

George Mason University
College of Education and Human Development
Kinesiology

KINE 400 - 001 Biomechanics (3)
Fall 2016
Tuesdays/Thursdays: Noon – 1:15 PM
Bull Run Hall 246 – Science and Technology Campus

Faculty

Name: Dr. Joel Martin
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Prerequisites/Corequisites

BIOL 124, BIOL 125, ATEP 300, KINE 360

University Catalog Course Description

Focuses on kinetic and kinematic concepts and how they apply to the quantitative assessment of human movement. Analyzes human movement and the functional dynamics of tissue such as muscle or bone.

Course Delivery Method

This course is delivered through classroom instruction (face to face), and online assignments.

Learner Outcomes or Objectives

The course will introduce students to the basic concepts and analysis techniques used in biomechanics with a focus on the analysis of human movement. At the completion of this course students should be able to:

- 1) Describe and define movements and fundamental biomechanical principles using scientific terminology.
- 2) Define, recognize, and apply concepts of both linear and angular kinematics and kinetics as they apply to the analysis of human movement.
- 3) Recognize the equipment and techniques used for the quantitative assessment of human movement.
- 4) Apply biomechanical principles to human movement situations including but not limited to performance, training, rehabilitation, and injury prevention.
- 5) Evaluate the mechanics of exercises and activities as they affect the human body.
- 6) Apply principles related to internal tissue loading to improving tissue structure and function, and to injury prevention.

Professional Standards

This course meets the Commission on Accreditation of Allied Health Education Programs (CAAHEP) requirements and covers the following American College of Sports Medicine's Knowledge-Skills-Abilities (KSA's):

| KSA | Description | Lecture, Lab, or both |
|--------|--|-----------------------|
| | GENERAL POPULATION/CORE: EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE | |
| 1.1.4 | Knowledge of the plane in which each movement action occurs and the responsible muscles. | Lecture |
| 1.1.5 | Knowledge of the interrelationships among center of gravity, base of support, balance, stability, posture, and proper spinal alignment. | Lecture |
| 1.1.8 | Knowledge of biomechanical principles that underlie performance of the following activities: walking, jogging, running, swimming, cycling, weight lifting, and carrying or moving objects. | Lecture |
| 1.7.47 | Ability to assess postural alignment and recommend appropriate exercise to meet individual needs and refer as necessary. | Lecture |

Required Texts

McGinnis, Peter. Biomechanics of Sport and Exercise, 3rd Edition, Human Kinetics. Champaign, Illinois, 2013.

Supplementary materials

Supplementary materials will be used in class and posted on BlackBoard/MyMason Portal. Please print these materials and bring them to class so that you have access to them when needed.

Course Performance Evaluation

Students are expected to submit all assignments on time in the manner outlined by the instructor. Students will be evaluated on content standards (knowledge gained) and performance (demonstration of the content). Content standards will be assessed via exams and laboratory assignments. Performance will be assessed through completion of class activities. Once your FINAL GRADE, at the end of the semester is posted on mymasonportal/blackboard, you will have 24 hours to inquire about it. After that period, your grade will be posted as final on Patriot Web.

• Assignments and Examinations

Exams and Final Exam (*Course objectives 1, 2, 3, 4 & 6*)

Each student will be required to complete two exams and a final exam. The final exam will be cumulative. The format for all exams will be multiple choice, true/false, short essays, and problem-solving questions. Examinations represent inquiries regarding student knowledge of fact regarding course content. Examinations demonstrate that the student can remember and apply facts as well as demonstrate a hierarchy of knowledge information.

EXAM REVIEWS

As time allows in class and depending on class progress in each unit, a review *may* be offered before each exam. At that time, students can ask any content question that they would like. Students are not required to participate in the review, and can participate or leave as they choose. If there are no questions related to the content of the unit, the review session will be ended. Whether or not a review is conducted in class depends of class progress through the material for each unit *and* class participation in previous reviews. If there is no time to have a formal review or, if review sessions are not being utilized, students will need to come to office hours to address any questions on class material.

