

## **HHD 1044: Biomechanics Spring 2025**

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### **Course Objectives**

After completion of the course, students should be able to describe the general concepts of biomechanics studied in the course, qualitatively and quantitatively analyze the forces and moments at a skeletal joint for various static and dynamic human activities, state and use the concepts of balance and stability in describing human motion, and evaluate the safety of movements and activities.

### **Course Description**

Biomechanics is an undergraduate course designed for Health and Human Development students that introduces the concepts of Statics and Dynamics applied to the body for human activities and the musculoskeletal system. The course is meant to provide an introductory background in biomechanical concepts and principles for students preparing for careers in medically related fields or industrial positions in rehabilitation, sports and exercise fields, and for those planning to attend graduate school in a related field. The course will allow students to develop proficiency in the diagnosis of motor performance errors and places emphasis on applications of biomechanics.

Course topics will include analysis of static forces in human musculoskeletal systems; linear and angular statics and dynamics of human movement; energy and power in human activity; application of stress and strain analysis to biological tissue; biomechanical applications for human performance. Please refer to the syllabus specific to each section for details regarding that portion of the course.

### **Class Meeting Times**

Monday, Wednesday    11:00 – 12:15 AM

OR

Monday, Wednesday    1:00 – 2:15 PM

## Course Materials

### Recommended Text:

Basic Biomechanics, Eighth Edition. McGraw Hill, Boston, MA., Hall, Susan J.

### Other texts:

Basic Biomechanics of the Musculoskeletal System; Nordin & Frankel

Biomechanics of Sport & Exercise; McGinnis

Clinical Mechanics & Kinesiology; Loudon, Manske & Reiman

Fundamentals Biomechanics of Sport & Exercise; Watkins

## Course Requirements and Grading

Homework is due at the date and time designated on the assignment. HOMEWORK WILL BE SUBMITTED ONLINE. Homework received after the due date will receive a 50% reduction in possible total score. Anyone unable to attend lecture when a homework assignment is due should make arrangements to turn in your homework before it is due. Late homework will only be accepted up to 1 week after original due date, unless instructor approval is provided. Assignments will be based on current class topics.

There will be quizzes. The primary purpose of quizzes is to allow the student and instructor to get feedback about comprehension of the material. Anyone missing a quiz will receive a zero score for the quiz. Quizzes can be made-up under the following conditions for absences that are considered excusable:

Medical Emergency or Sickness – Must have a note from medical doctor documenting medical visit (must correspond with and list dates of absence) and instructor must be notified before quiz.

Mandatory Academic Event – Must have a note from advisor/professor documenting attendance (must correspond with and list dates of absence) and instructor must be notified before quiz.

Personal or Family Emergency – Must communicate with Dr. Chambers prior to missing class so it can be determined if this is a reasonable reason for missing and alternative arrangements can be made immediately.

Exam dates are provided in the detailed schedule and available from the course webpage. Anyone missing the exam without informing the instructor of a conflict **at least one week prior to the exam** will receive a zero score for the exam. By contacting the instructor in advance, arrangements can be made for an alternate exam day and/or time. A student is only permitted to make up one exam during the semester. If a student misses more than one exam, they will receive a zero for the subsequent missed exams.

The instructor reserves the right to alter the grade assignment algorithm in a systematic manner.

<b>Quizzes</b>	5%
<b>Exams</b>	50%
<b>Assignments</b>	30%
<b>Final Project</b>	15%

Grading scale will be subject to curve if deemed necessary by instructor. Additional details will be available on canvas.

### **No Use of Generative AI Permitted**

Intellectual integrity is vital to an academic community and for my fair evaluation of your work. All work completed and/or submitted in this course must be your own, completed in accordance with the University's Guidelines on Academic Integrity. You may not engage in unauthorized collaboration or make use of ChatGPT or any other generative AI applications at any time.

### **Course Policies**

#### **Communication**

Email is the best form of communication. The subject line should read:

HHD1044\_11\_YOUR LAST NAME

HHD1044\_1\_YOUR LAST NAME

#### **Class Attendance**

**Class attendance** is expected and **strongly encouraged**.

Note that because of the broad multidisciplinary nature of the course, material presented in class may not be covered in the readings. Also note that there may be materials presented in the class, which may not be in canvas. Homeworks and exams will be prepared from the in class work as well as readings. The student is responsible to know all the material presented, whether from the readings or from class.

If a student misses a class, it is the student's responsibility, not the professor's, to obtain the material which was discussed in class. If you miss a class, please get the notes from a classmate. A significant portion of the class material is not written in lecture slides. I do not provide full notes for my lecture slides to students who miss class because they would still be missing much of the material. My notes would not provide all of the course material.

