

University of Florida
College of Health and Human Performance
Department of Applied Physiology and Kinesiology
Course Syllabus

APK 3220C Biomechanical Basis of Movement
Section #10819 (3 credits), Fall 2018

Instructor: K. Shin Park, PhD Graduated
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Email: parkks5@ufl.edu
Meeting Time(s): T Period 5-6 (11:45am – 1:40pm)
H Period 6 (12:50pm – 1:40pm)
Meeting Place: FLG 230
Office Hours: T, R 1:55-2:55 (or by appointment, as much as you request)

COURSE DESCRIPTION

Course Overview:

Students will explore the biomechanical basis of movement through the application of basic engineering principles related to human motor performance and skills. Basic college mathematics and physics knowledge will be utilized in order to more carefully analyze various human motor behaviors in a quantifiable fashion. While primarily a lecture-based course, experimental procedures and sport research techniques will be presented to facilitate lecture material.

Student Learning Outcomes:

At the end of this course, students will be able to demonstrate mastery of the following outcomes:

- 1) Understand and describe the impact of biomechanics research on daily life.
- 2) Understand the mathematical relationship between position, velocity and acceleration and utilize these measures to quantify movement.
- 4) Understand and apply the equations of uniformly accelerated motion.
- 5) Understand Newton's laws and apply these laws in the calculation and analysis of the forces that cause motion.
- 6) Understand how the body's center of gravity location is computed and how the location informs movement capabilities.
- 7) Understand and apply appropriate mathematical techniques to calculate torque for basic lever systems.
- 8) Understand how fluid forces influence human motion in water
- 9) Understand and describe the effects of aging, injury, exercise, and rehabilitation on mechanical properties and their influence on movement quality.
- 10) Understand and explain the properties of bones, tendons, ligaments, and cartilage.
- 11) Explain the mechanical construction and movements of the body's joints with emphasis on torque production, stability, and flexibility.
- 12) Understand the biomechanical basis for exercise and sport technique and health related applications.

Prerequisite Knowledge and Skills:

APK 2100C and MAC 1140 with minimum grades of C; PHY 2048 or PHY 2053 with minimum grade of C; Understanding of Physics 1 concepts will be very helpful in this course.

Required Items:

Textbook: Hall, Susan J. Basic Biomechanics. Boston, MA: McGraw-Hill.

Instruments: Pencil, paper, scientific calculator, Laptop, Phone, or Tablet

COURSE EVALUATION

Grading:

	% of Grade	Grades
Exam 1	20%	90 – 100% = A
Exam 2	20%	87 – 89.99% = B+
Exam 3	20%	80 – 86.99% = B
Homework	30%	77 – 79.99% = C+
Participation	10%	70 – 76.99% = C
Total	100%	67 – 69.99% = D+
		60 – 66.99% = D
		<60% = E

There is no minus grade in this course. Grades will not be rounded. Information on current UF grading policies: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx> **Any requests for additional extra credit or special exceptions to the grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.**

Exams (60%):

There will be three semester exams (which are not explicitly comprehensive). However, the course material builds on itself. The exams will evaluate conceptual knowledge, critical thinking, and biomechanical quantitative analysis skills. The exams will be primarily multiple choice and problem solving. A scientific calculator will be needed for trig functions in the exams. Exam grade inquiries must be made in writing within one week after the exams are handed back. Inquiries subject your exam to complete reevaluation, which could result in an increase or decrease in your exam grade. Unexcused missed exams will result in a zero point (this includes contacting the instructor after the assessment if you are ill). See make-up exam policy for more information.

Assignments (30%):

There will be a total of 6 homework assignments. The lowest grade will be excluded, then each of five assignment is 6% of your total grade. These assignments will be announced through Canvas and due by the start of class on the due date listed. The assignments are intended to encourage readings and reviews of lecture materials. The homework questions are in any of the following formats: problem-solving, multiple choice, fill in the blank, short answer, or essay. Inquiries concerning homework grades must be made in writing within one week after the lecture day that grades are handed back. Inquiries will subject your homework to complete re-evaluation, which could result in an increase or decrease in your grade.

Participation (10%):

You are expected to participate in class by commenting in discussions and asking questions during lectures and presentations. I will record responses at random, and this will involve both you volunteering to answer/discuss questions and I will also call on you for answers or comments. Occasionally, pop quiz will be used to rate participation. I will grade each of your responses similar to the rubric described below. The total sum of your responses will then be used in your final participation grade, which will be out of 10 points. You may acquire these points in any combination as described below.

