Southern Illinois University Carbondale  
Department of Kinesiology  
KIN 511 Biomechanical Analysis of Human Movement (3 Credit)

Instructor: Michael W. Olson, Ph.D.  
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Office: 121 Davies Hall  
Phone: 618-536-2244  
Office Hours: M /W: 11:00am-12:30 pm  
F: 11:00am – 2:00pm  
Course Meeting Time: Thursdays 6:30 – 9:15pm; Room 208 Davies Hall  

Important Dates:  
- First day of Class: Thursday, August 27th  
- Exam I (midterm): Thursday, October 8th  
- Thanksgiving Holiday: Wednesday November 25th - Sunday November 27th  
- Exam II (Final): Thursday, December 17th 5:00-7:00pm

Texts/Materials:  
There will be no specified text required for the course. Relevant reading materials for each class session will be provided in the form of research articles and selected book chapters through Desire2Learn.

Course Description:  
The purpose of this course is to familiarize graduate level students in the application of mechanics to biological systems. The course is intended to further your knowledge of the basic concepts introduced in the undergraduate biomechanics. Quantitative and qualitative analyses of movement will be discussed. Importance will be placed on application of mechanical principles when analyzing basic human movements. Each student will pick a topic of his/her choosing to research and discuss how biomechanical principles influence the biological system.

For the duration of this semester, we will be discussing terrestrial bipedal locomotion. Specific areas of interest will be theories of bipedal locomotion, kinematics and kinetics of locomotion, energy utilization and transfer during the gait cycle, and factors influencing locomotion. Since many of you will be actively participating in the fitness and general health regimen of diverse populations you will probably prescribe walking or running programs for your clients/students/athletes.

Course Objectives:  
There are five objectives to this course:  
- Introduction of underlying theories and concepts  
- Application of theories and concepts to real-world situations  
- Familiarize students with the biomechanics literature  
- Provide understanding of the role of biomechanics in everyday life  
- Introduce instrumentation and how it is used to measure mechanical variables
Course Evaluation:

<table>
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<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Exam I</td>
<td>25%</td>
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<tr>
<td>Exam II</td>
<td>25%</td>
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<tr>
<td>Written paper</td>
<td>25%</td>
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<tr>
<td>Oral presentation</td>
<td>15%</td>
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<tr>
<td>Participation</td>
<td>10%</td>
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Grading Scale:  
A: ≥ 90; B: 89.99 – 80; C: 79.99 – 70; D: 69.99-60; F: ≤ 59.99

Examinations:
There will be two examinations during the semester, a midterm and a final. The format of these examinations will be primarily essay incorporating material from previously presented lectures/discussions. Application questions may also be included to test each student’s critical thinking.

Research paper/presentation:
A self-selected, pre-approved topic will be chosen within the first two weeks of the course. A systematic timetable to track the progression of each group will be enforced to ensure the requirements of the assignment are attained. This timetable includes the selection of a research question or hypothesis, compilation of relevant research articles, and due date for rough drafts. At the end of the semester, students will be allotted 8-10 minutes to orally present their research topics. There will be a 5 minute time period for questions/answers and group discussion. In general, this project is a review of the literature of a specific topic related to biomechanics.

The format of the paper should include an introduction, a systematic presentation of the topic throughout the body, and a conclusion that cohesively ties the material together. Key questions should be answered in the paper: why is this topic important?, how is this topic relevant to human movement?, and what information have you disseminated through these articles?. Critical evaluation of the literature is also required. Provide any suggestions for future research in this topic area. A reference cited page should follow the paper (APA format). The length of the paper, not including title page and reference page(s), should be 7-8 pages, double spaced, 12 point Times New Roman or Ariel (or similar) font, with 1” (2.54 cm) margins on top and bottom, with 1.25” (3.18 cm) right and left margins.

For the oral presentation you will need to highlight the major points of your paper. The presentations will be Power Point slide presentations. Remember, pictures provide more information than words. Inundation of the slide with too many words will overload your audience.

