Subject Description Form

Subject Code	BME32136
Subject Title	**Upper Limb Orthotics**
Credit Value	3
Level	3
Prerequisite and Co-Requisite	**Prerequisites** ABCT2331 Human Biology for Biomedical Engineering I; and ABCT2332 Human Biology for Biomedical Engineering II; and BME21119 Fundamentals of Biomechanics **Co-Requisite** BME31125 Biomechanics
Objectives	This subject provides students with the principles and practical laboratory experiences in the prescription, design, fabrication, fitting, and evaluation of upper limb orthotic devices. The subject progressively integrates the health and engineering studies which the students have taken as part of their earlier academic studies, and which form the basis for the derivation of the scientific principles used in the clinical practice of upper limb orthotics.
Intended Learning Outcomes	Upon completion of the subject, students will be able to carry out the following procedures, in a safe manner, according to the patients' conditions. a. To assess the patients b. To prescribe orthotic interventions c. To take measurement on the patients d. To design appropriate orthotic devices e. To perform the technical process f. To fit the orthoses g. To evaluate the interventions h. To communicate with the patients effectively
Contribution to Programme Outcomes (Refer to Part I Section 10)	▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach, Practice and Measure) ▪ Programme Outcome 3: Demonstrate an ability to design a system, component, or process relevant to BME to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health

	and safety, manufacturability and sustainability. (Teach and Practice) ▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach, Practice and Measure) ▪ Programme Outcome 9: Demonstrate an ability to function in multi-disciplinary teams. (Teach, Practice and Measure) ▪ Programme Outcome 10: Demonstrate an understanding of professional and ethical responsibility. (Teach, Practice and Measure)
Subject Synopsis/ Indicative Syllabus	▪ Review of the anatomy, biomechanics, and pathomechanics of the upper limb; ▪ Principles and concepts of clinical assessments of the upper limb; ▪ Use of assessment tools for recognizing normal and abnormal findings of the upper limb; ▪ Clinical reasoning in assessment, diagnosis, planning, implementation, and evaluation of the upper limb disorder and management; ▪ Introduction to upper limb orthotics; materials and components; biomechanics of upper limb orthotics; upper limb orthoses for different levels, disorders and clinical conditions; ▪ The clinical assessment, documentation, measurement, moulding, cast rectification, fabrication; fitting, checkout and outcome measure of upper limb orthoses are included.
Teaching and Learning Methodology	The 21 hours of lectures and tutorials will be supported by 57 hours of clinical demonstrations and practices. The subject is to integrate the theoretical knowledge and the technical skills in a way that is important to patient care and management. Students will need to go through step by step the clinical process of patient assessment, patient measurement, casting, cast rectification, fabrication, patient fitting, and patient evaluation. Besides the development of technical skills, emphasis is placed on the development of clinical judgement and the process of clinical problem solving. Direct feedback from the patients/subjects at various stages, as well as from the instructors throughout the process, would constitute important inputs to the learning experience. In the process, students will also learn how to interact with the patients. At the end of a practical series, students will be guided to critique the work of other fellow students under the facilitation of the instructor. This is done to maximize the learning experience by learning not only from one's own mistakes but also from those of the fellow students.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							
		a	b	c	d	e	f	g	h
Student presentations	10%	√	√		√			√	
Practical assignments	30%	√	√	√	√	√	√	√	√
Quizzes	20%	√	√	√	√			√	
Final examination	40%	√	√	√	√			√	
Total	100%								

Note: To pass this subject, students must obtain grade D or above in both continuous assessment and final examination.

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

Each of the individual learning outcomes will be assessed as part of the integrated outcome demonstrated by the student in patient care. Individual orthotics design and fitting projects will be assessed with direct feedback from the model patients/subjects at various stages, as well as from the instructors throughout the process. In the process, students will also learn how to interact with the patients. At the completion of assigned individual projects, students will be guided to critique the work of other fellow students under the facilitation of the instructor. This is done to maximize the learning experience by learning not only from one's own experience but also from those of the fellow students. A final examination will be used to establish that the student has understood and can integrate the factual materials required to provide upper limb orthotic services.

Student Study Effort Expected	Class contact:	
	▪ Lectures	18 Hrs.
	▪ Tutorials	3 Hrs.
	▪ Clinical Demonstrations and Practices	57 Hrs.

	Other student study effort:	
	▪ Open laboratory practices	39 Hrs.
	▪ Written assignments and revisions	39 Hrs.
	Total student study effort	156 Hrs.
Reading List and References	▪ Beam JW. Orthopedic taping, wrapping, bracing & padding, 2nd Ed., Philadelphia: F.A. Davis; 2012. ▪ Canadian Prosthetics & Orthotics Journal. ▪ Chui KC, Yen S-C, Jorge M, Lusardi MM. Orthotics and prosthetics in rehabilitation. (Fourth Edition). St. Louis: Elsevier; 2020. ▪ Cooper C. Fundamentals of Hand Therapy: Clinical Reasoning and Treatment Guidelines for Common Diagnoses of the Upper Extremity. St Louis: Elsevier; 2013. ▪ Coppard B.M. Lohman H.L. Introduction to Orthotics: A Clinical Reasoning and Problem-Solving Approach, 5th Ed.; 2020. ▪ Fess EE. Hand and upper extremity splinting: principles and methods, 3rd Ed., St. Louis (MO): Elsevier/Mosby; 2005. ▪ Hsu JD, Goldberg B. Atlas of Orthoses and Assistive Devices; 2008. ▪ Jacobs MA, Austin NM. Orthotic intervention for the hand and upper extremity: splinting principles and process, 3rd Ed., Philadelphia, PA: Wolters Kluwer; 2022. ▪ Journal of Prosthetics and Orthotics ▪ Journal of Prosthetics and Orthotics International ▪ Schofield K. and Schwartz D. Orthotic Design and Fabrication for the Upper Extremity: A Practical Guide, 1st Ed.; 2019. ▪ Shurr DG, Cook TM. Prosthetics and orthotics, 2nd Ed., Upper Saddle River, N.J: Prentice Hall; 2002. ▪ Webster JB, Murphy DP, editors. Atlas of Orthoses and Assistive Devices, 5th Ed., Philadelphia: Elsevier; 2019. ▪ Wietlisbach CM. Cooper's Fundamentals of Hand Therapy: Clinical Reasoning and Treatment Guidelines for Common Diagnoses of the Upper Extremity, 3rd Ed.; 2020.	
Date of Last Major Revision	29 Oct 2020	
Date of Last Minor Revision	29 Dec 2022	