UF College of Health & Human Performance
Department of Applied Physiology and Kinesiology
UNIVERSITY *of* FLORIDA

BIOMECHANICAL BASIS OF MOVEMENT

APK3220 ~ 3 CREDITS ~ FALL 2019

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OFFICE HOURS: T 3:00-4:30 PM, R 1:45-3:00 or by appointment

I also have an open door policy. If you come by randomly without an appointment or during these times and my door is open you are welcome to talk to me but if my door is closed please respect my time to work and prepare for class.

MEETING TIME/LOCATION:

Section 10716: FLG 210 - MWF | Period 2 (8:30 AM - 9:20 AM)

Final Exam: 5/1/2020 @ 7:30 AM - 9:30 AM

Section 10717: FLG 285 - T | Period 5 - 6 (11:45 AM - 1:40 PM) R | Period 6 (12:50 PM - 1:40 PM)

Final Exam: 5/1/2020 @ 12:30 PM - 2:30 PM

COURSE DESCRIPTION: Fundamentals of kinematics and kinetics related to human movement. Basics of biomechanics applied to the concepts of injury prevention and performance improvement. Overview of various biomechanical data collection and analysis.

PREREQUISITE KNOWLEDGE AND SKILLS: junior or senior standing; APK 2100C and MAC 1140 with minimum grades of C; or PHY 2048 or PHY 2053 with minimum grade of C PET 2320C; MGF 1202 or MAC 1142

Although not an explicit prerequisite, understanding of Physics 1 concepts will be **very helpful in this course.*

REQUIRED AND RECOMMENDED MATERIALS:

Recommended Textbook:
Basic Biomechanics by Susan Hall 8th Edition ISBN9781259913877

Required Software:
Microsoft Word and Excel 2010 or later

Imagej: free image analysis software that we will download in class.
https://imagej.nih.gov/ij/download.html

Required Learning Platform Subscription:
TopHat

COURSE FORMAT:

In-Class Meetings: This course meets for three sessions per week. In general 2 meetings will be lecture/problem solving based and the third session will either be a quiz, exam, or in class activity. TopHat will be used during lectures for attendance and participation questions throughout. The schedule varies weekly (see below).

Online Lectures: Some (few) select topics will be covered exclusively in online lectures which will be noted (M) on the Canvas module page that you are expected to watch. Some additional online lectures that reiterate/review (R) class material or provide helpful reference examples will also be provided. Watching online lectures is NOT a replacement for attending class as additional content may be covered in class and you will miss participation questions/attendance.

COURSE LEARNING OBJECTIVES:

1. Identify biomechanical principles/concepts and describe the impact of biomechanics research on daily life
2. Describe the basic technology behind biomechanical instrumentation with a focus on motion capture
3. Identify the planes of motion and axes of rotation involved in a given human movement pattern
4. Solve biomechanical problems related to exercise, sport, and health using calculations related to:

a. Linear and angular kinematic variables (including position, velocity, acceleration)
b. Linear and angular kinetic variables (including force, torque, momentum, impulse, work, power, and energy)
c. Estimating the center of mass position
d. Fluid mechanics

5. Describe how fluid forces influence human motion involving liquids and air
6. Explain the basic mechanical properties, interactions, and functions of bones, tendons, ligaments, muscle, joints, and cartilage

CLASS LEARNING ENVIRONMENT

It is important to the learning environment that you feel welcome and safe in this class; and that you are comfortable participating in class discussions and communicating with me on any issues related to the class. If your preferred name is not the name listed on the official UF roll, please let me know as soon as possible by e-mail or otherwise. I would like to acknowledge your preferred name, and pronouns that reflect your identity. Please let me know how you would like to be addressed in class, if your name and pronouns are not reflected by your UF-rostered name. I welcome you to the class and look forward to a rewarding learning adventure together.

