectures	✓	✓	✓	✓	✓	✓
2. Practical sessions	✓	✓	✓	✓		
3. Flipped learning			✓	✓		

Aside from regular lectures and practical sessions, **flipped learning** will be used for some classes. Lecture notes and relevant videos will be provided through e-learning platforms such as Blackboard that facilitate in-class discussion, activities, and sharing. Students are expected to learn some of the content on their own before classes, and videos on these materials will be made available to students a week prior to class. Students are free to watch and learn these materials any time before class time.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes					
		a	b	c	d	e	f
1. Quizzes	15%	✓	✓	✓	✓	✓	✓
2. Midterm exam	25%	✓	✓	✓	✓		
3. Group project	25%	✓	✓	✓	✓	✓	✓
4. Final exam	35%	✓	✓	✓	✓	✓	✓
Total	100%						

	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: **Quizzes:** These are designed to evaluate the students' comprehension of the core concepts and knowledge presented and discussed during the previous lecture. **Midterm exam:** The midterm exam involves a practical component and theoretical component. For the practical component, students will be required to identify bony landmarks; whereas students will answer questions regarding module 1 to 3 in the theoretical component. **Group project:** A group of students (3 in a group) will be required to examine a functional movement skill in sports. Students will be asked to describe the anatomy of the key neuromusculoskeletal structures, as well as to analyze the roles of major muscles during different phases of movement and corresponding joint movements. **Final exam:** The final exam involves a combination of multiple choice, true or false, and open-ended questions taken from lecture materials and assigned readings.	
Student Study Effort Expected	Class contact:	
	▪ Lectures	26 Hrs.
	▪ Flipped learning	4 Hrs.
	▪ Practical sessions	6 Hrs.
	▪ Group project presentation	3 Hrs.
	Other student study effort:	
	▪ Self-study	48 Hrs.
	▪ Flipped learning preparation	12 Hrs.
	▪ Group project preparation	30 Hrs.
	Total student study effort	129 Hrs.
Reading List and References	**Suggested Text** ▪ Derek, F., Hutchinson, J.O. (2012). Field's anatomy, palpation and surface marking. (5th Edition). London, UK: Elsevier Health Sciences. ▪ Hall, S.J. (2022). Basic biomechanics. (9th Edition). Boston, MA: McGraw-Hill. ▪ Marieb, E. (2017). Essentials of human anatomy and physiology. (12th Edition). San Francisco, CA: Pearson International. ▪ Martini, F.H., Nath, J.L., & Bartholomew, E.F. (2018) Fundamentals of Anatomy and Physiology. (11th Edition). London, UK: Pearson. **Other Suggested Reference Materials** ▪ Cailliet, R. (2004). The illustrated guide to functional anatomy of the musculoskeletal system. Chicago, IL: American Medical Association. ▪ Enoka, R.M. (2025). Neuromechanics of human movement. (6th Edition). Champaign, IL: Human Kinetics. ▪ Galbusera, F., & Wilke, H.J. (2018). Biomechanics of the spine: basic concepts, spinal disorders and treatment. Cambridge, MA: Academic Press.	

	▪ Harris, P., & Ranson, C. (2008). Atlas of living and surface anatomy for sports medicine. Edinburgh: Churchill Livingstone. ▪ Hazari, A., Maiya, A.G., & Nagda, T.V. (2021). Conceptual biomechanics and kinesiology. Singapore: Springer. ▪ Hutchinson, M., Mallatt, J., Marieb, E.N., & Wilhelm, P.B. (2007). A brief atlas of human anatomy. San Francisco, CA: Pearson Education. ▪ Lindsay, K.W., & Bone, I. (2010). Neurology and neurosurgery illustrated. (5th Edition). Edinburgh, Scotland: Churchill Livingstone. ▪ Manocchia, P. (2008). Anatomy of exercise. Richmond Hill, ON: Firefly Books. ▪ Musculino, J.E. (2016). Kinesiology: The skeletal system and muscle function (3rd Edition). St Louis, MI: Elsevier. ▪ Ozkan, M., Huri, G., & Bilsel, K. (2022). Fundamentals of the Shoulder. Cham, Switzerland: Springer. ▪ Snell, R.S. (2024). Clinical neuroanatomy (9th Edition). Philadelphia, PA: Lippincott, Williams and Wilkins. ▪ Whiting, W.C., & Zernicke, R.F. (2008). Biomechanics of musculoskeletal injury. (2nd Edition) Champaign, IL: Human Kinetics.
Date of Last Major Revision	16 April 2025
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