Unannounced Quizzes (*Course objectives 1, 2, 3, 4, 5 & 6*)

Each student will give a brief presentation (8-10 minutes) on a research article they are assigned by the course instructor. The presentation must cover the entire article (introduction, methods, results & conclusion). Students are expected to demonstrate not only that they read the article but also that they thoroughly understand the study and subject matter

Labs, Lab Reports and Lab Exam (*Course objectives 1, 2, 3, 4, 5 & 6*)

The intent of the laboratories is to show how the theory learned in class can be applied to a variety of common activities. The labs will require students to work in small groups. During the lab sessions data will be collected and a simple analysis will be performed. The labs will include questions regarding the results and several discussion questions. Each group must hand in 1 formal lab report, which will be due in class exactly 1 week after the lab is performed. Lab reports must be typed and include a cover sheet. Calculations may be hand written. There will be 8 lab reports in total with each carrying the same weight towards the overall grade. The math review lab report will NOT count for your grade. There will be a lab exam at the end of the semester. The lab exam will cover content from all labs performed during the semester. Students should expect multiple choice, fill in the blank, and short answer questions as well as calculations from various labs.

Professionalism (*Course objectives 1, 2, 3, 4, 5 & 6*)

Students are expected to behave in a professional manner. Depending on the setting professionalism may look slightly different but generally consists of similar components. For undergraduate Kinesiology students in a classroom setting professionalism generally consists of the following components:

Attendance and Participation (50% of Professionalism Grade) – Show up on time to class, pay attention, and engage yourself in the lessons, discussions, class activities, etc. Demonstrate that you have an interest in the subject matter. Follow George Mason University policies for any missed classes. Arriving to class late or leaving early will be counted as an absence. Students are expected to show up prepared to class and participate during class activities. Students who know they will need to miss a class for a legitimate reason should contact the instructor before the class. Students who unexpectedly miss a class for an excused reason should contact the instructor within 24 hours of missing the class. Make-up tests, quizzes, assignments, or other grades will be granted for excused absences only. Excused absences include: serious illness, official university excused absences and extenuating circumstances. It is the student's responsibility to contact the instructor in order to obtain the make-up work.

Attendance and Participation Evaluation: Attendance will be documented for all classes.

Communication (25% of Professionalism Grade) – When communicating with the instructor and classmates, either face-to-face or via email, students should address the other person appropriately, use appropriate language and maintain a pleasant demeanor.

Example email with instructor:

Dr. Martin,

I have a question regarding....

Regards,

Student's Name

Example in-person interaction with instructor:

Student: Professor (*instructor's last name*) I have a question regarding....

Professor: (Student's name) I would be happy to help you. What is your question?

Student: My question is.....

Professor: The answer to that question is...

Student: Professor (*instructor's last name*) thank you for your time and availability to answer my questions.

Communication Evaluation: All students will start with 25%. For every instance in which the student does not use proper communication 5% will be deducted from 25%. All incidents will be documented by the instructor. The Professor reserves the right to not answer emails and questions in person, if the student does not appropriately address the Professor.

Responsibility/Accountability/ Honesty/Integrity (20% of Professionalism Grade) – Professionals take responsibility for their actions and are accountable. This can occur at multiple levels but generally consists of completing assignments on time, submitting work that is of the appropriate quality, honoring commitments and owning up to mistakes. Students are expected to be honest with the instructor, classmates and themselves. Professionals keep their word when committing to something and act in an ethical manner. See George Mason University policy for further guidance.

Responsibility/Accountability/ Honesty/Integrity Evaluation: All students will start with 20%. For every instance in which the student is irresponsibility, not accountable for their actions, dishonest or fail to act in an ethical manner 10% will be deducted from 20%. All incidents will be documented by the instructor.

Self-Improvement/Self-awareness (5% of Professionalism Grade) – One should be aware of their strengths/weaknesses and constantly seek to improve. Professionals regularly seek out opportunities to increase their knowledge and improve their current skill set. Specific to this class an example of how a student may demonstrate self-improvement/self-awareness is by attending office hours following a poor grade on an exam or assignment.

Self-Improvement/Self-awareness Evaluation: All students will start with 5%. For every instance in which the student does not take advantage of an opportunity to increase their knowledge in the subject area of the class and/or their personal skill set 1% will be deducted from 5%. All incidents will be documented by the instructor.