You may also change your “Display Name” in Canvas. Canvas uses the "Display Name" as set in myUFL. The Display Name is what you want people to see in the UF Directory, such as "Ally" instead of "Allison." To update your display name, go to one.ufl.edu, click on the dropdown at the top right, and select "Directory Profile." Click "Edit" on the right of the name panel, uncheck "Use my legal name" under "Display Name," update how you wish your name to be displayed, and click "Submit" at the bottom. This change may take up to 24 hours to appear in Canvas. This does not change your legal name for official UF records. https://elearning.ufl.edu/student-help-faqs/

COURSE AND UNIVERSITY POLICIES:

ATTENDANCE POLICY: Attendance is expected for every session to obtain important content that you will be assessed on. Additionally you will receive credit via TopHat for attending and answering questions that will count towards your attendance and participation grade. You will need a 90% attendance/participation score to receive the full 60 pts for this grade category. TopHat Attendance: Attendance will be taken via TopHat exactly when class begins. If you are late to class there will be no make up for miss the attendance. There may also be participation questions throughout the lecture that will count towards your attendance/participation grade. Attendance/participation points cannot be made up for either excused or unexcused absences (barring long term health related absences), but the 90% threshold is there as a buffer for excused absences.

Red Days: Days on the syllabus schedule bolded in Red are days for which attendance is will allow you to get full marks on an assignment or assessment. Excused absences will not affect your grade for these days, but the assessment or assignment must be made up. Not attending class on these days will cause loss of points or a zero on the assignment/assessment listed for that day.

Excused and unexcused absences:
Excused Absence: An excused absence is missing class or an assessment for an approved reason (see list below) with appropriate documentation. For an absence to be excused documentation of the excuse must be provided and the instructor must be notified at least 2 weeks in advance for all planned excused absences (e.g. interview, wedding) although extenuating circumstances will be considered (e.g. funeral, illness). In the case of illness (or other more emergent situations) notice must be given prior to the absence.

Excusable Absences: In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, and professional conferences), military obligation, severe weather conditions, religious holidays, and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved.

Unexcused Absences: An unexcused absence is missing class or an assessment for a non-approved reason or because of late notification of an excusable absence.
Reasons that will not be excused: general wedding attendance (not in the wedding party), family vacations, traffic or otherwise poor planning, multiple assessments in one day.

*Notification (documentation as evidence may be provided after but you have to let me know that you will be missing BEFORE the absence) of an excused absence MUST be given to the instructor before the absence or assessment occurs *even in the case of illness*.

*The application of these guidelines is up to the instructor's discretion especially for specific cases which may involve ambiguity.

PERSONAL CONDUCT POLICY: Students are expected to exhibit behaviors that reflect highly upon themselves and our University. 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 obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the instructor or TA in this class.

EXAM MAKE-UP POLICY: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at:
https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting accommodation for disabilities must first register with the Dean of Students Office (http://www.dso.ufl.edu/drc/). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

COURSE EVALUATIONS: Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

GETTING HELP:

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575
- Counseling and Wellness Center: https://counseling.ufl.edu/, 352-392-1575
- 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 on 2) or e-mail to Learning-support@ufl.edu. https://lss.at.ufl.edu/help.shtml
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. https://career.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/
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. http://writing.ufl.edu/writing-studio/
- Student Complaints On-Campus: https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/ On-Line Students Complaints: http://distance.ufl.edu/student-complaint-process/

GRADING:

Table 1: Grade Point Category Breakdown		
Evaluation Components (number of each)	**Points Per Component**	**Approximate % of Total Grade**
Lecture Exams (2)	100 pts each = 200 pts	200/700 = 28.6%
In Class Quizzes (6)	40 pts each = 240 pts	240/700 = 34.3%
Online Quizzes (14)	5 pts each = 70 pts	70/700 = 10%
Assignments (3)	40 pts each = 120 pts	120/700 = 28.6%
Profile Assignment and Picture (1)	10 pts	10/700 = 1.4%
Attendance and Participation (1)	60 pts	60/700 = 8.6 %

Exam 1 – Exam 1 will consist of multiple-choice, true-false, short answer and free response problem solving questions. Students are not permitted access to any kind of materials or notes during these exams. Exam questions are generated by the course instructor and the majority of focus should be given to the lecture notes and problem sets when studying although supplementary readings/resources will also be helpful. Students will take exams in the same room where weekly meetings are held and will be allowed 50 minutes to complete the exam. A **SCIENTIFIC** calculator will be permitted during exams and quizzes. A formula sheet will be provided.