Grade	Criteria
0	Absent
1 - 2	Present, but disruptive.
3 - 4	Present, not disruptive. Tries to respond when called on but does not offer much. Demonstrates very infrequent involvement in discussion.
5 - 6	Demonstrates adequate preparation: knows basic or reading facts, but does not show evidence of trying to interpret or analyze them. Offers straightforward information (e.g., straight from the reading), without elaboration. Does not offer to contribute to discussion but contributes to a moderate degree when called on. Demonstrates sporadic involvement.
7 - 9	Demonstrates good preparation: knows reading facts well, has thought through implications of them. Offers interpretations and analysis of material (more than just facts) to class. Contributes well to discussion in an ongoing way: responds to other students' points, thinks through own points, questions others in a constructive way, offers and supports suggestions that may be counter to the majority opinion. Demonstrates consistent ongoing involvement.
10	Demonstrates excellent preparation: has analyzed topic exceptionally well, relating it to readings and other material (e.g., readings, course material, discussions, experiences, etc.). Offers analysis, synthesis, and evaluation of material, e.g., puts together pieces of the discussion to develop new approaches that take the class further. Contributes in a very significant way to ongoing discussion: keeps analysis focused, responds very thoughtfully to other students' comments, contributes to the cooperative argument-building, suggests alternative ways of approaching material and helps class analyze which approaches are appropriate, etc.

Extra Credit (2%): Two percent of extra credit may be earned by participating in a biomechanical research study and by submitting a two-page typed critique of a research article dealing with a biomechanical topic (1% for each). This 2% will be added onto your final class grade (i.e., if you attained a 78% for the class, with the addition of the extra credit you would receive a final class grade of 80%). The topic of the article must be preapproved by the instructor and the critique shall include both a very basic summary of the article and, more importantly, your impression and response to the article. Further instructions as far as formatting and expectations will be given upon your submittal of a topic for preapproval.

Pubmed.org is a great resource for finding and reading research articles. You should have access to a large majority of the articles posted on pubmed as long as you're accessing the internet in a UF library, at most places on campus, or using remote access via the Gatorlink VPN Client (<http://www.uflib.ufl.edu/login/vpn.html>).

Opportunities to participate in a biomechanical research study will be announced in lecture later on in the semester. No announcements of this type will be sent through email nor posted online – come to class!

* You must earn your grade! Grades will not be rounded! The extra credit assignment is designed to help any individual with a borderline grade.

* Notification of final grades will be made by the Registrar or you may check your grade by using CANVAS. Final grades will not be posted.

COURSE POLICY

Academic Honesty:

Cheating will not be tolerated in this course. All students are required to abide by the Academic Honesty Guidelines and Honor Code, which have been accepted by the University. Cheating is defined as the improper taking or tendering of any information or material, which shall be used to determine academic credit. Violations of the Honor Code will be handled according to the guidelines set by Student Judicial Affairs. UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code.” On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with me.

Make-up Exam Policy:

Unexcused missed exams will result in a zero point (this includes contacting the instructor after the assessment if you are ill). Make-up exams will be given at the discretion of the instructor. To schedule a make-up assessment, please fill out the make-up exam request form posted in CANVAS and submit it to your course instructor as soon as possible. Make-up exams will be given at the discretion of the instructor. Documentation will be required. You are absolutely not permitted a make-up exam for personal travel/vacations, so please make your travel arrangements accordingly. If you have a serious emergency or life event, please contact the Dean of Students Office (www.dso.ufl.edu) and they will contact your instructor so that you do not have to provide documentation of the emergency/death in order to get a make-up exam. Requirements for class attendance and make-up exams, assignments, and other work are consistent with the university policies that can be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Personal Conduct Policy:

Students are expected to exhibit behaviors that reflect highly upon themselves, our Department and our University. Specific instructions are as follows:

- Read and refer to the syllabus.
- Arrive to lecture on time (a few minutes early).

- Show respect to your classmates and the course instructor through politeness and use of proper titles (e.g., “Mr. Park”)
- Use of professional, courteous standards for all emails and discussions:
 - Descriptive subject line starting with APK 3220
 - Address the reader using proper title and name spelling
 - Body of the email should be concise but have sufficient detail
 - Give a respectful salutation (e.g., thank you, sincerely, respectfully)
 - No textspeak (e.g., OMG, WTH, IMO)
- No texting or checking Face Book (or the like) during class/lab instruction time
- No personal conversations unrelated to class material during class instruction time
- Adherence to the UF Student Honor Code: <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>
 - Honor code violations of any kind will not be tolerated and sanctions will be determined by the course instructor for first-time violators
 - Any use, access, or handling of unapproved technology during an exam will result in a zero on the exam and potential failure of the course
 - All allegations, regardless of the severity, will be reported to the Dean of Students Office for University-level documentation and processing
- The University of Florida has enacted a policy of allowing NO food or drink of any kind in any campus classroom. This policy will be enforced during the meeting times of this course.

