

## **HPA 1044: Biomechanics Spring 2022**

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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 Physical Activity 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    10:00 – 11:15 AM

OR

Tuesday, Thursday    1:15 – 2:30 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%

General grading scale, subject to curve if deemed necessary by instructor is as follows:

90-100% A- thru A+  
80-89.9% B- thru B+  
70-79.9% C- thru C+  
60-69.9% D- thru D+  
<60% F

## **Course Policies**

### **Communication**

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

HPA 1044\_10\_ *YOUR LAST NAME*

HPA 1044\_115\_ *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 the 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 will 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 courseweb 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.

### **Calculator**

You will be required to use a calculator that has trigonometric functions on it. Specifically, you will need to use the sine, cosine, tangent, and square root functions on it. Cell phone calculators will not be permitted. Graphing calculators will be required to clear the memory prior to each exam. You will have to demonstrate to Dr. Chambers or her assistants that the memory on your calculator has been cleared.

### **Department of Health and Physical Activity Grievance Procedure**

If a student feels that they have been treated unfairly by the instructor with regard to their grade or other aspects of their course participation, there are a series of steps that should be taken in an attempt to resolve this matter. These include the following:

1. The student should first inform the instructor of the course of the issue in an attempt to resolve this matter. If the course is taught by a Teaching Assistant, Graduate Student, or Part-Time instructor, their faculty supervisor should also be informed of this matter. The student should bring this issue to the attention of the instructor in a timely matter and should maintain a record of interactions that occurred with the instructor regarding the matter in question. The course instructor should take necessary steps to address the concern raised by the student in a timely matter and should maintain a record of the interactions that occurred with the student regarding this matter.
2. If, after reasonable attempts to resolve the matter, the matter is not resolved in a manner that is deemed to be acceptable to the student, the student retains the right to file a grievance. This grievance is to be filed with the Department Chair in the form of a written document that can be submitted via email or campus mail. This document should include the following: a. Student's name b. Student contact information (email, address, telephone number) c. Information on the course for which the grievance applies (course title, course number, instructor name). d. A copy of the course syllabus that was provided to the student by the instructor e. Detailed description of the grievance and additional information the student feels is pertinent to this matter.

After receiving this information the Department Chair will inform the student if additional information is needed, as appropriate will discuss this matter with the student and the instructor, and will issue a decision in a timely manner.

3. If the student is not willing to accept the decision of the Department Chair, the student will be informed that they can request an additional review of this matter through the Office of the Dean of the School of Education. If the student decides to pursue this, the student should contact the Associate Dean for Student Affairs & Certification in the School of Education at the University of Pittsburgh.

## **University Policies**

### **Academic Integrity**

All students are expected to adhere to the standards of academic honesty. Any student engaged in cheating, plagiarism, or other acts of academic dishonesty would be subject to disciplinary action. 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 Understanding and Avoiding Plagiarism tutorial.

### **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.

### **Health and Safety Statement**

In the midst of this pandemic, it is extremely important that you abide by public health regulations and University of Pittsburgh health standards and guidelines. While in class, at a minimum this means that you must wear a face covering and comply with physical distancing requirements; other requirements may be added by the University during the semester. These rules have been developed to protect the health and safety of all community members. Failure to comply with these requirements will result in you not being permitted to attend class in person and could result in a Student Conduct violation. For the most up-to-date information and guidance, please visit [coronavirus.pitt.edu](http://coronavirus.pitt.edu) and check your Pitt email for updates before each class.

### **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.

### **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.

### **Diversity and Inclusion**

This instructor maintains an inclusive classroom. 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, see:

<https://www.diversity.pitt.edu/civilrights-title-ix-compliance/policies-procedures-and-practices>.

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: <https://www.diversity.pitt.edu/make-report/report-form>. 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.