#### **Inclement Weather**

Inclement weather may lead to a cancellation of class. If the University decides to close, cancel, or delay classes, an announcement is posted immediately on various websites,

including [www.pitt.edu](http://www.pitt.edu). In cases where the University does not close and the weather is questionable, the instructor will send you an email notice or post an announcement on canvas if class is cancelled. If no such email or announcement is made, then class will continue as normal. Any work due on the day of the cancelled class will be due on the next scheduled class or as otherwise directed by the instructor. Any student absent due to bad weather while class is still in session must notify the instructor prior to class. Students are responsible for getting cancellation information. In all emergency situations, however, we rely on individuals to make the best decision for themselves about their safety.

## **University Policies**

### **Academic Integrity**

Students in this course will be expected to comply with the University of Pittsburgh's Policy on Academic Integrity. Any student suspected of violating this obligation for any reason during the semester will be required to participate in the procedural process, initiated at the instructor level, as outlined in the University Guidelines on Academic Integrity. This may include, but is not limited to, the confiscation of the examination of any individual suspected of violating University Policy. Furthermore, no student may bring any unauthorized materials to an exam, including dictionaries and programmable calculators.

To learn more about Academic Integrity, visit the Academic Integrity Guide for an overview of the topic. For hands-on practice, complete the Academic Integrity Modules.

### **Disability Services**

If you have a disability for which you are or may be requesting an accommodation, you are encouraged to contact both your instructor and Disability Resources and Services (DRS), 140 William Pitt Union, (412) 648-7890, [drsrecep@pitt.edu](mailto:drsrecep@pitt.edu), (412) 228-5347 for P3 ASL users, as early as possible in the term. DRS will verify your disability and determine reasonable accommodations for this course.

### **Accessibility**

The Canvas LMS platform was built using the most modern HTML and CSS technologies, and is committed to W3C's Web Accessibility Initiative and Section 508 guidelines. Specific details regarding individual feature compliance are documented and updated regularly.

### **Classes Meeting During University-wide Closure**

As articulated in the University-wide Closure and Class Cancellation Policy, it is the policy of the University of Pittsburgh to remain open, but in rare instances, circumstances beyond the University's control may necessitate a closure of the University. Such circumstances may include severe weather, power outage, water main issues, and the like.

If feasible during a closure, I intend for our class to meet remotely at its regularly scheduled time. Please see canvas for details. Refer to our class attendance policy if you are unable to attend.

### **Student Opinion of Teaching Surveys**

Students in this class will be asked to complete a Student Opinion of Teaching Survey. Surveys will be sent via Pitt email and appear on your Canvas landing page during the last three weeks of class meeting days. Your responses are anonymous. Please take time to thoughtfully respond, your feedback is important to me. Read more about Student Opinion of Teaching Surveys.

### **Copyright Notice**

These materials may be protected by copyright. United States copyright law, 17 USC section 101, et seq., in addition to University policy and procedures, prohibit unauthorized duplication or retransmission of course materials. See Library of Congress Copyright Office and the University Copyright Policy.

### **Statement on Classroom Recording**

To ensure the free and open discussion of ideas, students may not record classroom lectures, discussion and/or activities without the advance written permission of the instructor, and any such recording properly approved in advance can be used solely for the student's own private use.

### **Equity, Diversity, and Inclusion**

The University of Pittsburgh does not tolerate any form of discrimination, harassment, or retaliation based on disability, race, color, religion, national origin, ancestry, genetic information, marital status, familial status, sex, age, sexual orientation, veteran status or gender identity or other factors as stated in the University's Title IX policy. The University is committed to taking prompt action to end a hostile environment that interferes with the University's mission. For more information about policies, procedures, and practices, visit the Civil Rights & Title IX Compliance web page.

I ask that everyone in the class strive to help ensure that other members of this class can learn in a supportive and respectful environment. If there are instances of the aforementioned issues, please contact the Title IX Coordinator, by calling 412-648-7860, or e-mailing [titleixcoordinator@pitt.edu](mailto:titleixcoordinator@pitt.edu). Reports can also be filed online. You may also choose to report this to a faculty/staff member; they are required to communicate this to the University's Office of Diversity and Inclusion. If you wish to maintain complete confidentiality, you may also contact the University Counseling Center (412-648-7930).

### **Gender Inclusive Language Statement**

Language is gender-inclusive and non-sexist when we use words that affirm and respect how people describe, express, and experience their gender. Just as sexist language excludes women's experiences, non-gender-inclusive language excludes the experiences of individuals whose identities may not fit the gender binary, and/or who may not identify with the sex they were assigned at birth. Identities including trans, intersex, and genderqueer reflect personal descriptions, expressions, and experiences. Gender-inclusive/non-sexist language acknowledges people of any gender (for example, first year student versus freshman, chair versus chairman, humankind versus mankind, etc.). It also affirms non-binary gender identifications, and recognizes the difference between biological sex and gender expression. Students, faculty, and staff

may share their preferred pronouns and names, and these gender identities and gender expressions should be honored.

