

GEORGE MASON UNIVERSITY  
School of Recreation, Health and Tourism

KINE 400-003 — Biomechanics (3)  
Fall 2014

DAY/TIME:	MW 3:00 – 4 :15 pm	LOCATION:	Bull Run 246/SMART LAB
PROFESSOR:	Dr. Joel Martin	EMAIL ADDRESS:	jmarti38@gmu.edu
OFFICE LOCATION:	Bull Run Hall 207	PHONE NUMBER:	703-993-7607
OFFICE HOURS:	Wednesday 1 – 3 pm	FAX NUMBER:	703-993-8888

**PREREQUISITES:**

BIOL 124, BIOL 125, ATEP 300, KINE 360

**COURSE CATALOG 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 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.

**SPECIAL REQUIREMENTS:**

This course requires a laboratory fee of \$25.00 payable to George Mason University. This fee is due at the beginning of the second-class meeting (August 27, 2014) and you need to pay online at: <http://rht.gmu.edu/course-fees> or you can bring a check to 220 Bull Run Hall. You should make your check payable to George Mason University and in the Memo section write in “KINE 400 Lab Fee.” A receipt will be issued to you upon payment.

## ACCREDITATION 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):

<b>KSA</b>	<b>Description</b>	<b>Lecture, Lab, or both</b>
	<b>GENERAL POPULATION/CORE: EXERCISE PHYSIOLOGY AND RELATED EXERCISE SCIENCE</b>	
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

### **E-mail Correspondence**

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

### **NATURE OF COURSE DELIVERY**

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

### **REQUIRED READINGS**

McGinnis, Peter. Biomechanics of Sport and Exercise, 3<sup>rd</sup> 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.

### **EVALUATION**

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.

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	Independent Study Paper	10
#5	Lab Reports	20

#6 Independent Study Presentation	10
#7 Professionalism	10
TOTAL	100

### Course Grading Scale:

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	

### 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.

### Independent Study Paper (Course objectives 2, 3, 4 & 5)

Students will be required to independently study and write a short review paper on a specific topic. The purpose of this assignment is to allow students to explore a topic they are interested in related to the field of biomechanics but is not covered in depth in the class. The paper must be between 3-5 pages long. A list of topics will be made available on Blackboard. Students must choose a topic from the list and cannot do the same topic as another member of the class. Topics will be approved on a first come first serve basis. **The topic needs to be chosen by September 31, 2014**

### Independent Study Presentation (Course objectives 2, 3, 4 & 5)

Each student will give a brief presentation on the respective independent study paper. The intent of the presentation is to teach the other members of the class about the topic you chose. The presentations must be no longer than 5 minutes.

### Labs and Lab Reports (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.

**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.

**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.

**Honor Code**

Students are held to the standards of the George Mason University Honor Code (see <http://honorcode.gmu.edu> for details). Violations, including cheating and plagiarism, will be reported to the Honor Committee. Student assignments may be put through plagiarism detecting software, and if the outcome of the software analysis raises questions the student will be held accountable and normal Mason Honor Code procedures will be set in place.

**TENTATIVE COURSE SCHEDULE**

<b>Date</b>	<b>Topic</b>	<b>Chapter/Assignment Due Date</b>
Aug 25 <sup>M</sup>	Introduction to KINE 400 Introduction to course and labs What's worth knowing? Questions and Answers	
Aug 27 <sup>W</sup>	Why study biomechanics Difference between Kinesiology & Biomechanics Instrumentation used in Biomechanics	<b>Lab fee is due</b> Introduction Chapter
Sept 1 <sup>M</sup>	<b>NO CLASS – Labor Day</b>	
Sept 3 <sup>W</sup>	Basic Terminology / Skeletal Considerations for Movement / Overview of Functional Anatomy	Chapter 10, 11 & 12
Sept 8 <sup>M</sup>	Activity Lab #1 – Math Review <i>Location: 246 Bull Run Hall</i>	
Sept 10 <sup>W</sup>	Linear Kinematics	Chapter 2
Sept 15 <sup>M</sup>	Activity Lab #2 – Biomaterials <i>Location: 246 Bull Run Hall</i>	<b>Lab report #1 is due</b>
Sept 17 <sup>W</sup>	Linear Kinematics	Chapter 2
Sept 22 <sup>M</sup>	Activity Lab #3 – Linear Kinematics <i>Location: Meet in 246 Bull Run Hall</i>	<b>Lab report #2 is due</b>
Sept 24 <sup>W</sup>	Angular Kinematics	Chapter 6
Sept 29 <sup>M</sup>	Activity Lab #4 – Projectile Motion <i>Location: Meet in 246 Bull Run Hall</i>	<b>Lab report #3 is due</b>
Oct 1 <sup>W</sup>	Angular Kinematics	Chapter 6
Oct 6 <sup>M</sup>	<b>EXAM I</b>	<b>Lab report #4 is due</b>
Oct 8 <sup>W</sup>	Linear Kinetics	Chapter 3
Oct 14 <sup>T</sup>	Linear Kinetics	Chapter 4 & 8
Oct 15 <sup>W</sup>	Activity Lab #5 – Moment of Inertia <i>Location: SMART Lab - 9438 Innovation Loop</i>	
Oct 20 <sup>M</sup>	Angular Kinetics	Chapter 5 & 7
Oct 22 <sup>W</sup>	Activity Lab #6 – Angular Momentum <i>Location: 246 Bull Run Hall</i>	<b>Lab report #5 is due</b>

Oct 27 <sup>M</sup>	Angular Kinetics	Chapter 5 & 7
Oct 29 <sup>W</sup>	Activity Lab #7 – Center of Mass/Anthropometry <i>Location: SMART Lab - 9438 Innovation Loop</i>	<b>Lab report #6 is due</b>
Nov 3 <sup>M</sup>	<b>EXAM II</b>	
Nov 5 <sup>W</sup>	Instrumentation Lecture	<b>Lab report #7 is due</b> Chapter 13, 14, 15 & 16
Nov 10 <sup>M</sup>	<b><i>In-Class Workday for Research Projects</i></b>	
Nov 12 <sup>W</sup>	Activity Lab #8 – Segmental Inertia Properties <i>Location: Meet in 246 Bull Run Hall</i>	
Nov 17 <sup>M</sup>	Electromyography Lecture	
Nov 19 <sup>W</sup>	Activity Lab #9 – EMG <i>Location: SMART Lab - 9438 Innovation Loop</i>	<b>Lab report #8 is due</b>
Nov 24 <sup>M</sup>	Presentations	<b>Presentations Slides Due by 3 pm</b>
Nov 26 <sup>W</sup>	<b><i>No Class – Thanksgiving Recess</i></b>	
Dec 1 <sup>M</sup>	Presentations	<b>Lab report #9 is due</b> <b>Independent Study Paper Due by Midnight</b>
Dec 3 <sup>W</sup>	Presentations/Final Exam Review	
Dec 15 <sup>M</sup>	<b>Final Exam: 1:30 – 4:15 PM</b>	
<b><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></b>		

### *Student Expectations*

- Students must adhere to the guidelines of the George Mason University Honor Code [See <http://oai.gmu.edu/honor-code/>].
- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See <http://ods.gmu.edu/>].
- 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 George Mason University 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 must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.

### *Campus Resources*

- 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 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/>].
- For additional information on the College of Education and Human Development, School of Recreation, Health, and Tourism, please visit our website [See <http://rht.gmu.edu>].

**PROFESSIONAL BEHAVIOR:** 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.





## 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)***