

**George Mason University**  
**College of Education and Human Development**  
**Kinesiology**

KINE 400.A01 - Biomechanics  
3 Credits, Summer 2018  
MTWR: 10:30AM – 12:35PM  
249 Bull Run Hall– Science and Technology Campus

**Faculty**

Name: Dr. Nelson Cortes  
Office hours: by appointment  
Office location: 208 Bull Run Hall  
Office phone: 703-993-9257  
Email address: [ncortes@gmu.edu](mailto:ncortes@gmu.edu)  
Teaching Assistant: Mr. Bryndan Lindsey / [blindse3@gmu.edu](mailto:blindse3@gmu.edu)

**Prerequisites/Corequisites**

C or higher in 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**

This course is designed to enable students to do the following:

- 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):

<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

### **Required Texts**

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.

### **Course Performance Evaluation**

Students are expected to submit all assignments on time in the manner outlined by the instructor (e.g., Blackboard, Tk20, hard copy).

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**

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

Each student will be required to complete four quizzes and a final exam. The final exam will be cumulative. The format for all quizzes 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. The final exam will assess cumulative knowledge from this course.

#### **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. Lab reports must

be typed and include a cover sheet. Calculations may be hand written. Each lab report carries 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. Cortes,

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. *Emails with no subject or no text in the body will not be acknowledged.* All email will be responded to in the order in which it is received. Students should allow 48 hours for a response.

- **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.

<b>Assignments</b>	<b>Points</b>
#1 Quizzes (10 points each * 4)	40
#2 Lab Reports	20
#3 Lab Exam	10
#4 Final Exam	20
<hr/>	
TOTAL	100

- **Grading**

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**

See <https://cehd.gmu.edu/students/polices-procedures/>

## Class Schedule

Date	Topic	Chapter/Assignment Due Date
May 21 <sup>M</sup>	Introduction to KINE 400 Introduction to course and labs What's worth knowing? Questions and Answers	Introduction Chapter Dr. Cortes
May 22 <sup>T</sup>	Lab #1 – Introductory Basic Terminology / Skeletal Considerations for Movement / Overview of Functional Anatomy / Movement Screens	Chapter 10, 11 & 12 Chapter 9 Mr. Lindsey
May 23 <sup>W</sup>	Linear Kinematics	Chapter 2 Mr. Lindsey
May 24 <sup>R</sup>	Linear Kinematics Lab #2 – Linear Kinematics	Chapter 2 Mr. Lindsey
May 28 <sup>M</sup>	<i>No Class – Memorial Day</i>	
May 29 <sup>T</sup>	Projectile Motion	Chapter 2 Dr. Cortes <b>Lab #2 due</b>
May 30 <sup>W</sup>	<b>Quiz #1</b> Forces & Linear Kinetics Lab #3 – Projectile Motion	Chapter 1, 3 Dr. Martin
May 31 <sup>R</sup>	Linear Kinetics, Fluid Mechanics & Work, Power, Energy	Chapter 3, 8, 4 Dr. Martin
June 4 <sup>M</sup>	Lab 4 – Ground Reaction Forces <i>9438 Innovation Loop</i>	Chapter 3, 4 & 8 Mr. Lindsey <b>Lab #3 due</b>
June 5 <sup>T</sup>	Angular Kinematics Lab 5 – Work, Power, Energy <i>9438 Innovation Loop</i>	Chapter 6 Mr. Lindsey
June 6 <sup>W</sup>	Angular Kinematics	Chapter 6 Mr. Lindsey <b>Lab #4 due</b>
June 7 <sup>R</sup>	<b>Quiz #2</b> Angular Kinetics Lab 6 – Angular Kinematics	Chapter 7 Mr. Lindsey
June 11 <sup>M</sup>	Lab 7 – Moment of Inertia, CoM & Angular Moment <i>9438 Innovation Loop</i>	Mr. Lindsey <b>Lab #5 due</b>
June 12 <sup>T</sup>	Mechanical Properties of Biological Tissues Internal forces & torques / Anthropometry	Chapter 9 Dr. Cortes <b>Lab #6 due</b>
June 13 <sup>W</sup>	Lab 8 – Mechanical Properties of Biological Tissues	Mr. Lindsey

June 14 <sup>R</sup>	<b>Quiz #3</b> Lab 9 – Anthropometry	Mr. Lindsey <b>Lab #7 due</b>
June 18 <sup>M</sup>	Technology & Instrumentation Application of Principles: technique, training, injury	Chapter 13, 14, 15, 16 Mr. Lindsey
June 19 <sup>T</sup>	<b>Quiz #4</b> In Class Work Day on Lab Reports	Mr. Lindsey <b>Lab #8 &amp; 9 due</b>
June 20 <sup>W</sup>	<b>Lab Exam: 10:30AM – 1:15PM</b>	Mr. Lindsey
June 21 <sup>R</sup>	<b>Final Exam: 10:30AM – 1:15PM</b>	Mr. Lindsey

*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.*

## 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](mailto:tk20help@gmu.edu) or <https://cehd.gmu.edu/aero/tk20>. Questions or concerns regarding use of Blackboard should be directed to <http://coursessupport.gmu.edu/>.
- For information on student support resources on campus, see <https://ctfe.gmu.edu/teaching/student-support-resources-on-campus>

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



### 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)

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