### **Take Care of Yourself**

Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep, and taking time to relax. Despite what you might hear, using your time to take care of yourself will actually help you achieve your academic goals more than spending too much time studying. All of us benefit from support and guidance during times of struggle. There are many helpful resources available at Pitt. An important part of the college experience is learning how to ask for help. Take the time to learn about all that's available and take advantage of it. Ask for support sooner rather than later – this always helps. If you or anyone you know experiences any academic stress, difficult life events, or difficult feelings like anxiety or depression, we strongly encourage you to seek support. Consider reaching out to a friend, faculty or family member you trust for assistance connecting to the support that can help. The University Counseling Center is here for you: call 412-648-7930 and visit their website. If you or someone you know is feeling suicidal, call someone immediately, day or night: University Counseling Center (UCC): 412 648-7930 University Counseling Center Mental Health Crisis Response: 412-648-7930 x1 Resolve Crisis Network: 888-796-8226 (888-7-YOU-CAN) If the situation is life threatening, call the Police: On-campus: Pitt Police: 412-268-2121 Off-campus: 911

## **ONLINE & HYBRID LEARNING – ONLY IF NECESSARY**

**Dr. Chambers will inform students if this mode of learning becomes necessary.**

This semester may involve a number of new and unfamiliar practices. The number of students in the classroom may be limited, class start times may be shifted, and masks will be required if in person. In addition, some or all students may not be present in the physical classroom. Those students who participate from a remote location will need to put forth extra effort to engage in the course, communicate/interact with their instructors and classmates, and participate in course activities. Above all, students should try to be as flexible and adaptive as possible as the semester progresses. This course may involve asynchronous and synchronous learning delivered through Canvas, Panopto, and ZOOM. We will incorporate active synchronous learning and anatomical software. In order to allow for flexibility in these difficult times, assignments will typically be due in modules that align with each exam instead of weekly. Students will be given a time frame in which to complete assignments, quizzes or exams. Subject materials have been broken down into smaller portions and content will be also be delivered through McGraw Hill Connect when applicable. As the University climate changes, how course materials will be delivered may change. All updates to course materials and information will be provided through Canvas. If you are having any difficulties completing this course (technology, personal, health, etc) please do not wait to contact Dr. Chambers. Communication is the key to this semester and Dr. Chambers will work with you if you maintain contact.

### **Student Responsibilities**

**Attendance:** While an online course may not have a fixed weekly meeting time, consistent attendance is still expected. The following actions on your part will demonstrate attendance:

1. Logging into the Canvas course environment and participating in all activities including the introductory activities.
2. Frequently and regularly accessing course instructional materials and assignments (assignments, discussion forums and projects) posted on the Canvas course environment during the entire semester.
3. Read and respond to the course e-mails.
4. Read course announcements.

**Participation:** Students will actively engage and participate in the online Canvas course environment. Active participation consists of the following actions and activities:

1. Setup and access connect account and required course software by the second week of class.
2. Engage actively in the online course by reading, reviewing and watching pertinent instructional materials provided in the Canvas course environment throughout the semester.
3. Read all assignments, discussion forums and project guidelines thoroughly.
4. Submit all assignments electronically by the due dates and times as specified in the guidelines provided.
5. All assessments such as quizzes and exams will be delivered online. All assignments will be listed on the Syllabus page and included in specific Modules.
6. Participate in discussion forums by creating threads and posting comments by the due dates and times as specified in the guidelines provided.



7. Your contributions to the discussions (posts and responses) should be complete and free of grammatical or structural errors.
8. All written assignments must follow APA format. A link to a Library Guide is provided on the course menu on the left which includes guides on APA.
9. Complete all assignments and projects by the due date and time specified.

**Missing Coursework:** Any missed coursework will receive a grade of zero if an appropriate documented excuse is not provided. This includes all graded activities and tasks. Students **MUST** notify the instructor in case of a non-life threatening emergency as soon as possible. It is your professional obligation to notify the instructor of any such emergency within a reasonable time period. A doctor's written verification of illness **MUST** be provided to the instructor before any make-up work will be accepted and/or rescheduled. For a non-medical emergency, securing documentation to support your explanation will increase the likelihood of being allowed the opportunity for make-up work. A doctor's note or other documentation will be accepted at the discretion of the instructor. If make-up work is granted, the instructor may alter the contents of such assignments or tests to minimize potential issues of academic integrity. The time lines for submitting make-up work will be determined by the instructor on a case-by-case basis.

