FLORIDA ATLANTIC UNIVERSITY

NEW COURSE PROPOSAL
Undergraduate Programs

Department Biomedical Engineering

College COECS

*(To obtain a course number, contact **erudolph@fau.edu**)*

UUPC Approval 12-2-24
UFS Approval _____
SCNS Submittal _____
Confirmed _____
Banner Posted _____
Catalog _____

Prefix BME **Number** 4200	*(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)* **Lab Code**	**Type of Course** Lecture	**Course Title** Orthopedic Biomechanics
Credits *(See Definition of a Credit Hour)* 3	**Grading** *(Select One Option)* **Regular** ◉ **Sat/UnSat** ○	**Course Description** *(Syllabus must be attached; see Template and Guidelines)* This course explores the biomechanics of the skeletal structure, focusing on the mechanical behavior/response of major joints like such as the spine, shoulder, hand, hip, knee, ankle, feet, and head to external loads. It explores the application of engineering principles in the design and application of devices used in orthopedic solutions and surgical methods.	
Effective Date *(TERM & YEAR)* Fall, 2025			

Prerequisites, with minimum grade*	**Corequisites**	**Registration Controls** *(Major, College, Level)*
EGN3321 & BSC2085/L, with minimum grade "C".		BME, COECS, Senior

Default minimum passing grade is D-.** **Prereqs., Coreqs. & Reg. Controls are enforced for all sections of course

WAC/Gordon Rule Course

☐ **Yes** ☑ **No**

WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to proposal. See WAC Guidelines.

Intellectual Foundations Program (General Education) Requirement *(Select One Option)*

None

General Education criteria must be indicated in the syllabus and approval attached to the proposal. See Intellectual Foundations Guidelines.

Minimum qualifications to teach course

PhD in Science or Engineering

Faculty Contact/Email/Phone
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List/Attach comments from departments affected by new course

Approved by	***Date***
Department Chair: Javad Hashmei	11/7/2024
College Curriculum Chair: Galan Liu	11/21/2024
College Dean:	11/26/24
UUPC Chair: Korey Sorge	12-2-24
Undergraduate Studies Dean: Dan Meeroff	12-2-24
UFS President:	
Provost:	

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

Department of Computer & Electrical Engineering and Computer Science
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours	
Orthopedic Biomechanics BME 4200 Website: Canvas.fau.edu	# of credit hour: 3
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: • EGN3321 & BSC2085/L, with a minimum grade "C".	
3. Course logistics	
Term: Springs *Class location and time: TBD*	
4. Instructor contact information	
Instructor's name *Office address* *Office Hours* *Email address*	TBD TBD TBD TBD
5. TA contact information	
TA's name *Office address* *Office Hours* *Contact telephone number* *Email address*	NA
6. Course description	
This course explores the biomechanics of the skeletal structure, focusing on the mechanical behavior/response of major joints like such as the spine, shoulder, hand, hip, knee, ankle, feet, and head to external loads. It explores the application of engineering principles in the design and application of devices used in orthopedic solutions and surgical methods.	
7. Course objectives/student learning outcomes/program outcomes	
Course objectives	• To deepen understanding of the biomechanics of key joints, including their anatomical structures and functional dynamics. • To analyze the mechanical behavior of orthopedic structures under various conditions.

	• To familiarize students with contemporary surgical techniques used for each joint. • To develop proficiency in 3D modeling, printing, and fabrication technologies as applied to orthopedic biomechanics. • To synthesize biomechanical theory with practical, real-world fabrication techniques.
	Upon successful completion of this course, students will be able to: • Demonstrate a thorough understanding of the biomechanics of major joints and orthopedic regions. • Apply principles of mechanics to evaluate the structural integrity and function of orthopedic joints. • Utilize diagnostic imaging tools, such as CT scans, for 3D modeling of orthopedic structures. • Design, fabricate, and evaluate models of orthopedic joints using 3D printing technologies. • Critically assess the biomechanical outcomes of various surgical interventions.

8. Course evaluation method

- Midterm Exam: 20%
- Final Exam: 30%
- Laboratory Reports: 20%
- Final Project: 30%

9. Course grading scale

90 and above: "A", 87-89: "A-", 83-86: "B+", 80-82: "B", 77-79 : "B-", 73-76: "C+", 70-72: "C", 67-69: "C-", 63-66: "D+", 60-62: "D", 51-59: "D-", 50 and below: "F."

10. Policy on makeup tests, late work, and incompletes

Students must turn in homework on time. Students will lose 25% (after 1 day) and 50% of marks (after 2 days) if they turn in late. Submissions are not accepted after 3rd day of due date.
Students are strongly suggested to inform the instructor in advance in the case of emergency (if possible) for exam attendance. Makeup exams are given only if there is solid evidence of a medical or otherwise serious emergency that prevents the student of participating in the exam.

11. Special course requirements

NA

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

13. Attendance policy statement

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance.
Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.
Special note: *"After two full weeks of face to face instruction with consecutive 'no show' of any students in person in the classroom, the modality of this course section may be changed to remote instruction only at the discretion of the university."*

14. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

15. Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of

services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

16. Code of Academic Integrity policy statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001. If your college has particular policies relating to cheating and plagiarism, state so here or provide a link to the full policy—but be sure the college policy does not conflict with the University Regulation.

17. Required texts/reading

To reduce costs for our students, we strongly encourage you to explore the adoption of open educational resources (OER), textbooks and other materials that are freely accessible. We also encourage you to clearly state in the syllabus if course materials are available on reserve in the Library.

1) *Basic Biomechanics of the Musculoskeletal System* by Margareta Nordin and Victor H. Frankel.
2) *Orthopaedic Biomechanics: Mechanics and Design in Musculoskeletal Systems* by Donald Bartel, Dwight Davy, and Tony Keaveny.

18. Supplementary/recommended readings

Lecture notes.

19. Course topical outline, including dates for exams/quizzes, papers, completion of reading

- **Weeks 1-2**: Overview of Orthopedic Biomechanics; Spine Biomechanics.
- **Weeks 3-4**: Mechanical Analysis of the Spine; Surgical Techniques and Biomechanical Implications.
- **Weeks 5-6**: Biomechanics of the Shoulder; Functional Dynamics and Common Injuries.
- **Weeks 7-8**: 3D Modeling and Fabrication Techniques for Shoulder Applications.
- **Weeks 9-10**: Biomechanics of the Hand and Wrist; Anatomical Considerations and Mechanical Analysis.
- **Weeks 11-12**: Surgical Techniques for Hand and Wrist; 3D Printing Applications.
- **Weeks 13-14**: Hip Joint/ Knee/ Ankle Mechanics; Analyzing Hip Joint Function and Pathologies.