Southern Illinois University Carbondale  
Department of Kinesiology  
KIN 321 Biomechanics of Human Movement  
(3 credit hours)

Day and Time: Monday/Wednesday/Friday section 001: 10:00 - 10:50 am;  
Tuesday/Thursday section 002: 10:00 -11:15 am  
Location: Room 208, Davies Hall  
Instructor: Michael W. Olson, Ph.D.  
Email: mwolson@siu.edu  
Telephone: 618-536-2244  
Office: 121 Davies Hall  
Office Hours: M/W: 11:00am-12:30 pm; F: 11:00am – 2:00pm  

Important Dates:  
First Day of Class Monday, August 24th /Tuesday, August 25th  
Labor Day Holiday Monday, September 7th (no class section 001)  
Fall Break Holiday Monday, October 12th – Tuesday, October 13th  
Veteran’s Day Wednesday November 11th (no Class section 001)  
Thanksgiving Holiday Wednesday November 25th - Sunday November 29th  
Exam I Wednesday, September 16th (In Class) Section 001  
Exam II Wednesday, October 28th (In Class) Section 001  
Final Exam Section 001: Wednesday, Dec 16th, 10:15 am-12:15 pm  

Course objectives:  
- Introduction to biomechanical concepts of movement  
- Be able to define the system being evaluated  
- Provide tools necessary for biomechanical analysis of movement  
- Provide the applicability of physics based concepts to real world situations  
- Increase your cognitive awareness of biomechanical factors in daily activities  
- Introduce qualitative and quantitative analyses of human movement  
- Be able to integrate biomechanical information to other areas of the kinesiology discipline  
(exercise physiology, pedagogy, clinical settings)

Class preparation: Review questions and problems will be assigned for each chapter to facilitate discussion. **It is your responsibility to come prepared for class and ready to engage in the topic matter.** Material from these assignments may be used for quizzes or exams! As such, you will need to bring a scientific calculator during each class session. **Cell phones will NOT be adequate! DO NOT use cellular phones in this class.** The notes presented in class serve as an **outline** for the topics during that class period.

Grading Scale: 90 - 100 A; 79 – 89.99 B; 68 – 78.99 C; 55 – 67.99 D; 0 - 54 F
Course Evaluation: Each student will be evaluated on the following criteria:

1. Online Quizzes  20%
   There will be at least one quiz per topic area given during the semester on Desire2Learn. You will be provided a 24-48 hour window to complete each quiz. Quizzes will not be given the first day of class or the first class after each exam. No quizzes will be dropped from the calculation of the final grade. If you fail to complete the quiz before the time period has expired you will not be able to receive credit for that quiz. The instructor will not accept emailed quizzes.

2. Exam I  20%
   Tentatively Chapters 1 – 3

3. Exam II  20%
   Tentatively Chapters 4 - 5

4. Exam III  20% (Final exam is NOT cumulative)
   Tentatively Chapters 6 – 8

5. Lab Activities  10%
   Laboratory activities will be assigned throughout the semester. These activities are provided in the back of the textbook, and at times, the instructor may modify the lab according to the data provided. Students will have notification a week prior to the due date for completion of the lab. ALL laboratories are to be completed outside of the allotted class period. Students will upload their completed laboratory activities into a Drop Box in Desire2Learn by the due date and time. No late laboratories will be accepted.

6. Article Critiques  10%
   Students will be provided a choice of articles related to the topic area being covered in class to read and critique. The articles will be posted in Desire2Learn in an Article folder. You will choose one of the articles to read and critique. A 2 page (no more than 2 pages) critical write-up of the article should be uploaded to a Drop Box in Desire2Learn. The critique should include the title of the article (with authors’ names), the premise of the study, a brief overview of the methods the authors used, your interpretation of their results, and a critical analysis of the content of the paper. The majority of this assignment should be devoted to the critical analysis of the paper you read as I will use this to evaluate your understanding of the article. These critiques will be done twice during the semester and will be due at the 6th (September 25th) and 12th (November 6th) weeks of the semester. No late work will be accepted. The instructor will not accept any critiques other than through the Desire2Learn Drop box. Each student MUST work on his/her own for this critique. Remember to type your name and the course on the document(s) you submit.

Course Content (tentative):

1. Chapter 1: Introduction to Biomechanics of Human Movement (pp.3-22)
   Review Questions #1-7 (p. 21)
   a. What is Biomechanics and why do we study it?
   b. Biomechanical Knowledge versus information.
   Lab Activity 1 (L-2 and L-3)

2. Chapter 2: Fundamentals of Biomechanics and Qualitative Analysis (pp.23-37) with Math Review (Math Review sheet in addition to Appendix D of the text, p. 305)
   Review Questions #1-8 (p. 37)
   a. Key mechanical concepts
   b. Nine fundamentals of biomechanics
   c. Qualitative Analysis

3. The Body as a Machine: Lever Systems and Pulleys (pp. 169-171) (Chapter 7)

4. Chapter 3: Anatomical Description and Its Limitations (pp.41-67)
Review Questions #1-10 (p. 66)
   a. Review of anatomical concepts
   b. Muscle actions
   c. Limitations of functional anatomy analysis
   d. Range of motion and force – motion principles