- **Other Requirements**

- **Email Correspondence**

- Only messages that originate from a George Mason University email address will be accepted.

- **Technology Use During Class**

- As per GMU policy, all sound emitting technology is required to be turned off during the class meeting time. No sound emitting technology (e.g., cell phones, smart phones, iPads, Tablets, pagers, etc.) is allowed at any time during the class period. Students who are observed using any form of technology inappropriately (e.g., sending text messages from cell phones, visiting social networking sites from laptops, etc.) will be dismissed from class for the day, counted as an absence, and not permitted to make up missed assignments.

- **Course Performance Evaluation Weighting**

This course will be graded on a point system, with a total of 100 possible points.

Assignments

Points

| | | |
|-------|---------------------|-----|
| #1 | Exam I | 15 |
| #2 | Exam II | 15 |
| #3 | Final Exam | 20 |
| #4 | Unannounced Quizzes | 5 |
| #5 | Lab Reports | 20 |
| #6 | Lab Exam | 15 |
| #7 | Professionalism | 10 |
| TOTAL | | 100 |

- **Grading Policies**

The student's final letter grade will be earned based on the following scale:

Grading Scale

| | | | |
|--------------|--------------|--------------|-------------|
| A = 94 – 100 | B+ = 88 – 89 | C+ = 78 – 79 | D = 60 – 69 |
| A- = 90 – 93 | B = 84 – 87 | C = 74 – 77 | F = 0 – 59 |
| | B- = 80 – 83 | C- = 70 – 73 | |

Note: * Although a B- is a satisfactory grade for a course, students must maintain a 3.00 average in their degree program and present a 3.00 GPA on the courses listed on the graduation application.

Professional Dispositions

Students are expected to exhibit professional behaviors and dispositions at all times.

Core Values Commitment

The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles: <http://cehd.gmu.edu/values/>.

GMU Policies and Resources for Students

Policies

- Students must adhere to the guidelines of the Mason Honor Code (see <http://oai.gmu.edu/the-mason-honor-code/>).
- Students must follow the university policy for Responsible Use of Computing (see <http://universitypolicy.gmu.edu/policies/responsible-use-of-computing/>).
- Students are responsible for the content of university communications sent to their Mason email account and are required to activate their account and check it regularly. All communication from

the university, college, school, and program will be sent to students **solely** through their Mason email account.

- Students with disabilities who seek accommodations in a course must be registered with George Mason University Disability Services. Approved accommodations will begin at the time the written letter from Disability Services is received by the instructor (see <http://ods.gmu.edu/>).
- Students must follow the university policy stating that all sound emitting devices shall be silenced during class unless otherwise authorized by the instructor.

Campus Resources

- Support for submission of assignments to Tk20 should be directed to tk20help@gmu.edu or <https://cehd.gmu.edu/api/tk20>. Questions or concerns regarding use of Blackboard should be directed to <http://coursesupport.gmu.edu/>.
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing (see <http://writingcenter.gmu.edu/>).
- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance (see <http://caps.gmu.edu/>).
- The George Mason University Office of Student Support staff helps students negotiate life situations by connecting them with appropriate campus and off-campus resources. Students in need of these services may contact the office by phone (703-993-5376). Concerned students, faculty and staff may also make a referral to express concern for the safety or well-being of a Mason student or the community by going to <http://studentsupport.gmu.edu/>, and the OSS staff will follow up with the student.

For additional information on the College of Education and Human Development, please visit our website <https://cehd.gmu.edu/>.

