TIME & PLACE: M-W-F 8:00-8:50 AM; Room 111 (Section 1)
M-W-F 11.00-11.50 AM; Room 111 (Section 2)
Silcox Physical Education & Health Center

INSTRUCTOR: Miriam Klous, Ph.D.

OFFICE HOURS: Mo-Wed 12.00-2.30 PM or by appointment

OFFICE: Room 309 Silcox Physical Education & Health Center

PHONE/FAX: (843) 953 5565/ (843) 953 6757

EMAIL: klousm@cofc.edu

PREREQUISITE: Physics 101, Biology 202, & PEHD 330

GRADING: A, B+, B, C+, C, D, F

COURSE DESCRIPTION: This course will focus on the mechanical basis of human movement with some consideration given to the anatomical constraints that influence normal, athletic, and pathological movement. Topics covered will include linear and angular kinematics and kinetics of movement, and equilibrium mechanics.

COURSE TEXT: *Biomechanical Basis of Human Movement* – Third Edition
Joseph Hamill & Kathleen M. Knutzen

COURSE OBJECTIVES:

1. Students will be provided a brief review of applied anatomy with particular reference to exercise and activity.
2. Students will learn the value of solving human movement challenges from an athletic as well as from an injury and/or pathological perspective.
3. Units of measurement, differences in scalar and vector quantities and two-dimensional and three-dimensional methods of measurement will be discussed and addressed.
4. Linear kinematic quantities will be addressed as they apply to movement of the body as well as projectiles.
5. Angular kinematics will be examined and understood, especially as it applies to creation of general planar motion.
6. Newton’s Laws of Motion with respect to linear and angular kinetics will be addressed as they have application to an understanding of inverse dynamics.

7. Center of gravity, and equilibrium mechanics will be discussed and examined.

8. Students will have a greater understanding of various types of human motion and how these movements can be quantified.

9. Students will become more aware of technology and why it is important in the field of biomechanics, through labs, electronic class communication, and use of listservers to name a few.

**TENTATIVE GRADING:**

- Written Exams- 2 @25% each: 50%
- Final Exam: 25%
- Quizzes: 5%
- Research Project: 20%
- TOTAL: 100%

Final grade will be calculated using the formula:

$$0.5 \cdot \text{average grade written exam} + 0.25 \cdot \text{grade final exam} + 0.05 \cdot \text{average grade quizzes} + 0.20 \cdot \text{grade research project}$$

**GRADED ITEMS:**

1. **Exams:** There will be 3 exams, 2 exams will be held in class while the 3rd exam will be held during final exam week. The format of the examinations will vary with the content which is being tested. Generally speaking, exams will be problem solving and critical thinking/interpretation format.
   - **Exam #1** (25%) will cover linear and angular kinematic quantities and how they relate to movement.
   - **Exam #2** (25%) will cover linear and angular kinetic quantities, and equilibrium and how they relate to movement.
   - **Final Exam** (25%) will be comprehensive and will cover all information presented throughout the course including student projects.
2. **Quizzes** (5%) problem solving questions or interpretations/critical thinking that will cover the main topics in linear and angular kinematics and kinetics. The quizzes might be announced (or not) and given during class time or online using OAKS. Also, it can be asked to submit the home work announced or unannounced. Homework will also be graded as a quiz.
2. Class Project Description (20%).
Each group of 2-4 students will be responsible writing a referenced paper concerning how one of the mechanical constructs we examine during the semester influences normal, athletic, or pathological movement. The paper should contain 3-4 pages (title page and references not included) and 4-5 references per person in the group. The paper layout:
- 1) Title page, 2) Introduction, 3) Body, 4) Discussion, 5) References
- Double spaced
- Margins: normal = bottom, top, left, right 1"
- Times new roman 12

Each group will present their project in a 15 minute presentation with 5 minutes at the end for questions and/or comment. Two drafts of different papers will be peer reviewed by students of another group. There are five due dates for the project:
2. Outline of the paper including literature, due: February 15, 2012
3. Draft of the research paper containing at least 50% of the content, due: March 16, 2012
4. Written peer reviews, due: March 26, 2012
5. A referenced, written paper, due: April 9, 2012

EVALUATION SCALE:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
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<td>A-</td>
<td>88-89%</td>
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ATTENDANCE POLICY:
Attendance is not required but strongly recommended. Attendance will be taken randomly. In case of absence, the quizzes or submission of homework assignments that are announced or unannounced cannot be retaken/resubmitted in case of unexcused absence and the student will receive 0 points. In case of absence, you will be held responsible for the class material covered during your absence. Assignments can be submitted in hard copy or electronic copy to the instructor. If a copy is not received on time, 1 point will be subtracted for each hour the assignment is submitted late in the first 12 hours. After these 12 hours, 3 additional points will be subtracted for each 24 hours the assignment is submitted late (when submitting an assignment 13-37 hours late, you will lose $12 + 3 = 15$ points).
EXAMINATION AND MAKE-UP POLICY:
You will be notified at least one week in advance if there is a change in an exam date. Exams must be taken on the day assigned unless arrangements are made prior to the test date. All make up exams must be made up within one week of the original exam date. It is the students’ responsibility to make the necessary arrangements. If a student is absent on the day of an exam, he/she will receive a zero if the professor is not notified before class time. In case of taking a make-up exam, the professor reserves the right to give you a different exam.

