Subject Description Form

Subject Code	BME42135
Subject Title	**Spinal Orthotics**
Credit Value	3
Level	4
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 spinal 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 spinal 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	▪ 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)

Outcomes (Refer to Part I Section 10)	▪ 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 spine and trunk; ▪ Principles and concepts of clinical assessments of the spine; ▪ Use of assessment tools for recognizing normal and abnormal findings of the spine; ▪ Clinical reasoning in assessment, diagnosis, planning, implementation and evaluation of the spinal disorders and management; ▪ Introduction to spinal orthotics; materials and components; biomechanics of spinal orthotics; spinal orthoses for different levels, disorders and clinical conditions; ▪ The clinical assessment, documentation, measurements, moulding, cast rectification, fabrication, fitting, checkout and outcome measure of spinal 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 spinal 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	▪ Albert T, Vaccaro A. Physical Examination of the Spine. Stuttgart: Georg Thieme Verlag; 2017. ▪ Canadian Prosthetics & Orthotics Journal ▪ Chui KC, Yen S-C, Jorge M, Lusardi MM. Orthotics and Prosthetics in Rehabilitation, 4th Ed., St. Louis: Elsevier; 2020. ▪ Devlin V.J. Spine Secrets, 2020. ▪ Fisk JR, Lonstein JE, Malas BS. The Atlas of Spinal Orthotics. Exceed Worldwide; 2017. ▪ Heary RF, Albert TJ. Spinal deformities: the essentials, 2nd Ed., New York: Thieme; 2014. ▪ Jain SK, Jain G. Spine and Spinal Orthoses, 2016 ▪ Journal of Prosthetics and Orthotics ▪ Journal of Prosthetics and Orthotics International ▪ Singh K. Spine Essentials Handbook: A Bulleted Review of Anatomy, Evaluation, Imaging, Tests, and Procedures. NEW YORK: Thieme Medical Publishers, Incorporated; 2019. ▪ Webster JB, Murphy DP, editors. Atlas of Orthoses and Assistive Devices (Fifth Edition). Philadelphia: Elsevier; 2019.	
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