مركز الاعتماد وضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER

THE VISION OF THE UNIVERSITY OF JORDAN

A university excelling in pedagogy, research, and innovation and advancing in global standing

THE MISSION OF THE UNIVERSITY OF JORDAN

Providing students with fulfilling learning experiences, conducting knowledge-producing research, and building firm societal ties, within an environment conducive to creativity, innovation, and entrepreneurship: making efficient use of resources and forging fruitful partnerships.

THE VISION OF THE SCHOOL OF REHABILITATION SCIENCES

Leadership in the creation and development of knowledge, and in the preparation of human resources aspiring for excellence regionally and internationally

THE MISSION OF THE SCHOOL OF REHABILITATION SCIENCES

To excel in the preparation and training of model rehabilitation personnel, who participate in the health and community sector, and provide the local and regional community with appropriate rehabilitation services based on needs. Through educational curricula that facilitates the implementation of up to date rehabilitation services based on the best available evidence.

THE VISION OF THE DEPARTMENT OF PHYSIOTHERAPY

To be recognized as an outstanding educational program with high quality faculty members, staff and students

THE MISSION OF THE DEPARTMENT OF PHYSIOTHERAPY

To graduate professionals in the field of physical therapy who are to contribute to the health needs of society through education, scholarly activities, research, service and professional practice.

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Course Syllabus

1	**Course title**	Biomechanics
2	**Course number**	1801261
3	**Credit hours**	3 (2, 1)
	Contact hours (theory, practical)	6 (2, 4)
4	**Prerequisites/corequisites**	(0342103) General Physics and (0502108) Anatomy of extremities
5	**Program title**	B.Sc. in Physiotherapy and B.Sc. in Occupational Therapy
6	**Program code**	1801
7	**Awarding institution**	The University of Jordan
8	**School**	School of Rehabilitation Sciences
9	**Department**	Department of Physiotherapy
10	**Course level**	Undergraduate
11	**Year of study and semester (s)**	2023/ 2024 First Term
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English
14	**Delivery method**	☐Face to face learning ☐Blended ☐Fully online
15	**Online platforms(s)**	☐Moodle ☐Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	3/10/2024

17 Course Coordinator:

Name: Sumayeh Abujaber, PhD	Office hours: Sundays and Tuesdays 10-11
Office number: 334	Phone number: (+962-6)5355000 Ext 23224
Email: s.abujaber@ju.edu.jo	

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18 Other instructors:

None

19 Course Description:

This course covers the theory of motion and their application to the human body as well as the mechanical behaviour of active and static body tissues with a focus on biomechanical topics to the specialty of medical rehabilitation. The practical part of this course will develop the student's skill of observation and will teach the students how to do the objective measurement of human body movements.

This course consists of two parts: theoretical and practical. For theoretical part, we will have two face-to-face lectures every week (Sundays, and Tuesdays) at the school.

For the lab session, it includes two parts: synchronous part (online interactive lecture on Microsoft Teams), and asynchronous part in which an activity will be posted to you related to the topics being covered that week (activities include: watching videos, reading an article, online searching for selected topics, working on solving biomechanics problem, and analyzing simple movement tasks, etc.). These activities are crucial for understanding the course content and will be made available on the e-learning platform. Some activities are designed solely for the purpose of learning and comprehension, while others will be graded. The specific grading criteria for each activity will be announced to students. Students will be engaged in an active discussion in the following meeting to the asynchronous activity to clarify any content they found challenging. Students must attend all classes, finish all the activities, and actively participate in discussions during the synchronous sessions.

20 Course aims and outcomes:

A- Aims:

- **Provide students with the basic concept of biomechanics as applied to the musculoskeletal system for the accurate description and explanation of basic movements of the body**
- **Provide students with essential knowledge regarding the mechanical behaviors of different body tissues and their responses to the different types of loads**
- **Provide students with basic knowledge that relates the biomechanics factors with common musculoskeletal injuries**

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to:

SLOs / SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)	SLO (9)	SLO (10)	SLO (11)
1. Explain the basic concepts of biomechanics such as statics, dynamics, kinematics, and kinetics		x									
2. Describe human movement through the application of kinematic principles, including the types of motion, direction, and magnitude of movement		x									
3. Classify the different types and characteristics of forces, their effects on human body, and relation to human movement		x									
4. Identify the different types and components of simple body machines including levers and pulley system		x									
5. Discuss the types, purpose, and uses of available tools/instrumentations for kinematics and kinetics measurement		x									