ASSIGNMENT POLICY: All assignments are due at the beginning of class (8 am for section 1 and 11 am for section 2) on the day they are due.

ELECTRONIC DEVICE POLICY: Please turn off the sound of all electronic devices during class. NO TEXT MESSAGING or other forms of electronic communication permitted. Laptops are allowed to be used in class to take notes. Only non-programmable calculators will be allowed during exams: please plan accordingly.

PROVISIONS FOR STUDENTS WITH SPECIAL NEEDS:
The College of Charleston and I are committed to the full inclusion of all students. Students who have a documented disability and require academic accommodations should contact the instructor. Please do so during the first week of class of any accommodations needed for the course.

COLLEGE OF CHARLESTONS HONOR CODE AND ACADEMIC INTEGRITY:
Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.
Incidents where the instructor determines the student’s actions are related more to a misunderstanding will handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student’s file. Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student’s transcript for two years after which the student may petition for the X to be expunged. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.
Students should be aware that unauthorized collaboration—working together without permission—is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others’ exams, fabricating data, and giving unauthorized assistance.

Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class without obtaining prior permission from the instructor.

Students can find the complete Honor Code and all related processes in the Student Handbook at [http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php](http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php)

**COLLEGE OF CHARLESTON STUDENT HANDBOOK:**
This is a guide to your responsibilities and rights as a student. If you are not familiar with this document, please take the time to review the information contained within the handbook. [www.cofc.edu/studentaffairs/general_info/studenthandbook.html](http://www.cofc.edu/studentaffairs/general_info/studenthandbook.html)

**TENTATIVE COURSE OUTLINE:**
*It is expected that you read (part of) the chapter that will be discussed in class in preparation for your class*

- **Week 1** Intro, general, syllabus
  - Introduction to Biomechanics
  - January 9
  - January 11
  - January 13

- **Week 2** Biomechanics of Movement and sport
  - Linear kinematics
  - Vectors, resultants
  - January 18
  - January 20

- **Week 3** Linear kinematics
  - Instantaneous velocity and acceleration
  - Kinematics of gait
  - January 23
  - January 25
  - January 27: **Topic for research project due**
**Week 4**  Linear kinematics
   - Projectile motion
   - Review linear kinematics
January 30
February 1
February 3

**Week 5**  Angular kinematics
   - Introduction to angular kinematics
   - Axes of rotation and units of measurement
   - Angular motion and types of angles
February 6
February 8
February 10

**Week 6**  Angular kinematics
   - Relationship between linear and angular kinematics
   - Angular kinematics of running
   - Review angular kinematics
February 13
February 15: **outline research project due**
February 17

**Week 7**  Introduction to linear kinetics
   - Review for exam 1
February 20: **Review day for exam #1**
February 22
February 24: **Exam #1**

**Week 8**  Linear kinetics
   - Laws of motion
   - Ground reaction forces
   - Other contact forces
   - Free body diagram
February 27
February 29
March 2

**Week 9**  Spring Break
March 5
March 7
March 9
Week 10 Linear kinetics
   Special force applications
      Pressure, mechanical work, energy, and power
   Review linear kinetics
March 12
March 14
March 16: **Update on research project due**

Week 11 Angular kinetics
   Introduction angular kinetics
      Center of gravity and center of mass
   Rotation and leverage
      Lever classifications
      Moment of inertia
March 19
March 21
March 23

Week 12 Angular kinetics
   Angular momentum
   Angular analogs to Newton’s Laws of motion
   Effect of force over distance
March 26: **Feedback on research paper due**
March 28
March 30

Week 13 Angular kinetics
   Types of mechanical analysis
   Torque applications in human movement
   Introduction to gait analysis
April 2: **Review day for exam #2**
April 4
April 6: **Exam #2**

Week 14 In-class presentations
April 9: **Research paper due & In-Class presentation demonstration**
April 11
April 13

Week 15 In-class presentations
April 16
April 18
April 20
Week 16 Review and evaluation
April 23: Review for Final Exam & Evaluations

Section 1 MWF 8-8.50 am: Comprehensive Final Exam May 2nd: 8:00-11:00 am
Section 2 MWF 11-11.50 am: Comprehensive Final Exam April 30th: 8:00-11:00 am