Problem Sets – Problem sets will largely provide practice for quantitative skills that you will be assessed on during quizzes and exams. Problem sets are "due" weekly at the start of the first session, but no direct credit is given for completing these problem sets.

In Class Quizzes – There will be 6 ~bi-weekly multiple choice quizzes that will test conceptual knowledge and quantitative skills covered over the previous two weeks. Some quizzes will have group work components to them and some will be individual. Your grade for each quiz will be based partially on participation and partially on performance. All quizzes will count towards your final grade. You will have a formula sheet (example on Canvas) and permitted a SCIENTIFIC CALCULATOR.

Online Quizzes – There will be 14 online quizzes each worth 5 pts. These will be an introduction to assessment on the content from each module. You will have at least 2 attempts for each quiz and they are intended to be open note individual quizzes. It behooves you to prepare for these quizzes as an assessment to gain the greatest learning benefit from them in a low pressure environment and grading. These quizzes may be timed.

Exam 2 **(The final)** – The final exam is NOT meant to be comprehensive. Some topics build on topics that are represented in the first half of the semester (e.g. vector operations) that you need to know to be successful but it will focused to assess objectives from topics from the second half of the semester. The final exam will consist of multiple-choice, true-false, short answer and free response problem solving questions. You will be allowed two hours to complete this exam. The final exam will be held in the same room where lectures and midterm exams are given. You will have a formula sheet (example on Canvas) and permitted a SCIENTIFIC CALCULATOR.

Assignments – There will be 3 assignments during the semester each worth 40 points and a student profile (worth 10 pts). 2 of the assignments will be group assignments (the Introduction to Image Analysis Assignment and the Acro Analysis Assignment).

Extra Credit – No extra credit is guaranteed for this class.

GRADING SCALE: Grades will be based on a point system of 700 total points coming from quizzes, exams, attendance/participation, and assignments.

Assessment scores will be posted directly to Canvas. Exams and quizzes will be graded within approximately 1 week from the latest proctored assessment given (i.e. if there are makeup exams/quizzes that occur after the scheduled date). Other assignments may take longer in order to evaluate and provide more comments and feedback.

Once a grade is posted students have **two weeks** to come to office hours to dispute an error in grading.

Exams and quizzes may be reviewed during office hours throughout the semester for the benefit of feedback and learning.

More information about UF's grading policies may be found here: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

Any requests for additional extra credit or special exceptions to these grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.

Table 2: Grading Scheme			
Letter Grade	**Points Needed to Earn Each Letter Grade**	**Percent of Total Points Associated with Each Letter Grade**	**GPA Impact of Each Letter Grade**
A	651-700	90.00-100%	4.0
B+	609-629.99	87.00-89.99%	3.33
B	581-608.99	83.00-86.99%	3.0
B-	560-580.99	80.00-82.99%	2.67
C+	539-559.99	77.00-79.99%	2.33
C	511-538.99	73.00-76.99%	2.0
C-	490-510.99	70.00-72.99%	1.67
D+	469-489.99	67.00-69.99%	1.33
D	420-468.99	60.00-66.99%	1.0
E	≤ 419.99	0-59.99%	0

WEEKLY COURSE SCHEDULE:

M – Mandatory online lecture with content not covered in class.

