

MENG 5361 Biomechanics
Course Syllabus

Semester / Year	Fall 2026
Catalog Description	The purpose of the course is to introduce students to concepts of mechanics as they apply to human movement, particularly those pertaining to exercise, sport, and physical activity. The student should gain an understanding of the mechanical and anatomical principles that govern human motion and develop the ability to link the structure of the human body with its function from a mechanical perspective. Furthermore, this course introduces students to musculoskeletal biomechanics and the quantitative analysis of human movement. Students will learn how muscles act as mechanical actuators to produce movement. Students will also evaluate how muscles, bones, and joints work together as a mechanical system. A course project is required towards the end of the course.
Prerequisites	ENGR 2302
Section Number	050 (Tyler), 051 (HEC)
Instructor Name	Dr. Andrew Robbins
Contact Information	Office: RBN 3006 Email: arobbins@uttyler.edu
Lecture Class Type / Instruction Mode / Location	Section 050 Type: Hybrid Instruction Mode: Lecture Location: RBN 3038 Section 051 Type: Hybrid Instruction Mode: Lecture Location: HEC A217, ZOOM
Lecture Class Time	TR 5:00PM - 6:20PM
Office Hours	Wednesdays 8:30-10:00am, Thursdays 8:30-10:00am, In-person or ZOOM, additional times available by request
No. of Credits	3
Required Textbook	None

Optional References	1. Biomechanics of Movement By Thomas Uchida, Scott Delp. 2021 ISBN: 9780262044202 2. Research Methods in Biomechanics By D. Gordon E. Robertson, Graham E. Caldwell, Joseph Hamill, Gary Kamen, Saunders N. Whittlesey. 2013. ISBN:9780736093408, 0736093400.	
Additional Rules and Requirements	Since the mechanical engineering program is designed to prepare students for professional practice, all submitted work (e.g., homework, lab reports, projects, presentations) is expected to meet professional standards. Work that does not reflect professional quality may be subject to grade reductions, even if professionalism is not explicitly listed in the grading rubric. Students can use AI programs (ChatGPT, Copilot, etc.) in this course. If you utilize an AI tool to help create content for an assignment, you must acknowledge and cite the tool's contribution to your work.	
Evaluation Method	Quizzes and HW Exams Graduate Project	40 % 40 % 20%
Grading Policy / Scale	Letter grades, scale: A: 90 – 100; B: 80 – 89.9; C: 70 – 79.9; D: 60 – 69.9; F: < 60	
Important Events / Dates	Census date: September 8th Final Exam: Week of December 8th Last date to withdraw: October 30th, 2026 https://www.uttlyer.edu/academics/academic-calendar-26-27/	
Attendance / Makeup policy / other rules	Attendance is required. Only excused absences in accordance with university policy as written in the current catalog will be accepted. It is expected that you will coordinate anticipated excused absences 2 weeks in advance with your instructor, including a plan for makeup work. For unexpected excused absences, students are expected to provide documentation and coordinate makeup work within 2 business days of the end of the excused absence period. For more information refer to the university policy University of Texas at Tyler - Class Attendance/Excused Absences (smartcatalogiq.com)	
Course Learning Objectives / ABET & PEOs Relation	At the end of this course, students should be able to: 1. Model the mechanical behavior of bone, tendon, ligament, cartilage, and muscle tissues 2. Model the behavior of the knee, ankle, hip, spine and shoulder 3. Use quantitative motion analysis to study human motion	

Tentative Topics	See schedule below
University Policies	For comprehensive institutional guidelines, please visit: https://www.utt Tyler.edu/offices/academic-affairs/faculty-resources/syllabus-information/

Tentative Schedule

Week	Lecture	Unit	Lecture	
1	8-25	Intro	Intro	
	8-27		Basic anatomy of the musculoskeletal system	
2	9-1	Tissues	Bones (structure, function, and mechanical properties)	
	9-3		Ligaments, Tendons, and Cartilage (structure, function, and mechanical properties)	
3	9-8		Muscles (structure, function, and mechanical properties)	
	9-10			
4	9-15			
	9-17			
5	9-22	Joints	Knee	
	9-24			
6	9-29		Hip	
	10-1			
7	10-6		Foot and Ankle	
	10-8			
8	10-13		Shoulder	
	10-15			
9	10-20		Spine	
	10-22			
10	10-27	Motion	Walking	
	10-29			
11	11-3			Running
	11-5			
12	11-10			
	11-12			
13	11-17			
	11-19			
14	12-1	Measurements	Motion Capture	
	12-3			
15	TBD	Final exam week	FINAL EXAM	