Accommodations for Students with Disabilities or Special Needs:

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester. In accordance with university policy, I make every effort to accommodate unique and special needs of students with respect to speech, hearing, vision, seating, or other disabilities. Please notify the Office of Disability Services to register for services.

Course Materials and Copyright Law:

The content presented in the class is the property of the instructor and may not be duplicated in any format without permission from the instructor, and may not be used for any commercial purposes. Students violating this policy may be subject to disciplinary action under the UF Conduct Code. Class lectures are the property of the professor and may not be audio or video taped.

Online Course Evaluation:

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

COURSE SCHEDULE

Week	Date	Topic	Readings / Assignments Due
1	8/23	Introduction – What is Biomechanics?	Syllabus & CH 1
2	8/28	Trigonometry and Vector Algebra	Appendix A-C
	8/30	Syllabus & Trigonometry Quiz	
3	9/4	Kinematic Concepts	CH 2
	9/6	Kinetic Concepts	CH 3 / HW 1
4	9/11	Biomechanics of Bones	CH 4
	9/13	Biomechanics of Joints	CH 5
5	9/18	Exam 1 Preview	HW 2
	9/20	EXAM 1	
6	9/25	Biomechanics of Muscles	CH 6
	9/27	Biomechanics of Upper Extremity	CH 7
7	10/2	Biomechanics of Lower Extremity	CH 8
	10/4	(Continued)	HW 3
8	10/9	Biomechanics of Spine	CH 9
	10/11	(Continued)	
9	10/16	Linear Kinematics	CH 10
	10/18	(Continued)	
10	10/23	Exam 2 Preview	HW 4
	10/25	EXAM 2	
11	10/30	Angular Kinematics	CH 11
	11/1	(Continued)	
12	11/6	Linea Kinetics	CH 12
	11/8	(Continued)	HW 5
13	11/13	Equilibrium	CH 13
	11/15	(Continued)	
14	11/20	Angular Kinetics	CH 14
	11/22	Thanksgiving Day – No Class	
15	11/27	Fluid Mechanics	CH 15
	11/29	Exam 3 Preview	HW 6
16	12/4	EXAM 3	
	12/6	Reading Day – No Class	

* This syllabus is intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. However, the instructor reserves the right to modify, supplement and make changes as the course needs arise. This includes exam dates and lecture topics that may change depending on class progress.

OTHER INFORMATION

Study Tips for Biomechanics:

- Read from the textbook BEFORE attending lecture.
- Snow-ball the lecture notes. Begin studying lecture material immediately after the first lecture. Then, after the second lecture, begin your studies with day one lecture material. Continue this all the way up to the exam.
- Study with friends!
- Re-write questions. Taking complex questions and breaking them down to identify exactly what the question is REALLY asking for is very helpful. It is also very helpful to look at incorrect answer choices and identify what makes those choices wrong. Ask yourself, “How could I make that statement correct?” You can practice this with the critical thinking questions at the end of each chapter.
- Do not fall behind. This course moves at a FAST pace...and you can easily get overwhelmed if you procrastinate. Avoid studying at the last minute. Complete the homework as you go.
- Stay organized. Keep track of all due dates and move through each day in a uniform manner, so that you are always aware of what you have done and what to do next.
- Ask questions and participate in class discussions.
- Check CANVAS announcements/emails daily...just pretend it is Facebook for school. Your course instructor will post important and helpful information (such as friendly reminders of due dates) as announcements.
- Utilize office hours. I ask that you make effort to attend my scheduled time slot but do not let a schedule conflict be the reason you fail to seek help in office hours. Schedule an appointment with me.
- Have a positive attitude! THIS STUFF IS COOL!

Health and Wellness Care:

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 392-1575, so that a team member can reach out to the student.
- Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575;
- Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.
- University Police Department, 392-1111 (or 9-1-1 for emergencies). <http://www.police.ufl.edu/>

Academic Resources:

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learningsupport@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.
- Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <http://www.crc.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaintprocess>