Instructors: Jill McNitt-Gray, Ph.D. mcnitt@usc.edu

Lecture: VKC102 M/W 2:00 – 3:20 P.M; Comprehensive Final
Office Hours: MON / WED, 3:20-4:20 PM (Bring lab notebook to office hour meetings).

Laboratory: 3 hours/week
2:00 – 4:50 T PED B16
5:00 – 7:50 T PED B16
2:00 – 4:50 Th PED B16

*Course includes project-based capstone experience
Kinematic and kinetic analysis of human motion; emphasis on performance enhancement and injury prevention. 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. Prerequisite: EXSC 301L and 1 from (MATH 108 or MATH 125) and 1 from (PHYS 135a or PHYS 151)

Required Texts and Supplies:
1. Web-Based Lecture Notes
2. Selected Literature Readings available through PubMed@usc through USC Library
3. Electronic Storage Device (back up and store homework, labs, and project content)

Course Reader (Optional)

I. Objectives:
1. Develop critical thinking and analytical skills to solve meaningful problems; use Newton's Laws to understand cause-effect relationships governing human movement.
2. Improve oral, written, electronic information and communication skills.
3. Gain hands-on experience analyzing motion and quantifying and interpreting biomechanical information in scientific, ethical, social, and environment related contexts.

II. Grading Procedures:
1. Exam 1 - 20%
2. Exam 2 - 20%
3. Comprehensive Final - 25%
4. Lab - 20%
5. Project - 15%

Lab Grading:
1. Pre/Post Lab Reports, Demonstrations, - 50%
2. Weekly Lab Quizzes - 25%
3. Practical - 25%

Grading Scale: >90%=A, >80%=B, >70%=C, >65%=D, otherwise =F
III. Laboratory Component
Undergraduate Lab Director: Emi Embler, Ph.D.
Email: eembler@usc.edu

Teaching Assistants:
Marisa Papp (mpapp@usc.edu) Office hours PED B9
Casey Wiens (cwiens@usc.edu) Office hours PED B9

IV. Expectations
1. Come prepared for class and labs (lecture pop quizzes).
2. Sincere Personal Investment in independent discovery and lab activities.
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. Email and class participation.

VI. Project Overview and Grading

Project: Identify significant problem (compare/contrast), generate a meaningful hypothesis, design and conduct a biomechanical experiment to test hypothesis (limitation of analysis: two 2D planar movements).

Project Grade:
1. Background/Significance (10%) Problem? known/unknown in peer reviewed literature?
2. Kinematics (angle-angle) (25%) kinematic context for muscle force generation
3. Kinetics (whole body: imp/mom (25%); joint kinetics (25%) cause/effect at joint &CM levels
4. Presentation and hand-in materials (15%); all comparisons specific to research question
   a) 3 related scientific journal articles (.pdf emailed to TA prior to presentation)
   b) hand written Free Body Diagrams and associated calculations (show all work)
   c) Paper copy of presentation (must be able to read all text on all figures)
   d) Peer evaluation ( emailed to TA prior to presentation)
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:
Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.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) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation 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 Support and Advocacy** - (213) 821-4710  
studentaffairs.usc.edu/ssa  
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.

**STATEMENT FOR STUDENTS WITH DISABILITIES**  
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. Website for DSP and contact information: (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu.

**STATEMENT ON ACADEMIC INTEGRITY**  
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one’s own academic work from misuse by others as well as to avoid using another’s work as one’s own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

**EMERGENCY PREPAREDNESS/COURSE CONTINUITY IN A CRISIS**  
In case of a declared emergency if travel to campus is not feasible, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies. See the university’s site on Campus Safety and Emergency Preparedness.
<table>
<thead>
<tr>
<th>Week*</th>
<th>Syllabus may be modified as needed Monday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>1</td>
<td>Motion analysis events/phases</td>
<td>Independent Field Study: Mechanical objectives?</td>
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<td>2</td>
<td>Mechanical Object, FBD</td>
<td>Kinematic Context Multijoint control</td>
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<td>3</td>
<td>Labor Day</td>
<td>Linear Impulse, Change in momentum</td>
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<td>4</td>
<td>Angular Impulse, FBD</td>
<td>Projectile motion, angular impulse</td>
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<td>Integration of Concepts, FBD</td>
<td>Review, ang kine/imp</td>
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<td>EXAM 1</td>
<td>Project Planning, Motion Analysis</td>
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<td>Joint level FBD</td>
<td>Joint kinetics, Ergonomics, Clinical Applications</td>
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<td>Joint Level Kinetics</td>
<td>Applications in Rehab engineering -STS</td>
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<td>9</td>
<td>Rehab Engineering, Ergonomics</td>
<td>Project: assimilate research literature</td>
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<td>Multijoint Kinetics</td>
<td>Multijoint kinetics, project: intro/methods</td>
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<td>11</td>
<td>Multijoint Kinetics Whole Body Mechanics</td>
<td>Project: hypothesis (related to each var), project: FINALIZE results &amp; discussion</td>
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<td>12</td>
<td>Review</td>
<td>EXAM 2, Project discussion, Translation into practice</td>
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<td>Project discussion</td>
<td>Project: discussion, Project: FINALIZE to LAB TA</td>
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<td>14</td>
<td>Natural History</td>
<td>Thanksgiving</td>
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<td>15</td>
<td>Applications</td>
<td>Review for Final Exam, Project: results &amp; discussion</td>
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**Practice with problem solving**

- **Homework**
  - Trig, linear motion
  - Center of mass
  - Linear impulse, proj motion
  - Angular impulse
  - Ang kine/imp

**Lab Exercises**

- Introduction/computer skills, FBD
- Linear kinematics & TBCM (video clips)
- Angular kinematics
- Linear impulse & momentum
- Angular impulse & momentum

**Project Progression***:

- Understanding Cause-Effect
  - *Integrate knowledge each week*

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