**KINE 7670 – Laboratory Techniques in Biomechanics (3 credits)**

**Spring 2012**

**Instructor**: Wendi Weimar, PhD

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**Office Hours**: MTWR 10-11

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**Meetings:**

Lecture: MW 11:00 AM - 12:15 PM

MC 2033 & Sport Biomechanics Lab

**Text:** None

**Course Description:** Learning techniques and methods used in biomechanical analysis of human movement, and applications of these techniques and methods in data collection, and analysis for research and teaching in biomechanics.

**Course Objectives:** The students will be able to:

1. employ imaging techniques to record and analyze human movement;

2. conduct anthropometric measurement in human movement;

3. operate force platform and force measuring systems for human motion analysis;

4. administer electromyography for human motion analysis.

**Course Contents:**

Week 1. Introduction to Biomechanical testing procedure – prepared by instructor

Lab 1: Template for completing a laboratory report

Week 2. Motion capture: video cameras - prepared by instructor

Lab 2: Data extraction and interpretation from video camera data

Week 3. Motion capture: flock of birds system– prepared by instructor

Lab 3: Data extraction and interpretation from flock of bird data

Week 4. Motion capture: optical sensor system – prepared by instructor

Lab 4: Data extraction and interpretation from optical sensor data

Week 5. Imaging data treatment and analysis: filter & normalization – prepared by instructor

Lab 5: Smooth and normalize previous data

Week 6. Force measurement: force platform and strain gauge – prepared by instructor

Lab 6: Operation of force platform.

Week 7. Force data treatment: postural control – prepared by instructor

Lab 7: Calculation of center of pressure and sway velocity

Week 8. Muscle activation patterns: EMG – prepared by instructor

Lab 8: Application of EMG

Week 9. Anthropometric measurement: body density, and segment dimension - prepared by instructor

Lab 9: Measurement of body density and segment dimension

Week 10. Anthropometric measurement: Center of gravity, & moment of inertia - prepared by instructor

Lab 10: Measurement of center of gravity, & moment of inertia

Week 11. Static model application: Three segments - prepared by instructor

Lab 11: Calculation of static model in walking

Week 12. Dynamic model: Two segments - prepared by instructor

Lab 12: Calculation of dynamic model in walking

Week 13. Dynamic model: Two segments with EMG- prepared by instructor

Lab 13: Motion and EMG data collection

Week 14. Dynamic model: Two segments with EMG & Force platform- prepared by instructor

Lab 14: Integration of Motion capture, EMG & Force platform data

Week 15. Interpretation of data collected in Lab 14

Lab 15: Lab 14 data presentation

**Course Requirements:**

Laboratory work, midterm and final exam will be given during this course.

**8. Grading and Evaluation Procedure:**

Lab work ...... 30% 90 - 100 --- A

Mid Exam ...... 30% 80 - 89 --- B

Final Exam ...... 40% 70 - 79 --- C

                                                 60 - 69 --- D

                                                 Under 60 --- F

**Class Policy Statements:**

Participation: Students are expected to participate in all class discussions and participate in all homework and laboratory exercises. It is the student’s responsibility to contact the instructor if assignment deadlines are not met. Students are responsible for initiating arrangements for missed work.

Attendance/Absences: Attendance is required at each class meeting. If an exam is missed, a make-up exam will be given only for University-approved excuses as outlined in the Student Policy eBook. Arrangement to take the make-up exam must be made in advance. Students who miss an exam because of illness need a doctor’s statement for verification of sickness and should clear the absence with the instructor the day they return to class. Other unavoidable absences from campus must be documented and cleared with the instructor **in advance**.

Unannounced quizzes: There will be no unannounced quizzes.

Accommodations: Students who need accommodations are asked to electronically submit their approved accommodations through AU Access and to arrange a meeting during office hours the first week of classes, or as soon as possible if accommodations are needed immediately. If you have a conflict with my office hours, an alternate time can be arranged. To set up this meeting, please contact me by e-mail. If you have not established accommodations through the Office of Accessibility, but need accommodations, make an appointment with the Office of Accessibility, 1228 Haley Center, 844-2096 (V/TT).

Honesty Code: The University Academic Honesty Code and the Student Policy eBook Rules and Regulations pertaining to Cheating will apply to this class.

Professionalism: As faculty, staff, and students interact in professional settings, we are expected to demonstrate professional behaviors as defined in the College’s conceptual framework. These professional commitments or dispositions are listed below:

* + - Engage in responsible and ethical professional practices
    - Contribute to collaborative learning communities
    - Demonstrate a commitment to diversity
    - Model and nurture intellectual vitality