### **Instructor Obligations to Students**

Just as I have expectations for your conduct and behavior in the course, you have expectations from me as your instructor. I will ensure that I maintain an active role in the course. I will log into the course daily and I will respond to any queries/concerns posted in the student lounge. I will ensure that I participate in the discussion forums periodically. As students, you are expected to engage and interact with your peers consistently and extensively in the discussion forums. I will also provide timely feedback to you on submitted assignments and projects. You are also encouraged to communicate privately with the instructor using email or the Send Email tool in Canvas, You should expect a response from me within 36 hours of receiving your e-mails and course messages. I will be logging in and checking the course on a daily basis. Please note that I will typically be more available to address queries and respond to discussion forum comments in the evenings.

I also understand that some of you may wish to work ahead but please be aware that I will not grade assignments ahead of schedule.

### **Netiquette**

An online course requires the same level of professionalism, respect, and courtesy that you would show your instructor and classmates in a face-to-face setting. To that end, please observe the following standards in the online class:

- A. Discussion forums: The purpose of discussion forums in an academic setting is to advance the understanding of a given topic. Therefore, your threads and posts should:
  - be substantive (more than a few words), constructive, and on-topic;
  - advance the discussion in a meaningful way;
  - demonstrate professional courtesy;
  - use correct grammar and punctuation (no acronyms commonly used in texting).

B. Electronic communication: You should avoid casual language and abbreviations commonly used in texting, which are not appropriate for in-class communication. Care should be taken to use correct grammar and punctuation.

C. Websites: You should use care when sharing websites in your posts by ensuring that the website is appropriate for an academic setting, non-offensive in nature, and relevant to the topic at hand.

## **Zoom**

- Do not share your Zoom classroom link or password with others.
- Be early. You will wait to be admitted into the meeting. At the scheduled class time, the instructor will begin the meeting.
- Come prepared and participate.
- Setup in as professional a space as possible and stay seated. Find a quiet place, free of distractions.
- Use only your full (and real) name. Just as during regular learning, we want to honor the dignity and importance of our own and each other's names. Do not change your Zoom ID or Google profile name to a nickname or anything other than the name your instructors call you by in your classes.
- Please note that all lectures in this course are recorded to asynchronous access. If you do not wish to be recorded during a session, please refrain from using your camera or audio.
- Mute your microphone unless you are called upon to speak.
- Click the raise hand button or raise your hand if you have a question or want to contribute.
- Dress for success. Just like in person learning, casual clothing is OK, but no PJ's or clothing that would otherwise distract from the seriousness of the meetings.
- No Side "Conversations". Please do not privately text, chat, or engage in other electronic communication during Zoom meetings.
- Do Not Record the Meetings. Though you may want to preserve a meeting for later use, in some states this would be illegal. Please do not record any Zoom meeting using your computer or another recording device.

### Schedule for HPA 1044: Biomechanics

University of Pittsburgh

\*Subject to change\*

<b>Date</b>	<b>Topic</b>	<b>Date</b>	<b>Topic</b>
1-10	What is Biomechanics & Math Review	1-12	Kinematics
1-17	NO CLASS	1-19	Kinetics
1-24	Lab – Biomechanics Tools	1-26	Equilibrium
1-31	Center of Gravity & Anthropometry	2-2	Lab – Center of Gravity
2-7	Balance & Stability	2-9	Exam 1
2-14	Bone Biomechanics	2-16	Muscle Biomechanics
2-21	Lab – Muscle Strength & Moment Arms	2-23	Back Biomechanics & Ergonomics
2-28	Lab – Lifting Biomechanics	3-2	Exam 2
3-7	NO CLASS	3-9	NO CLASS
3-14	Lower Extremity Biomechanics	3-16	Locomotion
3-21	Lab – Gait vs. Running	3-23	Upper Extremity Biomechanics
3-28	Lab – Exercise Biomechanics	3-30	Rehabilitation Biomechanics
4-4	Exam 3	4-6	<i>Project Collection</i>
4-11	<i>Project Collection</i>	4-13	<i>Project Collection</i>
4-18	<i>Project Presentations</i>	4-20	<i>Project Presentations</i>
4-25	<i>Finals Week</i>	4-27	<i>Finals Week</i>