Lab Activity 3 (L-6 and L-7)
5. Chapter 4: Mechanics of the Musculoskeletal System (pp.69-103)
   Review Questions #14 (p. 101)
   a. Tissue loads
   b. Responses of the tissues
   c. Biomechanics of the passive muscle-tendon unit
   d. Biomechanics of bone
   e. Biomechanics of ligament
   f. Mechanical characteristics of muscle
   g. Stretch-shortening cycle
   h. Force-time principle
   i. Neuromuscular control

6. Chapter 5: Linear and Angular Kinematics (pp.107-132)
   Review Questions #1-15 (p. 130)
   a. Linear motion
   b. Angular motion

Lab Activity 4 (L10-L11)
7. Chapter 6: Linear Kinetics (pp.133-167)
   Review Questions #1-1-15 (p. 165)
   a. Newton’s Laws
   b. Muscle angle of pull
   c. Contact forces
   d. Impulse-momentum relationship
   e. Force-time principle
   f. Work-energy-power relationships

Lab Activity 6B (L-16-L-17)
8. Chapter 7: Angular Kinetics (pp.169-191)
   Review Questions #1-1-13 (p. 190)
   a. Torque
   b. Angular inertia
   c. Equilibrium-balance-stability
   d. Center of mass/center of gravity

Lab Activity 7A (L-18-L-19)
9. Chapter 8: Fluid Mechanics (pp. 193-211)
   Review Questions #1-1-14 (p. 210)
   a. Fluids/fluid forces
   b. Principles of spin

Classroom Policies: It is assumed that everyone enrolled in this course is here to pursue further knowledge in the area of human movement. The following list provides what will be expected by the instructor and should also be expected by the students:

   1. Attendance in class is expected. If you will not be able to participate in a class session please notify the instructor PRIOR to your absence in a timely manner. Only those with excuses that are related to University events (academic, athletic, etc.) or religious purposes may make-up work (i.e., quizzes, labs). If you have an excused absence and will not be available for an exam (EXCLUDING the FINAL EXAM) you must take the exam PRIOR to your absence (NO EXCUSES!!). Those individuals who do not have an excuse for an absence will receive a zero score for that day’s evaluation. If you fail to inform the instructor in a timely manner of your absence, then any make-up work performed will be worth 50% of the original work.
2. Turn off all cell phones, pagers, and any other electronic devices before class begins. It is disrupting to other students, and disturbing to the instructor, if these electronic devices are active during the class period.

3. Food is not permitted in the classroom. Bottled water will be the ONLY beverage allowed in the classrooms in Davies Hall.

4. If you have a question that was not answered during the class period please feel free to stop by my office or email me your question (see front page).

5. Neither academic dishonesty nor plagiarism will be tolerated and as such, disciplinary action will be issued in accordance with university guidelines (http://libguides.lib.siu.edu/plagiarism).

Extra credit: All communications regarding extra credit should be conveyed through email!

1. Participation or assistance in a biomechanical study this semester (UP TO 5% towards final grade):
   this requires a write-up of the experience *(No opportunities will be allowed after December 4th!!)*
   OR
   
2. Review Paper: (UP TO 5% towards final grade)
   One review paper on a self-selected, pre-approved, biomechanics related topic.

Format: These are the minimum requirements to be considered for the addition of 5% to the final grade

- **Introduction** - state why this topic is important to study. A discernable thesis statement following a list of specific points in the first paragraph are key to setting up the flow of the paper.

- **Main text** – synthesized summary of the related articles in a comprehensive fashion, i.e., a list of summaries for individual articles is not acceptable. Only research publications can be used as references (see reference listing of journals below). Book chapters, reference material published on websites, teaching material are not research publications. Note: journal articles from online sources will only accepted from the journals listed below.

- **ALL references cited in the text should be of the format of the American Psychological Association (APA).**

- **Reference list** – minimum of 5 articles: citations of the references should be included in the text!

- **Length**: 4 - 5 pages, double-spaced, 12-point font size, Times New Roman font (preferred).

- **Title and reference cited pages should also be included**

- **Remember, you are citing the article, not the journal!**

Timing:
***Pre-approved topics are due by October 2nd. Paper due date: December 11th. ***

Journals Related to Biomechanics Topics – references from these journals will be accepted

- American Journal of Physical Medicine and Rehabilitation*
- American Journal of Sports Medicine*
- Archives of Physical Medicine and Rehabilitation*
- Clinical Biomechanics*
- Clinical Orthopaedics*
- Clinical Sports Medicine
- Journal of Gerontology*
- Journal of Biomechanical Engineering*
- Journal of Bone and Joint Surgery (American)*
- Journal of Bone and Joint Surgery (British)*
- Journal of Electromyography and Kinesiology
- Journal of Neurophysiology*
- Journal of Orthopaedic Research*
- Journal of Physiology*
- Journal of Rehabilitation*
- Journal of Rehabilitation Medicine*
- Journal of Spinal Disorders*
- Journal of Sports Sciences*
- Journal of Sports Science and Medicine*
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](http://www.bert.siu.edu), Department of Public Safety's website [www.dps.siu.edu](http://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.