OAKLAND UNIVERSITY
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF HUMAN MOVEMENT SCIENCE

EXS 3020, CRN 11251 – Human Motion Analysis (4 Credits)
Winter, 2018

Instructor: Myung D. Choi, Ph.D.
Office Location: HHB 3169
Class Time: Monday:8:00 – 10:27am, HHB 2085
Office Hours: Wed. 4:00-6:00pm or by appointment

DEPT: Human Movement Science
Email: Choi@oakland.edu
Phone: 364-8685

Required Text Book: Basic Biomechanics (7th ed.) by Susan J. Hall, McGraw-Hill.

Additional Materials

It may be helpful to refer back to your anatomy and physiology course materials: textbook & anatomy coloring book

Course Description: The purpose of this course is to introduce the biological and mechanical principles as they apply to human motion, and to provide students with practical experience on analysis of human motion, particularly those pertaining to exercise, sport, physical activity, and rehabilitation. The student should gain an understanding of the mechanical and anatomical principles that govern human motion and develop the ability to link the structure of the human body with its motor function from a mechanical perspective.

Prerequisite: BIO 2100 (Human Anatomy), Completion of the university writing foundation requirement (WRT1060).

COURSE OBJECTIVES: At the conclusion of the course, the students will:

1. Know and understand the laws of physical motion as they apply to human movement.
2. Understand the action of the joints and muscles.
3. Know how to differentiate between linear and curvilinear motion.
4. Understand the effects of force, torque, work and power as they relate to anatomical kinesiology.
5. Know the role of inertia, momentum, kinetic and potential energy in human movement analysis.
6. Appreciate the role of levers, vectors and resolution of forces in analyzing human movement.
7. Know and understand the integration of physiological and mechanical energy systems in human movement.
8. Understand the analysis of human movement in exercise, rehabilitative and industrial contexts.
9. Demonstrate: appropriate uses of a variety of methods of inquiry and a recognition of ethical considerations that arise; and, the ability to integrate the knowledge learned in the Natural Science and Technology general education knowledge area and its relevance to the major, the student's life and career.
10. Successfully apply three cross-cutting generic capacities that are cornerstones of the Oakland University General Education program, namely, critical thinking, effective communications, and subject-specific information literacy to problem solving in the major.
11. Demonstrate: knowledge of the elements, writing processes, and organizing strategies for creating analytical and expository prose.

COURSE PROCEDURES: The course will be a combination of lecture, problem-solving, and a gait lab. All readings, both in the textbook and on the course website, are recommended to complete prior to attendance at each class. There will be 5 *or* 6 mini-tests (30 minutes duration each) and a final examination. Approximately one-third of the questions on these evaluations will require a written answer that demonstrates the student's ability to integrate principles from the natural sciences (primarily biology and physics) into an understanding of human motion analysis. Some of these questions may also require mathematical calculations and/or graphic depiction of principles. All written answers will be evaluated for organization, style, grammar, and content. All mini-test questions will be posted on the course website at least one week prior to the mini-test. You will notice, however, that there are many more questions than can be answered in 30 minutes posted for each test. A selection of questions from the mini-test question bank will be chosen for each mini-test. You will be required to answer only those questions on the test. You are encouraged to review/answer all questions for each mini-test prior to the day of the test. The professor will be pleased to assist you to understand how to answer the questions after you have made a sincere effort to answer them on your own. *You will not be allowed to bring your answers into the test with you.*

Each student will complete **a term project** involving analysis of a functional human movement or anatomical principle. Please see the **Term Project** description on Moodle.

Activities/Grading **% of Grade**

Mini-tests ---------- 60% of grade (10%-12%/test).

Each test date will be announced in class the week before each test. Mini-test question banks are posted on-line (Moodle) at least one week before the test. Twenty points of test questions are selected from the question sheets. At the beginning of the test the instructor will distribute a test booklet containing the questions you are to answer. Mini-tests are 30 minutes in duration. Please bring a calculator, and measuring/drawing equipment. Your written answers are graded on content, style, organization, and grammar.

Term project ---------- 15% of grade.

This is an internet/library search project. See the attached description of the project. You will be assigned to a TERM PROJECT GROUP. Your submission schedule is spelled out in the document EXS 350 TERM PROJECT GROUPS.doc (see the course home page on Moodle).

Final Exam ---------- 25% of grade, including gait lab.

The final examination is scheduled for April 23, 2018 from 8:00 am until 11:00 am. It is a comprehensive final with emphasis on integrating the musculo-skeletal kinesiology covered in the first half of the term with the biomechanical principles covered in the second half of the term. Questions will relate your understanding of anatomy and physics to exercise principles and practices. Expect some computational questions. Please bring a calculator, and measuring/drawing equipment.

Tentative Topic Outline (subject to change): Winter, 2018

No	Topics	To Do
1	Introduction. Skeletal structure.	Choose topic for term project. Complete Topic 1 Problems.
2	Muscle structure and force. Kinesiological terms.	Initiate your search of the literature for the term project. Complete Topic 2 Problems.
3	The shoulder and shoulder girdle kinesiology.	Complete Topic 3 Problems.
4	The kinesiology of the upper extremity, the spine, and the trunk.	Complete Topic 4 Problems.
5	The hip and the pelvis kinesiology.	Complete Topic 5 Problems.
6	Kinesiology of the knee, ankle and foot.	Complete Topics 6 and 7 Problems.
7	Kinesiological analysis. Types of human movement.	Complete Topic 8 Problems.
8	**Winter Recess**	
9	Linear kinematics and exercise prescription.	Complete Topic 9 Problems.
10	Angular kinematics and exercise prescription.	Complete Topic 10 Problems.
11	Linear kinetics and exercise prescription.	Complete Topic 11 Problems.
		Term Project Submission - Due for those in Group 1
12	Angular kinetics, stability and exercise prescription.	Complete Topic 12 Problems
		Term Project Submission - Due for those in Group 2.
13	Motion through fluids and air.	Complete Topic 13 Problems
		Term Project Submission - Due for those in Group 3.
14	Integrating anatomical kinesiology with biomechanics.	Come with questions about kinesiological analysis
		Term Project Submission - Due for those in Group 4
15	**Gait Lab (April 9)**	
16	**Final exam (April 23) 8:00pm – 10:00am**	Expect comprehensive questions.

****** Readings: in Hall's Basic Biomechanics

GRADING SCALE

PERCENT	GRADE	PERCENT	GRADE
92 – 100	4.0	70	2.4
90 – 91	3.9	69	2.3
88 – 89	3.8	68	2.2
86 – 87	3.7	67	2.1
84 – 85	3.6	66	2.0
82 – 83	3.5	65	1.9
80 – 81	3.4	64	1.8

79	3.3	63	1.7
78	3.2	62	1.6
77	3.1	61	1.5
76	3.0	60	1.4
75	2.9	59	1.3
74	2.8	58	1.2
73	2.7	57	1.1
72	2.6	56	1.0
71	2.5	<56%	0.0

Any student with a documented disability needing academic accommodations is required to speak with the Office of Disability Support Services to make arrangements. The office is located in room 106 North Foundation Hall. For information or to make an appointment call 248-370-3266.