6. Discuss the biomechanical properties, behavior and responses of the different body tissue structures to mechanical loading, at normal and pathological conditions		x									
7. Relate the effects of different mechanical loading to common musculoskeletal injuries (i.e. Deformation effects)						x					
8. Describe the normal gait and its deviation, optimum posture and abnormal posture using the biomechanical principles		x									
9. Solve biomechanical problems, and perform a relatively low level of analysis for some movements, postures, and exercises through the application of biomechanics principles						x					
10. Search for biomechanics papers and materials and appraise specific biomechanics topics related to rehabilitation field					x						

Program SLOs:

1. Recognize, critically analyze and apply the conceptual frameworks and theoretical models underpinning physiotherapy practice
2. Demonstrate comprehension of background knowledge that informs sound physiotherapy practice
3. Demonstrate the ability to use online resources and technologies in professional development
4. Display a professional commitment to ethical practice by adhering to codes of conduct and moral frameworks that govern the practice of physiotherapy
5. Evaluate the importance of and critically appraise research findings to inform evidence-based practice such that these skills could be utilized in continuing self-development

6. Implement clinical reasoning, reflection, decision-making, and skillful application of physiotherapy techniques to deliver optimum physiotherapy management
7. Adhere to the professional standards of physiotherapy practice in terms of assessment, management, outcome measurement, and documentation
8. Display a willingness to promote healthy lifestyle and convey health messages to clients
9. Value the willingness to exercise autonomy while appreciating the challenges associated with delivering physiotherapy services
10. Display the ability to practice in a safe, effective, non-discriminatory, inter- and multi-disciplinary manner
11. Demonstrate effective oral and written communication with clients, carers, and health professionals

11. Topic Outline and Schedule

Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended / Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Intro- What is Biomechanics?	1	Face to Face	Moodle	Synchronous	Throughout this course, these will include: Theoretical exams Assignment Quizzes And Journal club	**# 1: chp.1** **# 3: chp.1**
	1.2	Kinematics- Types of motion	1,2	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**

		Lab	Discuss lab and journal club instructions		Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides
	2	2.1	Kinematics-location direction, magnitude, and rate of change of motion	1,2	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		2.2	Intro to kinetics	1,3	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		Lab	Planes and axes activity	2,9	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides and videos will be uploaded on Moodle
	3	3.1	Kinetics-types of forces	3	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		3.2	Kinetics-stability & equilibrium newton laws of motion	3	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		Lab	Motion analysis instrumentation	5	Blended	Moodle + Teams	Synchronous & Asynchronous		
	4	4.1	Kinetics-Force systems and moments	3	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**

		4.2	Kinetics- Simple body machines: levers & pulleys	4	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		Lab	Tools for kinematics analysis	5	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	5	5.1	Kinetics- Simple body machines: Lever systems in the body	4	Face to Face	Moodle	Synchronous		**# 1: chp.1** **# 3: chp.1**
		5.2	Mechanical behavior of connective tissues	6	Face to Face	Moodle	Synchronous		**# 1: chp.2/ General Properties of Connective Tissue**
		Lab	Force platform	5	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	6	6.1	Bone Biomechanics-1	6	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 2**
		6.2	Bone Biomechanics-2	6	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 2**

		Lab	Solving Moment and lever system exercises	3,9	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	7	7.1	Bone Biomechanics-3	6	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 2**
		7.2	Bone Biomechanics-4	6,7	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 2**
		Lab	Hand-held dynamometer	5	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	8	8.1	Biomechanics of muscle-1	6	Face to Face	Moodle	Synchronous		**# 1: chp.3** **#2: chp. 6**
		8.2	Biomechanics of muscle-2	6	Face to Face	Moodle	Synchronous		**# 1: chp.3** **#2: chp. 6**
		Lab	Isokinetic dynamometer	5	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle

