TIME & PLACE: M-W-F 9:00-9:50 AM; Johnson Physical Education & Health Center-Rm 206

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

OFFICE HOURS: M-W-F 10:00-11:00 AM & Tu-Th 9:00-10:00 AM

OFFICE: #213 Silcox Physical Education & Health Center

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

PREREQUISITE: Successful completion of Physics 101, Biology 202, & PEHD 330

GRADING: A, A-, B+, B-, C+, C-, D+, D, 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*  
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 a understanding of inverse dynamics.
7. Center of gravity, equilibrium and fluid mechanics will be discussed and examine
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.

REQUIREMENTS:

Written Exams- 2 @20% each 40%
Participation 10%
Research Project 30%
Final Exam 20%
TOTAL 100%

DESCRIPTION OF PROJECTS:

1. In-class activities will include lecture/presentation, small group discussion, written examinations, and in-class research projects.
2. Out-of-class activities will include readings, study and project preparation.
3. Class Project Description (30%). 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 45 minutes with 5 minutes at the end for questions and/or comment.
4. Participation involves class attendance and active involvement in the daily class activities.

EXAMS:

Exam #1 (20%) will cover linear and angular kinematic quantities and how they relate to movement.

Exam #2 (20%) will cover linear and angular kinetic quantities, and equilibrium and how they relate to movement.

Final Exam (20%) will be comprehensive and will cover all information presented throughout the course including guest lecture information and student projects.

EVALUATION SCALE:

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<th>Score</th>
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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.
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. When a student misses more than 4 classes they will be dropped from the course.

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, and if accepted, points will be deducted based on tardiness of assignment.

CELL PHONE/PDA POLICY:
1. Students will be turn off all cell phones/PDAs, Blackberrys and other electronic devices during class. Failure to abide with this policy will result in permanent dismissal from class.

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:
January 11  Introduction to Class and Biomechanics
January 13  Introduction to Biomechanics & Biomechanics of Movement & Sport
January 15  Introduction to Linear Kinematics  
Vectors and scalars  
Distance, displacement
January 18  NO Class-ML King Holiday
January 20  Introduction to Linear Kinematics  
Speed, velocity  
Acceleration
January 22  Linear Kinematics  
Kinematics of gait  
Projectile motion
January 25  Review of Linear Kinematics  
Muddiest point(s)
January 27  Linear Kinematics
January 29  Linear Kinematics
review of any unclear area of linear kinematics

February 1  Introduction to Angular Kinematics
axes of rotation and units of measurement
angular motion and types of angles

February 3  Angular Kinematics
relationship between linear and angular kinematics

February 5  Angular Kinematics
angle/angle diagrams
angular kinematics of running

February 8  Review of Linear & Angular Kinematics

February 10  Review for Exam #1

February 12  Southeast ACSM-No Class

February 15  Exam #1

February 17  Introduction to Electromyography (EMG)
combination of kinematics with EMG
Return Test #1 and Review

February 19  Guest Lecture

February 22  Introduction to Linear Kinetics

February 24  Laws of Motion
ground reaction forces
other contact forces

February 26  Linear Kinetics
evaluation and meaning of graphs

March 1  Free-Body Diagrams

March 3  Special Force Applications
pressure, mechanical work, energy, and power

March 5  Linear Kinetics
Review of any unclear area of linear kinetics

March 8-12  Spring Break
March 15  Introduction to Angular Kinetics  
            center of gravity and center of mass
March 17  Rotation and Leverage  
            lever classifications  
            moment of inertia
March 19  Angular Momentum
March 22  Angular Analogs to Newton’s Laws of Motion
March 24  Special Torque Applications
March 26  Review of Unclear Areas in Linear & Angular Kinetics
March 29  Review for Exam #2
March 31  Exam #2
April 2  Mechanical Analyses of Movement  
            Return Test #2
April 5  Clinical Gait Analysis
April 7  Clinical Gait Analysis
April 9  Clinical Gait Analysis and Example of Student In-Class Presentation
April 12  Clinical Gait Analysis
April 14,16,19,21  Student In-Class Projects
April 26  Last Class Day /Review for Final Exam
May 5  **Comprehensive Final Exam**