	Ministry of Higher Education and Scientific Research - Iraq Al-Mustaqbal University College of Engineering Department of Prosthetics and Orthotics Engineering	

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	الميكانيك الحيوي I			**Module Delivery**	
Module Type	CORE			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UOMU0103053				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	3		**Semester of Delivery**	5	
Administering Department	UOMU0103		**College**	UOMU01	
Module Leader	Firas Thair Al-maliky		**e-mail**	firas.thair.almaliky@uomus.edu.iq	
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	PhD.	
Module Tutor					
Peer Reviewer Name			**e-mail**		
Review Committee Approval	10/06/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	PHYSIS	**Semester**	1-level 1
Co-requisites module	ANATOMY	**Semester**	3-level 2
Co-requisites module	STRENGTH OF MATERIALS	**Semester**	3-level 2
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	The study of biomechanics involves the application of principles and methods of physics and engineering to understand the mechanics of biological systems. It focuses on analyzing the structure, function, and movement of human body. The aims of studying biomechanics can be broadly categorized into the following: - 1. Understanding Human Movement... Biomechanics aims to analyze and understand the mechanics of human movement. It investigates how forces, motion, and energy interact within the human body 2. Developing the student's intellectual skills to enable him to understand the application of engineering principles and draw them from biological systems. 3. Designing Prosthetics and Assistive Devices... Biomechanics plays a crucial role in the design and development of prosthetic limbs, orthotic devices, and assistive technologies. 4. Preventing and Rehabilitating Injuries. 5. Understanding Biological Systems. Overall, the aims of studying biomechanics are to advance our understanding of how human body move and function.		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	learning outcomes may vary between institutions and programs, here are some common learning outcomes that you may expect from a biomechanics module within a Prosthetic and Orthotics Engineering dept.: 1- Understand the Principles of Biomechanics: Gain a solid foundation in the fundamental principles and concepts of biomechanics, including the laws of motion, kinetics, kinematics, and the mechanics of materials. 2- Analyze Human Movement: Acquire skills to analyze and evaluate human movement patterns using biomechanical principles and techniques. Learn how to quantify and interpret data related to forces, torques, joint angles, and muscle activity during different activities, such as walking, running, and functional movements. 3- Apply Biomechanical Knowledge to Prosthetic and Orthotic Design: Understand the biomechanical considerations involved in the design, development, and fitting of prosthetic and orthotic devices. Explore how biomechanics can inform decisions related to materials, alignment, component		

	selection, and customization to optimize the function, comfort, and performance of these devices for individuals with limb loss or musculoskeletal conditions. 4- Conduct Biomechanical Assessments: Develop skills to perform biomechanical assessments of individuals with limb loss or musculoskeletal conditions. Learn how to use motion analysis systems, force plates, electromyography (EMG), and other tools to collect and analyze data to assess movement patterns, gait parameters, joint kinetics, and muscle activation.
Indicative Contents المحتويات الإرشادية	Here are some indicative contents that can be covered in a biomechanics course for prosthetic and orthotic students: 1- Introduction to Biomechanics: Definition of biomechanics and its relevance in prosthetics and orthotics. Basic principles of biomechanics: force, torque, moment, stress, and strain. In addition to statics, dynamics, kinematics, and kinetics, and explain the ways in which they are related. 2- Kinetic and Kinematic Concepts for Analyzing Human Motion Introduction to Kinematic Concepts for Analyzing Human Motion Identify and explain the linear, angular, and general forms of motion. Identify and describe reference positions, planes, and axes associated with the human body. Define and appropriately use directional terms & joint movement terminology. 3- Review of relevant anatomical structures and their functions, including bones, joints, muscles, and ligaments. Understanding the mechanical properties of musculoskeletal tissues. 4- The Biomechanics of Human Skeletal Articulations Categorize joints based on structure and movement capabilities. Explain the functions of articular cartilage and fibrocartilage. Describe the material properties of articular connective tissues. 5- The Biomechanics of the Human Upper and Lower Extremity Explain how anatomical structure affects movement capabilities of upper and lower extremity articulations. Identify factors influencing the relative mobility and stability of upper and lower extremity articulations. Identify muscles that are active during specific upper and lower extremity movements. 6- The Biomechanics of the Human Spine Explain how anatomical structure affects movement capabilities of the spine

	Identify factors influencing relative mobility and stability of different regions of the spine Explain the ways in which spine is adapted to carry out its biomechanical functions
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	When it comes to teaching biomechanics, it's important to employ effective learning and teaching strategies that enhance their understanding and application of the subject matter. Here are some strategies you can consider: -1Active Learning: Encourage active participation. -2Visual Aids: Use visual aids such as diagrams, charts, and multimedia presentations to supplement your lectures. Visual representations can aid students in comprehending complex biomechanical concepts and enhance their retention. -3Real-Life Examples: Connect biomechanics concepts to real-life examples and applications. -4Group Work: Promote collaborative learning through group work or projects. Assign students to work together on practical exercises or research projects related to biomechanics. This encourages teamwork, fosters discussion, and allows for peer learning. -5Assessment Methods: Use a variety of assessment methods to evaluate students' understanding of biomechanics. This can include written exams, presentations, or research projects. Assessments should align with the learning objectives and encourage critical thinking and problem-solving skills. -6Feedback and Reflection: Provide constructive feedback to students regularly, both during class activities and through assessments.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	LO #1 and 2
	Assignments	2	10% (10)	2, 12	LO # 3
	Projects / Lab.	1	10% (10)	13	LO # 4
	Report	2 hr	10% (10)	7	LO # 1-4
Summative assessment	Midterm Exam	3hr	60% (60)	16	All
	Final Exam	2	10% (10)	5, 10	LO #1 and 2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Biomechanics
Week 2	Human Movement Analysis
Week 3	Kinematic Concepts for Analyzing Human Motion
Week 4	Anatomical Reference Position and planes
Week 5	Kinetic Concepts for Analysing Human Motion
Week 6	Levers:- Types of machines found in the body
Week 7	The Biomechanics of Human Bone Growth and Development
Week 8	The Biomechanics of Human Skeletal Articulations
Week 9	The Biomechanics of Human Skeletal Muscle
Week 10	The Biomechanics of The Human Upper Extremity :- Shoulder joint
Week 11	The Biomechanics of The Human Upper Extremity :- Elbow, Wrist and Hand joints
Week 12	The Biomechanics of the Human Lower Extremity:- Hip joint
Week 13	The Biomechanics of the Human Lower Extremity:- Knee joint
Week 14	The Biomechanics of the Human Lower Extremity:- Ankle and Foot joints
Week 15	The Biomechanics of the Human Spine

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Basic Biomechanics "Seventh Edition", Susan J. Hall, 2016	Yes
Recommended Texts	1- BIOMECHANICS Principles and Practices by Donald R. Peterson and Joseph D. Bronzino, 2015. 2- Fundamentals of Biomechanics "Second Edition" by Duane Knudson , 2007..	No
Websites	https://www.classcentral.com/tag/biomechanics	

APPENDIX:

GRADING SCHEME مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 – 100	Outstanding Performance
	B - Very Good	جيد جدا	80 – 89	Above average with some errors
	C –Good	جيد	70 – 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 – 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

ملاحظة: هذا النموذج تم وضعه وتقديمه من قبل مديرية ضمان الجودة في وزارة التعليم العالي والبحث العلمي