Instructor: Jill McNitt-Gray, Ph.D. mcnitt@usc.edu
Lecture: 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)

*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. Describe the structure/function of muscles, bones, joints and tissues of the human body.
2. Apply cross-disciplinary scientific principles to explain how humans function, adapt and evolve.
3. Independently and collaboratively apply scientific knowledge as well as analytical and experimental skills to produce integrative original work.
4. 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.
5. Formulate testable hypotheses, design and conduct experiments, present interpretations of results and articulate reasoned conclusions to solve real-world and conceptual problems.
6. 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.
7. 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.
8. Discuss the interplay and relative influence of biology and social context on dimensions of human diversity and health.

**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
3 hours/week
2:00 – 4:50, 5:00 – 7:50 T PED B15
5:00 – 7:50 W PED B15
2:00 – 4:50, 5:00 – 7:50 Th PED B15

Lab Director: Emi Embler, Ph.D. eembler@usc.edu

Teaching Assistant:
Office Hours PED B9: TUE 12-2 PM (Bring lab notebook to office hour meetings)

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 Section 11, Behavior Violating University Standards https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity http://equity.usc.edu or to the Department of Public Safety http://adminopsnet.usc.edu/department/department-public-safety. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage http://sarc.usc.edu describes reporting options and other resources.

Support Systems
A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the American Language Institute http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. The Office of Disability Services and Programs http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

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.
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<th>Week of*</th>
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<tr>
<td>Monday</td>
<td>Wednesday</td>
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<tr>
<td>1 8/25</td>
<td>Motion analysis: events/phases</td>
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<td>2 9/2</td>
<td><strong>Labor Day</strong></td>
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<td>3 9/9</td>
<td>Kinematic Context</td>
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<td>4 9/16</td>
<td>Angular Impulse, FBD</td>
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<td>5 9/23</td>
<td>Review</td>
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<td>6 9/30</td>
<td>Integration of Concepts, FBD</td>
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<td>7 10/7</td>
<td>Joint level FBD</td>
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<td>8 10/14</td>
<td>Joint Level</td>
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<td>9 10/21</td>
<td><strong>Applications in Sports Science</strong></td>
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<td>10 10/28</td>
<td>Multijoint Kinetics</td>
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<td>Clinical Applications</td>
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<td>12 11/11</td>
<td>Review</td>
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<td>13 11/18</td>
<td>Project discussion</td>
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Lab Exercises

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

- Introduction/computer skills, FBD
- Microsoft Excel, Kinovea (PC), Tracker (Mac) *develop tool proficiency
- Linear kinematics & TBCM (video clips) **Clarify real world problems & critical questions that are meaningful to you!!
- Angular kinematics **Finalize movements of interest and begin extensive research on topic - what? how?
- Linear impulse & momentum **Critically read literature, pilot, develop hypotheses and experimental design - why?
- Angular impulse & momentum **Methods, variables to test hypothesis
- Total body kinetics **Collection plan, movement analysis plan, time table, responsibilities, milestones
- PROJECT COLLECTION
  - REVIEW QUANTITATIVE SKILLS
  - MAP out Project Timeline within group
- Joint kinetics **Title, significance, expected results from compare and contrast analysis
- Project: kinematics **Analyze multijoint control using joint and segment kinematics
- Project: impulse/momentum **Analyze net impulse/change in momentum relationships (lin or ang)
- Project: joint kinetics **Analyze upper extremity or lower extremity joint kinetics
- Project: interpretation **Compare results to the literature, data makes sense? What makes quantities big and small? Cause-effect? Significance
- Final report .ppt/prezi **Assimilate results, communicate results
- ORAL PROJECT PRESENTATIONS- **10 min, 5 min questions, hand written FBD/joint kinetics turned in before, literature .pdf emailed