



HBIO 408L Biomechanics

Units: 4

Fall 2020

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Course Description

Kinematic and kinetic analysis of human motion. Emphasis on performance enhancement and injury prevention. Geared for junior and senior undergraduate students. Concepts from high school algebra (word problems and solving for an unknown) and the use of sine, cosine, and tangent concepts from trigonometry. Calculus is not required.

Prerequisites: [MATH 108](#) and [PHYS 135A](#) or higher

Learning Objectives (See Learning Blocks)

1. Discuss the interplay and relative influence of biology and social context on dimensions of human diversity and health.
2. Apply cross-disciplinary scientific principles to explain how humans function, adapt and evolve.
3. Analyze and synthesize discipline-related content specific to real world problems and utilize the scientific method, basic scientific principles and methodologies concepts to clarify what is known, unknown or need further study.
4. Independently and collaboratively apply scientific knowledge as well as analytical and experimental skills to produce integrative original work.
5. Describe the structure/function of muscles, bones, joints and tissues of the human body.
6. Formulate testable hypotheses, design and conduct experiments, present interpretations of results and articulate reasoned conclusions to solve real-world and conceptual problems.
7. Safely and properly use scientific equipment, databases, Newton's Laws, and other mathematical and computational tools to advance working knowledge of cause-effect relationships governing human movement.
8. Use relevant sources of scientific evidence to construct a well-supported, logical argument, explain it to others using oral, written, and multimedia forms of communication in real world contexts.

Course Notes

The course is organized in 2-week learning blocks. Each learning block incorporates learning modules, self-directed learning, discussion, peer review, thinking, designing, editing, and personal reflection and all content is found in the learning block google drive. Content for each Learning block and executable software required for digitizing will be located here: <http://www.usc.edu/dept/LAS/kinesiology/exsc408l/lab/lab.html>

Work for peer review will be posted and commented on using Blackboard.

Work submitted for evaluation will be uploaded into an assigned personal google drive shared with the professor and teaching assistants.

Technological Proficiency and Hardware/Software Required

You will need access to a personal computer with Microsoft Excel, preferably a PC. Kinovea software runs on a PC. Tracker software runs on a MAC. IF you need access to a PC, please contact Dornsife IT prior to the start of the semester.

Required Readings and Supplementary Materials

1. Web-based lecture notes and videos
2. Selected literature readings available through PubMed@usc through USC Library
3. Electronic Storage Device (back up and store homework, labs, and project content)

Grading Breakdown

Learning Assessments	% of Grade
Motion analysis	10%
Cause-Effect in Context	10%
Impulse Regulation	20%
Joint Kinetics	20%
Refinements	10%
e journal finale	5%
Project	15
TOTAL	100%

Grading Scale

>90%=A, > 80%=B, >70%=C, >65%=D, otherwise =F

Assignment Submission Policy

Meet weekly due dates on Wednesday, Thursday and Friday
otherwise weekly points = 0

Grading Timeline

Feedback provide weekly

Policies

1. Come prepared to live meetings
2. Sincere personal investment in independent discovery and timely peer review
3. USC conduct code (***you must do your own work!***) - Refer to **SCampus** Academic Integrity Section.
4. Excused absences require written notification *one week in advance*.
5. Honor due dates in lab and lecture (**anything turned in after due date = zero points**).
6. Active weekly participation

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplcity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu Non-emergency assistance or information.

Description and Assessment of Assignments

HBio 408L Biomechanics: Fall 2020															
Hybrid Model in the lab and in the field opportunities scheduled as needed throughout the semester															
Be you- find your passion-create your pathway				Block by Block: Personal Quest											
Think	by questioning with clarity and precision			Quality achieved at a level required to sustain impact of work											
				Understand the challenge in realistic contexts											
				Expertise develop skills through self-directed learning opportunities											
Design	by listening with empathy and openness			Strategy practice habits of mind and body											
				Time manage, modify, monitor and reflect											
				Reflect											
Edit	by iterating with reflection, trust and interdependency			Live Discussions			Live Discussions								
				Monday:		Tuesday		Wednesday:		Thursday		Friday		Points	
				Modular Lecture				Discussion Board Participation		Learning Communities		Finalize/Prepare			
Block 1	Motion Analysis Habits of Mind and Body	17-Aug	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		24-Aug	Apply to Task of interest	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		Personal Habits		5	
						self check				Peer review		Reflect: think, design, edit			
Block 2	Cause-Effect in Context	31-Aug	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
	Library Investigation					self check						feedback			
	Known, Want to know, Implications	7-Sep	Define Problem and RQs	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		2 page Scientific Abstract		5	
						self check				Peer review		Reflect: think, design, edit			
Block 3	Net Impulse = change in momentum Film Strip and force-time curve	14-Sep	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		21-Sep	Apply to Project	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		Finalize project slide		5	
						self check				Peer review		Reflect: think, design, edit			
Block 4	Net Angular Impulse = change in ang mom Events with Force Vector Overlay	28-Sep	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		5-Oct	Apply to Project	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		Finalize project slide		5	
						self check				Peer review		Reflect: think, design, edit			
Block 5	Multijoint Control and Coordination segment and joint angular motion	12-Oct	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		19-Oct	Apply to Project	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		1 min Key Concept Demo		5	
						self check				Peer review		Reflect: think, design, edit			
Block 6	Joint Kinetics Lower Extremity	26-Oct	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		2-Nov	Apply to Project	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		FBD and Computations		5	
						self check				Peer review		Reflect: think, design, edit			
Block 7	Joint Kinetics Upper Extremity	9-Nov	Content Modules	Content Q&A		Self directed learning		Post/Comment		Discuss/Refine		e-journal post		5	
						self check						feedback			
		16-Nov	Apply to Project	Apply Q&A		Self directed learning		Post Slide Draft/Comment		Share		Finalize project slide		5	
						self check				Peer review		Reflect: think, design, edit			
Finale		23-Nov		Present project: 10 minutes, 5 minutes Q&A										5	
				Recorded Zoom Format:								e-journal Finale		5	
												Final Grade		100	