R – Review or reiterative online lecture

***** – Bring laptop to Class

Red Text – Attendance necessary for full marks on assignment or assessment listed

Problem sets are expected to be completed by Session 1 of the week they are due. These are not for credit but timely completion of these problems set will help you do well especially on the quantitative problems on exams and quizzes.

Table 3: Semester Schedule			
Week	**Dates**	**Lecture Topic**	**Due Dates**
1	Jan 6 - Jan10	1-2 Syllabus/Introduction to Biomechanics 3 Concepts and Tools in Kinematics and Kinetics	
2	Jan 13 - Jan17	3 Concepts and Tools in Kinematics and Kinetics 4 Biomechanical Instrumentation	**Syllabus Quiz (Due Tues)** **Student Profile (Due Tues)** M2: Problem Set **M2: Online Quiz (Due Tues)**
3	Jan 20 - Jan 24	*Mon, Jan 20 is a holiday…no class* ImageJ Demo* **Quiz 1 Online (2-3) (Session 3)**	M3: Problem Set **M3: Online Quiz (Due Tues)**
4	Jan 27 - Jan 31	**Intro Image Analysis*** 5 Muscle Biomechanics	M4: Problem Set **M4: Online Quiz (Due Tues)**

Table 3: Semester Schedule			
5	Feb 3 - Feb 7	6 Tissue Loading	M5: Problem Set **M5: Online Quiz (Due Tues)** **Intro to Image Analysis (Due Tues)**
6	Feb 10 –Feb 14	7 Joint Mechanics – The Knee **Quiz 2 – Group (4-6) (Session 3)**	M6: Problem Set **M6: Online Quiz (Due Tues)**
7	Feb 17 – Feb 21	7 Joint Mechanics – The Hip 8 Linear Kinematics	M7: Problem Set **M7: Online Quiz (Due Friday)**
8	Feb 24 - Feb 28	9 Angular Kinematics **Quiz 3 (7-8) (Session 3)**	M8: Problem Set **M8: Online Quiz (Due Tues)**
	Mar 2 – Mar 6	SPRING BREAK!	
9	Mar 9 – Mar 13	**Acro Activity** 10.1 Linear Kinetics **Exam 1 (2-8) (Session 3)**	M9: Problem Set **M9: Online Quiz (Due Tues)**
10	Mar 16 – Mar 20	10.2 Linear Kinetics 11 Equilibrium and Inverse Dynamics	M10.1: Problem Set **M10.1: Online Quiz (Due Tues)**
11	Mar 23 – Mar 27	11 Equilibrium and Inverse Dynamics **Quiz 4 (9-10) (Session 3)**	M10.2: Problem Set **M10.2: Online Quiz (Due Tues)**
12	Mar 30 - Apr 3	**Acroyoga Analysis* (Sessions 1 and 2)** 11 Equilibrium and Inverse Dynamics	
13	Apr 6 - Apr 10	12 Angular Kinetics **Quiz 5 (11) (Session 3)**	M11: Problem Set **M11: Online Quiz (Due Tues)**
14	Apr 13 - Apr 17	13 Fluid Mechanics 13	M12: Problem Set **M12: Online Quiz (Due Tues)** **M13: Online Quiz (Due Friday)** **Acro Analysis (Due Friday)**
15	Apr 20 - Apr 24	**Quiz 6 (12-13) (Session 3)**	M13: Problem Set **Reflection (Due Friday)**
Exam 2 (9-13) **MWF – Section 10716 Final Exam: 5/1/2020 @ 7:30 AM - 9:30 AM** **TR – Section 10717 Final Exam: 5/1/2020 @ 12:30 PM - 2:30 PM**			

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 professor 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.

SUCCESS AND STUDY TIPS:

Keep up with the material
Study for quizzes as if preparing for exams
Spend MORE time doing practice problems and quizzing each other conceptual content (i.e. test your recall before you get to the in class assessment) vs. spending time passively reading the slides
Study with friends
Come to office hours with specific questions on challenging topics
TRY all problem set problems