### **Religious Observances**

The observance of religious holidays (activities observed by a religious group of which a student is a member) and cultural practices are an important reflection of diversity. As your instructor, I am committed to providing equivalent educational opportunities to students of all belief systems. At the beginning of the semester, you should review the course requirements to identify foreseeable conflicts with assignments, exams, or other required attendance. If at all possible, please contact me (your course coordinator/s) within the first two weeks of the first class meeting to allow time for us to discuss and make fair and reasonable adjustments to the schedule and/or tasks.

### **Sexual Misconduct, Required Reporting, and Title IX**

If you are experiencing sexual assault, sexual harassment, domestic violence, and stalking, please report it to me and I will connect you to University resources to support you. University faculty and staff members are required to report all instances of sexual misconduct, including harassment and sexual violence to the Office of Civil Rights and Title IX. When a report is made, individuals can expect to be contacted by the Title IX Office with information about support resources and options related to safety, accommodations, process, and policy. I encourage you to use the services and resources that may be most helpful to you.

As your professor, I am required to report any incidents of sexual misconduct that are directly reported to me. You can also report directly to Office of Civil Rights and Title IX: 412-648-7860 (M-F; 8:30am-5:00pm) or via the Pitt Concern Connection at: Make A Report

An important exception to the reporting requirement exists for academic work. Disclosures about sexual misconduct that are shared as a relevant part of an academic project, classroom discussion, or course assignment, are not required to be disclosed to the University's Title IX office.

If you wish to make a confidential report, Pitt encourages you to reach out to these resources:

The University Counseling Center: 412-648-7930 (8:30 A.M. TO 5 P.M. M-F) and 412-648-7856 (AFTER BUSINESS HOURS)

Pittsburgh Action Against Rape (community resource): 1-866-363-7273 (24/7)

If you have an immediate safety concern, please contact the University of Pittsburgh Police, 412-624-2121

Any form of sexual harassment or violence will not be excused or tolerated at the University of Pittsburgh.

### **Email Communication**

Each student is issued a University e-mail address (username@pitt.edu) upon admittance. This e-mail address may be used by the University for official

communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail address.

### **Take Care of Yourself**

College/Graduate school can be an exciting and challenging time for students. Taking time to maintain your well-being and seek appropriate support can help you achieve your goals and lead a fulfilling life. It can be helpful to remember that we all benefit from assistance and guidance at times, and there are many resources available to support your well-being while you are at Pitt. You are encouraged to visit Thrive@Pitt to learn more about well-being and the many campus resources available to help you thrive.

If you or anyone you know experiences overwhelming academic stress, persistent difficult feelings and/or challenging life events, you are strongly encouraged to seek support. In addition to reaching out to friends and loved ones, consider connecting with a faculty member you trust for assistance connecting to helpful resources.

The University Counseling Center is also here for you. You can call 412-648-7930 at any time to connect with a clinician. If you or someone you know is feeling suicidal, please call the University Counseling Center at any time at 412-648-7930. You can also contact Resolve Crisis Network at 888-796-8226. If the situation is life threatening, call Pitt Police at 412-624-2121 or dial 911.

### Schedule for HHD 1044: Biomechanics

University of Pittsburgh

\*Subject to change\*

Date	Topic	Date	Topic
		1-8	What is Biomechanics & Math Review
1-13	Kinematics	1-15	Kinetics
1-20	NO CLASS	1-22	Lab – Biomechanics Tools
1-27	Equilibrium	1-29	Center of Gravity & Anthropometry
2-3	Lab – Center of Gravity	2-5	Balance & Stability
2-10	Exam 1	2-12	Bone Biomechanics
2-17	NO CLASS	2-19	Muscle Biomechanics
2-24	Lab – Muscle Strength & Moment Arms	2-26	Back Biomechanics
3-3	NO CLASS	3-5	NO CLASS
3-10	Lab – Lifting Biomechanics	3-12	Exam 2
3-17	Lower Extremity Biomechanics	3-19	Locomotion
3-24	Lab – Gait vs. Running	3-26	Upper Extremity Biomechanics
3-31	Rehabilitation Biomechanics	4-2	Lab – Exercise Biomechanics
4-7	Exam 3	4-9	<i>Project Collection</i>
4-14	<i>Project Collection</i>	4-16	<i>Project Presentations</i>
4-21	<i>Project Presentations</i>	4-23	NO CLASS
4-28	<i>Finals Week</i>	4-30	<i>Finals Week</i>