The following rubric will be followed when assessing your presentation and/or paper:

Presentation:
1. Content (30%): is the information valuable to explore
2. Clarity (15%): how well are you presenting the information
3. Competency (40%): are you communicating that you understand and can use the biomechanical terminology applied to the research review
4. Overall Presentation (10%): were the main themes (introduction, systematic presentation, and discussion/conclusion) included in your presentation
5. Slide Show (5%): how well did you prepare the presentation and make use of technology
Paper:
1. Content (20%): is the information valuable to explore
2. Clarity (20%): how well are you presenting the information
3. Required elements (20%): Introduction, summary of topics/subtopics, discussion/conclusion, APA format
4. Grammar/spelling (20%): one point taken away for every 3 misspellings or grammatical errors
5. References (20%): were primary sources of literature used, the format of the reference cited page, minimum number of citations used/listed

Participation:
The format of the course is half lecture and half group discussion of the assigned readings and presented materials. It is expected that each person will contribute to the group discussion. The class will meet 15 times during the semester. Thirteen of those weeks will consist of lecture/discussion, one week will be focused on the midterm examination, and the last week will be tailored to your presentations. In addition, you will be expected to contribute weekly on a Discussion Board on Desire2Learn. The instructor will post a question or comment regarding the topic from either the previous class or the next class period, and each student will be required to post responses relevant to the original post at least three (3) times during that week. I want relevant posts, not just “I agree with that statement”. It is expected that additional thoughts regarding the materials from the original post will be posted. Additionally, you can also pose your own questions to the class and begin a new discussion thread.

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<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Readings</th>
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<tr>
<td>1</td>
<td>Introduction to the course, and Theories of Bipedal Locomotion</td>
<td>Milton (2009)</td>
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<td>Chapman (Chapter 6)</td>
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<td>2</td>
<td>Theoretical and Conceptual Models of Bipedal Locomotion</td>
<td>Geyer et al. (2006)</td>
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<td></td>
<td>(lecture/discussion)</td>
<td>Adamczyk &amp; Kuo (2009)</td>
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<td>3</td>
<td>Kinetics of Human Movement (lecture)</td>
<td>Griffiths (Chapter 8)</td>
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<td>4</td>
<td>Kinetics of Human Movement (discussion)</td>
<td>Rooney and Derrick (2013)</td>
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<td></td>
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<td>Gotchell &amp; Cram (2005)</td>
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<td>5</td>
<td>Kinematics of Human Motion (lecture)</td>
<td>Hamill &amp; Knutzen (Chapters 8 &amp; 9)</td>
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<td>6</td>
<td>Kinematics of Human Motion (discussion)</td>
<td>Saunders et al. (2005)</td>
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<td>Huang et al. (2010)</td>
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<td>7</td>
<td>EXAM I</td>
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<td>8</td>
<td>Muscle Mechanics (lecture)</td>
<td>Komi et al. (2000)</td>
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<td>Kubo et al. (2005)</td>
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11 (Nov. 3) Equilibrium and Balance (lecture/discussion) Chapman (Chapter 4) Chapman (Chapter 5)


14 (Dec. 3) Running (lecture/discussion) Perl et al. (2012) Stearne et al. (2014)

15 (Dec. 10) Student Presentations

16 (Dec. 17) EXAM II (FINAL)

**Research Paper/Presentation**

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<tr>
<th>Week</th>
<th>Project Focus</th>
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<tr>
<td>3 (Sept. 10)</td>
<td>Topic approval deadline (email your topic to me)</td>
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<tr>
<td>5 (Sept. 24)</td>
<td>Sample of literature due for approval to instructor (please stop by my office the week prior)</td>
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<td>6 (Oct. 1)</td>
<td>General paper outline due (electronic submission via D2L)</td>
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<tr>
<td>8 (Oct. 15)</td>
<td><em>Rough-draft</em> of paper due via D2L <em>(electronic copies as a WORD document)</em>: I will use editing/tracking to make comments and suggestions, then resend the edited copy to you</td>
</tr>
<tr>
<td>15 (Dec. 10)</td>
<td><strong>Final Draft Due (NO EXCUSES!!)</strong> <em>(Electronic copies via D2L!!)</em></td>
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Emergency Procedures:

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on the BERT's website at www.bert.siu.edu, Department of Public Safety's website www.dps.siu.edu (disaster drop down) and in the Emergency Response Guidelines pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency. The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.
REFERENCES


