

OAKLAND UNIVERSITY
SCHOOL OF HEALTH SCIENCES
EXERCISE SCIENCE PROGRAM

COURSE: EXS 3020, CRN 11018

COURSE TITLE: Human Motion Analysis

COURSE CREDIT: 4 credits

SEMESTER/YEAR: **Winter, 2018**

COURSE LOCATION/ **Human Health Building: Room 2085**

TIME: **Wednesday --- 8:00 am – 10:27 am**

PROFESSOR: Thomas A. Brennan M.S.

OFFICE: Human Health Building

OFFICE HOURS: By appointment only and immediately following class

TELEPHONE: Office - 248-370-3562

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COURSE DESCRIPTION: The anatomical kinesiology and the mechanical bases of human movement in daily life, exercise, rehabilitation, sport, and work settings are analyzed. *Satisfies the university general education requirement for a writing intensive course in general education or the major, not both. Satisfies the university general education requirement for the capstone experience.*

Prerequisite: Completion of the university writing foundation requirement. BIO 205.

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 lecture, problem-solving, and laboratory exercise presentation. All readings, both in the textbook and on the course website, must be completed prior to attendance at each class. Laboratory and quantitative problem solving assignments designed to illustrate various principles of anatomical kinesiology will supplement the lecture and printed material.

There will be 6 mini-tests (approx. 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. The term project is submitted twice. The first submission occurs shortly before the middle of the semester. You will receive a preliminary grade and feedback on the content, organization, style and grammar of your writing. You will have approximately 4 weeks to revise the paper and resubmit it. The paper will receive its final grade after the second submission. Part of the final grade will be based on how successfully you dealt with the feedback from the first submission. Please see the **Term Project** description, at the end of the syllabus.

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.

CLASSROOM ETIQUETTE: All cell phones, pagers and any other form of electronic device should be turned off and put out of sight during class. (This includes Bluetooth or similar devices). No texting or checking phones will be allowed during class. No exceptions. Points will be deducted for ANY use of cell phones during class. If you need to use your phone for an emergency purpose, you will need to step outside of the classroom.

TEXT/READINGS: REQUIRED - Hall, S. Basic Biomechanics McGraw-Hill, Boston, Mass.

Tentative Topic Outline: **Winter Semester, 2018**

No	Date	Topics	To Do	To Read **
1	1/3	Introduction. Skeletal structure.	Choose topic for term project. Complete Topic 1 Problems.	Chapters 1, 2, 4. Website notes
2	1/10	Muscle structure and force. Kinesiological terms.	Initiate your search of the literature for the term project. Complete Topic 2 Problems.	Chapters 3, 5, 6. Website notes
3	1/17	The shoulder and shoulder girdle kinesiology.	Mini-test 1. (Weeks 1 - 2) Complete Topic 3 Problems.	Chapter 7. Website notes
4	1/24	The kinesiology of the upper extremity, the spine, and the trunk.	Complete Topic 4 Problems.	Chapters 7, 9. Website notes
4	1/31		Term Project First Submission - Due for those in Group 1	
5	1/31	The hip and the pelvis kinesiology.	Mini-test 2. (Weeks 3 - 4). Complete Topic 5 Problems.	Chapter 8. Website notes
5	2/7		Term Project First Submission - Due for those in Group 2	
6	2/7	Kinesiology of the knee, ankle and foot.	Mini-test 3. (Weeks 4 - 5). Complete Topics 6 and 7 Problems.	Chapter 8. Website notes
6	2/14		Term Project First Submission - Due for those in Group 3	
7	2/14	Kinesiological analysis. Types of human movement.	Mini-test 4. (Week 6). Complete Topic 8 Problems.	Chapter 2. Website notes
7	2/28		Term Project First Submission - Due for those in Group 4	
8	2/28	Linear kinematics and exercise prescription.	Complete Topic 9 Problems.	Chapters 2, 10. Website notes
8	3/7		Term Project 2nd Submission - Due for those in Group 1	
9	3/7	Angular kinematics and exercise prescription.	Mini-test 5. (Weeks 8 – 9). Complete Topic 10 Problems.	Chapter 11. Website notes
9	3/14		Term Project 2nd Submission - Due for those in Group 2	
10	3/14	Linear kinetics and exercise prescription.	Complete Topic 11 Problems.	Chapters 3, 12. Website notes

10	3/21		Term Project 2nd Submission - Due for those in Group 3	
11	3/21	Angular kinetics, stability and exercise prescription.	Mini-test 6. (Weeks 10 - 11). Complete Topic 12 Problems.	Chapters 13, 14. Website notes
11	3/28		Term Project 2nd Submission - Due for those in Group 4	
12	3/28	Motion through fluids and air.	Complete Topic 13 Problems.	Chapter 15. Website notes
13	4/4	Kinesiological analysis and integrating anatomical kinesiology with biomechanics.	Come with questions about kinesiological analysis	
14	4/11	Kinesiological analysis examined Exam Review	Come with questions regarding the final exam	
15	4/17	Gait lab		
14	4/25	Final exam 8:00am – 10:00am	Somewhat greater focus on weeks 11 and 13. Expect comprehensive questions.	All above chapters Website notes

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

Activities/Grading % of Grade

Mini-tests ----- 60% of grade. (10% for each of 6 mini-tests)

Mini-test question banks are posted on-line 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 submitting this project twice. The first submission is due between **January 31 and February 28**. You have been assigned to a TERM PROJECT GROUP. You will receive feedback on content, style,

organization and grammar, and receive a preliminary grade. This preliminary grade represents 10% of your final grade in the course. You will have about 3 weeks to revise the project and resubmit it between **March 7 and March 28** depending upon your TERM PROJECT GROUP submission schedule. The grade in the second submission represents 5% of your final grade in the course. You are strongly advised to select a topic and initiate your project in the first week of class.

Final Exam ----- 25% of grade.

The final examination is scheduled for **April 25 2018 from 8:00 am until 10:00 am**. While it will focus more heavily on the material covered in classes 13 to 14, 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. **There will also be a laboratory portion to this assignment that will be done prior to the final exam but will be part of the final exam grade. More information on this to come.** Expect some computational questions. Please bring a calculator, and measuring/drawing equipment.

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