College of Charleston  
EXSC 440-01 Biomechanics  
Fall 2016- 3 Semester Credit Hours

TIME & PLACE:  
Tu-Th 9:25-10:50 AM  
Johnson Center-Rm 207

INSTRUCTOR:  
William R. Barfield, Ph.D., FACSM  
Professor

OFFICE HOURS:  
MWF 10-11 AM & Tu-Th 8:35-9:25

OFFICE:  
#213 Silcox Physical Education & Health Center

PHONE/FAX:  
803/953-6746 / 803/953-6757

PREREQUISITE:  
Physics 101, Biology 202, & EXSC 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, equilibrium, and fluid mechanics.

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

COURSE OBJECTIVES:  
The course objectives in biomechanics are to have students apply the mechanical knowledge gained in kinesiology and physics quantitatively to kinematic and kinetic forms of movement.

STUDENT LEARNING OUTCOMES:

1. Students will quantitatively solve human movement challenges from an athletic as well as from an injury and/or pathological perspective. This will be evaluated on test 1 and test 2.
2. Students will quantitatively solve two-dimensional measurement kinematically and kinetically. This will be evaluated on test 1 and test 2.
3. Students will conduct a literature review on a biomechanically topic and write and give an oral presentation to their peers and the professor. Students will be expected to score at least 80% of the combined written and oral presentation.
REQUIREMENTS:

Written Exams- 2@30% each 60%
Class Project 10%
Final Exam 30%
TOTAL 100%

DESCRIPTION OF PROJECTS:
1. In-class activities will include lecture/presentation, small group discussion, problem solving, written examinations, and in-class research projects.
2. Out-of-class activities will include readings, study and project preparation.
3. Class Project Description (10%). Each student will be responsible for presenting an in-class group project concerning how one of the mechanical constructs we examine during the semester influences normal, athletic, or pathological movement. The presentation should be planned for 10 minutes. Evaluation will be from Dr. Barfield. The grading rubric can be found in OAKS.

EXAMS:

Exam #1 (30%) will cover linear and angular kinematic quantities and how they relate to movement.

Exam #2 (30%) will cover linear and angular kinetic quantities, and equilibrium and how they relate to movement.

Final Exam (30%) will be comprehensive and will cover all information presented throughout the course including student projects.

EVALUATION SCALE:

90-100 A
88-89 A-
85-87 B+
80-84 B
78-79 B-
75-77 C+
70-74 C
68-69 C-
66-67 D+
64-65 D
62-63 D-
<62 F

ATTENDANCE POLICY:
1. Students will be allowed two (2) unexcused absences, except during major evaluations. EACH UNEXCUSED ABSENCES in excess of two (2) will result in 2% being deducted from your final average. Students who miss more than 5 classes will be dropped from the course (WA).
2. Class will begin and end in a timely manner. You are expected to be prepared when class begins. Persistent tardiness will not be tolerated and may result in loss of points.
3. You are responsible for any work missed when you fail to attend class.
4. Two tardies will be the equivalent of one excused absence. Tardy means you are 1 minute late + for the start of class.

MAKE-UP POLICY:
1. Make-up exams will be given at the discretion of the professor when extenuating circumstances exist. It is the student’s responsibility to see the professor within three calendar days to request a make-up exam time and date.
2. Assignments that are not turned in at the designated time will be accepted at the discretion of the professor. Be aware that unusual circumstances must exist for acceptance of late assignments

CELL PHONE/PDA POLICY:
The use of all PDA devices, including cell phones and laptop computers are expressly forbidden in the classroom. Texting, receiving or sending messages, cell phone use, or the use of laptop computers will result in immediate loss of points from your final class average and an absence will be recorded. If there is a 2nd violation of the class policy you will be awarded an F. The first violation will result in a 20 point deduction from your final class average. The 2nd violation is another 20 points, therefore making it impossible to successfully complete the class with a passing grade. Students must keep these devices turned off and out of sight during class. It is a violation of this policy to keep such devices on your lap, in your pocket or on the floor by your desk. Any suspicion of your use on my part will result in loss of points.

DISABILITY ACCESS STATEMENT:
Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged.

ACADEMIC HONOR CODE:
Students will be expected to abide by the academic honor code found in the most current edition of the Student Handbook.

PROJECTED COURSE OUTLINE:
August 23  Introduction to Biomechanics
August 25  Biomechanics of Movement & Sport
August 30  Biomechanics of Movement & Sport
September 1  Review of Linear Kinematics
          vectors, resultants
September 6  Review of Linear Kinematics
          instantaneous velocity and acceleration
          kinematics of gait
          projectile motion
September 8  Linear Kinematics Review
September 13  Linear Kinematics Final Review

September 15  Introduction to Angular Kinematics
  axes of rotation and units of measurement
  angular motion and types of angles

September 20  Angular Kinematics
  relationship between linear and angular kinematics

September 22  Angular Kinematics
  angular kinematics of running

September 27  Angular Kinematics Review
  Update #1 on Biomechanics Project Due

September 29  Guest Lecture on Biomechanics Applications

**Learning Activities:** lecture, class discussion, in class problems and graphing.

October 4  Review Day for Exam #1

October 6  Exam #1

October 11  Linear Kinetics
  ground reaction forces
  other contact forces

October 13  Laws of Motion

October 18  Free-Body Diagrams

October 20  Special Force Applications
  pressure, mechanical work, energy, and power

October 25  Linear Kinetics Review and Summary

October 27  Introduction to Angular Kinetics
  center of gravity and center of mass

November 1  Rotation and Leverage
  lever classifications
  moment of inertia

**Learning Activities:** lecture, class discussion, in-class problem solving and article review.
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<tr>
<th>Date</th>
<th>Topic/Event</th>
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<tbody>
<tr>
<td>November 3</td>
<td>Angular Momentum</td>
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<td>Update #2 on Biomechanics Project Due</td>
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<td>November 10</td>
<td>Angular Analogs to Newton’s Laws of Motion</td>
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<td>November 15</td>
<td>Quiz #2</td>
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<td>November 17,22,29</td>
<td>Student Presentations</td>
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<td>December 1</td>
<td>Last Class Day for EXSC 440-Fall 2016</td>
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<td>December 8</td>
<td><strong>Comprehensive Final Exam</strong></td>
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