	9	9.1	Biomechanics of muscle-3	6	Face to Face	Moodle	Synchronous		**# 1: chp.3** **#2: chp. 6**
		9.2	Biomechanics of muscle-4	6,7	Face to Face	Moodle	Synchronous		**# 1: chp.3** **#2: chp. 6**
		Lab	Types of muscle contraction during different tasks	9	Blended	Moodle + Teams	Synchronous & Asynchronous		
	10	10.1	Biomechanics of ligaments and tendons	6	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 4**
		10.2	Biomechanics of ligaments and tendons	6,7	Face to Face	Moodle	Synchronous		**# 1: chp.2** **#2: chp. 4**
		Lab	EMG	5	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	11	11.1	Biomechanics of articular cartilage	6	Face to Face	Moodle	Synchronous		**#2: chp. 3**
		11.2	Biomechanics of articular cartilage	6,7	Face to Face	Moodle	Synchronous		**#2: chp. 3**
		Lab	Journal club	10	Blended	Moodle + Teams	Synchronous & Asynchronous		

	12	12.1	Biomechanics of gait	8	Face to Face	Moodle	Synchronous		**#1: chapter 14** **#3: chapter 15**
		12.2	Biomechanics of gait	8	Face to Face	Moodle	Synchronous		**#1: chapter 14** **#3: chapter 15**
		Lab	Gait analysis	8,9	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	13	13.1	Biomechanics of gait	8,9	Face to Face	Moodle	Synchronous		**#1: chapter 14** **#3: chapter 15**
		13.2	Biomechanics of gait	8	Face to Face	Moodle	Synchronous		**#1: chapter 14** **#3: chapter 15**
		13.3	Journal club	10	Blended	Moodle + Teams	Synchronous & Asynchronous		
	14	14.1	Biomechanics of Posture	8	Face to Face	Moodle	Synchronous		**#1: chapter 13**
		14.2	Biomechanics of Posture	8	Face to Face	Moodle	Synchronous		**#1: chapter 13**

		Lab	Posture analysis	8	Blended	Moodle + Teams	Synchronous & Asynchronous		Instructor's slides, videos, and assigned articles will be uploaded on Moodle
	15	15.1	Review		Face to Face	Moodle	Synchronous		
		15.2	Review		Face to Face	Moodle	Synchronous		
		Lab	Journal club	10	Blended	Moodle + Teams	Synchronous & Asynchronous		

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)
First exam	20	TBA		5th week
Second exam	30	TBA		10th week
Final exam	40	All topics		TBA
Quizzes*& Assignments**	10	TBA		Throughout the course

*Students need to expect a quiz in the lab each week on the material covered in the last lecture. The marks of all quizzes will be converted to 5.

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**There will be assigned activities (group or individual) that are required by the instructor as part of the asynchronous learning part. There will be several activities, marks will be converted to 5.

23 Course Requirements

Students should have a computer, internet connection, webcam, account on a Microsoft teams

Regularly check the e-learning portal for any announcements, tasks and learning materials.

24 Course Policies:

A- Attendance policies:

- Students are expected to be on time.
- Repeated tardiness or leaving early will not be accepted.
- Students who miss class (or any portion of class) are responsible for the content. All classes will be recorded and uploaded on Microsoft Stream. It is the student's responsibility to review the material of classes they missed.
- Attendance will be taken on every class throughout the semester.
- Absence of more than 15% of all the number of classes (which is equivalent to 6 classes) requires that the student provides an official excuse to the instructor and the dean.
- If the excuse was accepted the student is required to withdraw from the module.
- If the excuse was rejected the student will fail the module and mark of zero will be assigned according to the regulations of The University of Jordan.

B- Absences from exams and submitting assignments on time:

- The instructor will not do any make-up exams.
- Exceptions for make-up exams and late submission of class assignments will be made on a case-by-case basis for true personal emergencies that are described as accepted by the regulations of UJ (e.g., documented medical, personal, or family emergency).
- It is the student's responsibility to contact the instructor within 24 hours of the original exam time to schedule a make-up exam>
- Late submission of homework will result in deduction of 2 points for each day of delay
- Makeup for the final exam may be arranged according to the regulations of The University of Jordan.

C- Health and safety procedures:

- This course is offered using blended learning to observe the safety procedures imposed by the Ministry of Higher Education and The University of Jordan due to the Covid-19 pandemic.