Class Schedule

| Date | Topic | Chapter/Assignment Due Date |
|-----------------------|--|--|
| Aug 30 ^T | Introduction to KINE 400 Introduction to course and labs What's worth knowing? Questions and Answers | Introduction Chapter |
| Sept 1 TH | Basic Terminology / Skeletal Considerations for Movement / Overview of Functional Anatomy / Movement Screens | Chapter 10, 11 & 12 |
| Sept 6 ^T | Mechanical Properties of Tissues | Chapter 9 |
| Sept 8 TH | Activity Lab #1 – Math Review <i>Location: 246 Bull Run Hall</i> | |
| Sept 13 ^T | Linear Kinematics | Chapter 2 |
| Sept 15 TH | Activity Lab #2 – Biomaterials <i>Location: 246 Bull Run Hall</i> | Lab report #1 is due |
| Sept 20 ^T | Linear Kinematics | Chapter 2 |
| Sept 22 TH | Activity Lab #3 – Linear Kinematics <i>Location: 246 Bull Run Hall</i> | Lab report #2 is due |
| Sept 27 ^T | Angular Kinematics | Chapter 6 |
| Sept 29 TH | Activity Lab #4 – Projectile Motion <i>Location: 246 Bull Run Hall</i> | Lab report #3 is due |
| Oct 4 ^T | Angular Kinematics | Chapter 6 |
| Oct 6 TH | EXAM I | Lab report #4 is due |
| Oct 11 ^T | <i>NO CLASS – Columbus Day Recess</i> <i>You will have your Monday classes today</i> | |
| Oct 13 TH | Linear Kinetics | Chapter 3 |
| Oct 18 ^T | Linear Kinetics | Chapter 4 & 8 |
| Oct 20 TH | Anthropometry & Inertial Properties of Body Segments Activity Lab #5 – Segmental Inertia Properties <i>Location: 246 Bull Run Hall</i> | Add Book Chapter |
| Oct 25 ^T | Angular Kinetics | Chapter 5 & 7 |
| Oct 27 TH | Activity Lab #6 – Moment of Inertia <i>Location: SMART Lab - 9438 Innovation Loop</i> | Lab report #5 is due Chapter 5 & 7 |

| | | |
|--|---|-----------------------------|
| Nov 1 ^T | Angular Kinetics | |
| Nov 3 TH | Activity Lab #7 – Center of Mass <i>Location: SMART Lab - 9438 Innovation Loop</i> | Lab report #6 is due |
| Nov 8 ^T | Angular Kinetics / Work, Power & Energy | |
| Nov 10 TH | Activity Lab #8 – Angular Momentum / Work, Power & Energy <i>Location: 246 Bull Run Hall</i> | Lab report #7 is due |
| Nov 15 ^T | Angular Kinetics / Review | |
| Nov 17 TH | EXAM II | Lab report #8 is due |
| Nov 22 ^T | Instrumentation | |
| Nov 24 TH | <i>No Class – Thanksgiving Recess</i> | |
| Nov 29 ^T | Electromyography | Chapter 13, 14, 15 & 16 |
| Dec 1 TH | Activity Lab #9 – EMG <i>Location: SMART Lab - 9438 Innovation Loop</i> | |
| Dec 6 ^T | Lab Exam Review | Lab report #9 is due |
| Dec 8 TH | Lab Exam /Final Exam Review | |
| Dec 15 TH | Final Exam: 10:30 AM – 1:15 PM | |
| <i>Note: The instructor reserves the right to make changes to the course syllabus and/or schedule at any time. Students will always be informed of any changes made.</i> | | |

Note: Faculty reserves the right to alter the schedule as necessary, with notification to students.

Student Acknowledgement of Syllabus

I, _____, by signing below, attest to the following:

(Print First and Last Name)

*I have read the course syllabus for KINE 400 in its entirety, and I understand the policies contained therein. This syllabus serves as a binding contract for KINE 400 between the instructor and me.

*I have a clear understanding of the due dates for assignments and examinations, and I accept responsibility for the material.

*I am aware that failure to submit assignments by the dates assigned will result in no points awarded as late work will not be accepted.

*I understand that if I am using emitting sound technology or personal computers I will be dismissed from class for the day, counted as an absence, and not permitted to make up missed assignments

*I understand the instructor reserves the right to alter the provided schedules as necessary and I am responsible for the assignments and examination dates for the most current version of the syllabus schedule.

*I accept responsibility for reading announcements that are sent to me via e-mail through Blackboard/MyMason Portal; it is my responsibility to access my Blackboard/MyMason Portal e-mail for messages, or forward Blackboard/MyMason Portal e-mail as per the directions provided in the syllabus.

(Signature)

(Date)

(Student Copy: This copy should remain attached to your syllabus)



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(Signature)

(Date)

(Instructor Copy: Submit to the instructor at the end of the first class meeting)