George Mason University
College of Education and Human Development
Kinesiology

KINE 400.003 - Biomechanics
3 Credits, Fall 2019
T/TH: 12:00 – 1:15 PM
258 Katherine Johnson Hall – Science and Technology Campus

Faculty

Name: Bryndan Lindsey
Office hours: By appointment
Office location: 220B Bull Run Hall
Email address: 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):

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 (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**

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)*
Quizzes may be given unannounced during the semester. The format of quizzes may be true/false, multiple choice, short answer and/or problem solving.

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 (aside from the introductory lab which will be due the next day). Lab reports must be typed and include a cover sheet. Only calculations or figures (not graphs) 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.

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:
Mr. Eddo,

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.

Responsibility/Accountability/ Honesty/Integrity– 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.

Self-Improvement/Self-awareness– 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.

Professionalism evaluation – *Any professionalism violation will be documented by the instructor. Violations will result in a 1-point deduction from the final average. In extreme cases the student may be dismissed from the class at the discretion of 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.

Assignments		**Points**
#1	Exam I	15
#2	Exam II	15
#3	Final Exam	15
#4	Homework Assignments	10

#5	Lab Reports	25
#6	Lab Exam	10
#7	Professionalism	10
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	

Notes:
1) 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.
2) Any student asking for their grade to be rounded up, increased a letter grade, extra credit only for themselves at the end of the semester, etc. may have their final average reduced by up to 2 points at the discretion of the instructor.

Professional Dispositions

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

Class Schedule

Date	Topic	Chapter/Assignment Due
Aug 26[M]	Introduction to KINE 400 Introduction to course and labs What's worth knowing? Questions and Answers Lab 1 - Introductory Lab	Introductory Chapter
Aug 28[W]	Linear Kinematics	Chapter 2 **Lab 1 Due**
Sept 2[M]	**NO CLASS – Labor Day**	
Sept 4[W]	Linear Kinematics	Chapter 2 **Lab 1 Due**
Sept 9[M]	Lab 2 – Linear Kinematics *Location: Meet in 248 Bull Run Hall*	Chapter 2
Sept 11[W]	Projectile Motion	Chapter 2
Sept 16[M]	Lab 3 – Projectile motion *Location: Meet in 248 Bull Run Hall*	Chapter 2 **Lab 2 Due**
Sept 18[W]	Forces and Linear Kinetics	Chapter 1, 3
Sept 23[M]	Lab 4 – Ground reaction forces *Location: SMART Lab - 9438 Innovation Loop*	Chapter 1, 3 **Lab 3 Due**
Sept 25[W]	Linear Kinetics, Fluid Mechanics & Work, Power, Energy	Chapter 4, 8
Sept 30[M]	Lab 5 - Work, Power & Energy *Location: SMART Lab, Freedom Aquatic and Fitness Center*	Chapter 4, 8 **Lab 4 Due**
Oct 2[W]	Exam 1 Review	
Oct 7[M]	**Exam 1**	
Oct 9[W]	Angular Kinematics	Chapter 6 **Lab 5 Due**
Oct 15[T]	Lab 6 – Angular Kinematics	
Oct 16[W]	Angular Kinetics	Chapter 5, 7
Oct 21[M]	Angular Kinetics	**Lab 6 Due**
Oct 23[W]	Lab 7 – COM and Angular Momentum *Location: Innovation lab*	Articles on Blackboard

Oct 28[M]	Mechanical Properties of Biological Tissues	Chapter 9
Oct 30[W]	Lab 8 –Mechanical Properties of Biological Tissues *Location: Meet in 248 Bull Run Hall*	**Lab 7 due**
Nov 4[M]	Neuromuscular Control of Movement	Articles on Blackboard
Nov 6[W]	Lab 9 – Isokinetic Testing	**Lab 8 Due** Chapter 9
Nov 11[M]	Review for Exam 2	
Nov 13[W]	**Exam 2**	Lab 9 Due
Nov 18[M]	Technology & Instrumentation	Chapter 16 **Lab 9 Due**
Nov 20[W]	Lab 10 – EMG Location: SMART Lab – 9438 Innovation Loop	
Nov 25[M]	Technology & Instrumentation	
Nov 27[W]	**No Class – Thanksgiving**	Chapter 13, 14
Dec 2[M]	Final Review	**Lab 10 Due**
Dec 4[W]	**Lab Exam**	
Dec 11[W]	**Final Exam: 1:30 – 4:15 PM**	

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

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/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/ **.**