- Students will not be in direct contact with patients during this course.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

- Students are expected to observe all University guidelines pertaining to academic misconduct.
- Any work submitted by a student for academic credit must be the student's own work. Submission of work taken directly from another source (e.g., book, journal, internet, or another student work) will be considered plagiarism and the student/group will get a zero grade on that homework. In addition, if copying occurred, both the student who copied the work and the student who gave material to be copied (if applicable) will receive a zero for the assignment.
- Students are expected to do work required for homework on their own. Asking other instructors at JU, staff, or other students to assist in or do any part of the assignment for them will negatively affect their grade on that assignment. The course instructor is the person the student needs to talk to if s/he has any difficulties pertaining to an assignment or project and is strongly encouraged to schedule an appointment with the instructor if such difficulties arise during the semester.
- Course materials prepared by the instructor, together with the content of all lectures and review sessions presented by the instructor are the property of the instructor. Video and audio recording of lectures and review sessions without the consent of the instructor is prohibited.
- Any forms of academic misconduct will be handled according to the University of Jordan guidelines.

E- Grading policy:

- Grading for this course will be determined based upon the accumulation of points for variety of assignments and exams.
- All work will be evaluated on completeness, organization, clarity of information, and the integration and application of the material.

F- Available university services that support achievement in the course:

- The University of Jordan provides many services to support social, health, and mental well-being of students in general and students with disabilities in specific. Students are advised to visit the Deanship of Students Affairs to learn more about those services.
- If you are a student with a disability for which you may request accommodations, please notify the instructor as soon as possible (email is acceptable) so the appropriate accommodations for this course can be made. Also, notify the staff of Services for Student with Disabilities (Deanship of Students Affairs) as soon as possible.
- The University of Jordan provides internet access for students who request such services. Please contact the Assistant Dean for Student Affairs for such requests.

25 References:

Required book (s), assigned reading and audio-visuals:

1. Levangie PK, Norkin CC, & Lewek. (2019). Joint Structure and Function: A Comprehensive Analysis. FA Davis, Philadelphia, 6th Edition

2. Nordin M. and Frankel V. (2021). Basic biomechanics of the musculoskeletal system. 5th edition. Lippincott Williams and Wilkins.

3. Neumann D.A. 2016. Kinesiology of the musculoskeletal system: foundations for rehabilitation, 3rd ed. Elsevier

4. Selected biomechanics articles will be allocated to students for Journal club part.

Recommended books, materials, and media:

5. Hall S. (2012). Basic Biomechanics. Sixth edition. McGrew Hill.
6. Richards J. (2008). Biomechanics in clinic and research. Elsevier

26 Additional information:

Students with disabilities:

- If you are a student with disability, please contact the course coordinator at the beginning of the term to inform them of any needs or adjustments you might have.
- According to University regulations, some students with disabilities can be allowed additional time during exams. This extra time is granted by an official letter from the University administration. Please discuss with the course coordinator your need for such extra time at the start of the term.
- All information you provide to the course coordinator will be dealt with confidentially.

Course material and copy rights:

- All material prepared by the course coordinator for the purposes of this course are the intellectual property of the course coordinator. It is only intended for the personal use of students for their individual learning.
- Sharing of course content with other people or via different platforms other than those used by the course coordinator is prohibited. The permission of the course coordinator must be sought before sharing of content.

This course builds up on knowledge obtained previously from following courses:

- **General physics:** knowledge related to force resolution, simple machines such as pulleys and levers and their types.
- **General biology:** knowledge related to different body tissues, their structures and composition.
- **Anatomy of lower extremities:** knowledge related to anatomy of muscles and joints

- This course forms the basis of other physiotherapy core courses, like musculoskeletal physiotherapy I & II. Students will use knowledge and experience obtained through this course to inform their patient management process.

The course material will be uploaded on the e-learning website so make sure you have access to the website. Independent study is essential part of this course. You are required to read the selected chapters from the reference textbook and prepare some materials prior to the lecture.

Name of Course Coordinator: ----Sumayeh Abujaber------Signature: -------S.A-- Date: --------5/10/2024----
Head of Curriculum Committee/Department Dr. Mais Aldoghmi Signature: Mais Aldoghmi
Head of Department: Dr. Mais Aldoghmi Signature: - Mais Aldoghmi
Head of Curriculum Committee/Faculty: : Prof. Kamal Hadidi--- Signature: -KAH
Dean: : Prof. Kamal Hadidi--- Signature: -KAH
Reviewed by : Dr. Maha Tayseer