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American Public University System

The Ultimate Advantage is an Educated Mind

School of Management

Department of Sports and Health Sciences

SPHE324

Biomechanics

3 Credit Hours

8 weeks

Prerequisite(s): None

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Instructor Information

[\(Biography\)](#)

Instructor:

Email:

Office Hours:

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Course Description (Catalog)

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Students in this course will use qualitative and quantitative analysis to understand the biomechanics of human movement. This course will focus on biomechanics in sports and how biomechanical evaluation can improve performance and prevent injuries. Through the use of videos and personal observations, students will learn to apply mathematical equations to various sports skills to develop an understanding of how the laws of physics affect performance. Linear and angular kinematics and kinetics will be applied to sport skills. Students will complete a course project which will require the student to observe a sport skill, qualitatively analyze the athlete performing the skill and make recommendations for improvement. It is highly recommended that students complete College Algebra and Physics before taking this course. [Table of Contents](#)

Course Scope

This course in biomechanics will encompass various aspects of athletic development and improvement including proper technique, the physics of human movement and ways to improve performance.

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Course Objectives

After successfully completing this course, students will fulfill the following **Learning Objectives** (L.O.):

1. define a movement system and determine the nature of the system's movement (i.e., linear, angular, general motion).
- 2: appropriately represent kinematic and kinetic quantities as vectors and use vectors, vector addition, and vector resolution to enhance the understanding of basic mechanical concepts (e.g., impact of the direction of resultant force application (external forces), the effect of changes in line of muscle pull upon the amount of force used to rotate a segment (internal forces)).

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3: define the basic terms of distance, displacement, speed, velocity, and acceleration as they relate to linear and angular motion in human movements.

4: define buoyancy, drag, lift and discuss the theories regarding fluid forces.

5: explain the kinematic relationships between linear and angular motion and apply this relationship to improve motor skill performance (e.g., striking, throwing, kicking) and equipment design (e.g., sport, rehabilitation, work environment).

6: describe how the variables of release height, angle, and velocity affect projectile motion and apply these variables to a projectile activity to optimize performance.

7: define basic terms (e.g., force, inertia, mass, and weight) as they relate to linear motion in human movement.

8: define basic terms (e.g., torque, moment, moment of inertia, moment arm, radius) as they relate to angular motion.

9: state the linear and angular forms of Newton's laws of motion and explain the relationship between the observed movements of a body experiencing linear or angular motion and the forces/torques responsible for that motion.

10: explain the effects of weight, normal reaction, and friction upon motor performance.

11: estimate the location of the center of gravity of

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persons in any position and describe how changes in location of the center of gravity and other mechanical factors that influence stability.

12: identify and explain the importance of impulse-momentum, work-energy, and the conservation of momentum to the production of effective human movements

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Course Delivery Method

This course delivered via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. Online assignments are due by Sunday evening of the week as noted and include Forum questions (accomplished in groups through a threaded forum), examination, and individual assignments submitted for review by the Faculty Member). Assigned faculty will support the students throughout this eight-week course.

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Course Resources

Required Course Textbooks:

Book Number	Authors	Book Title	Publication Info	ISBN
SPHE324-0	Susan Hall	Basic Biomechanics	McGraw Hill	978-0-07-37644-8

Required Readings: See Course Outline

Additional Resources: In the Course Materials folder there are additional course articles and up to date APA handouts.

Web Sites:

In addition to the required course texts, the following public domain web sites are useful. Please abide by the university's academic honesty policy when using Internet sources as well. Note web site addresses are subject to change.

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Site Name	Web Site URL/Address
APA Style Homepage	http://www.apastyle.org/index.aspx
Purdue Owl APA website	http://owl.english.purdue.edu/owl/resource/560/01/
NATA	http://nata.org

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Evaluation Procedures

Reading Assignments: Will be evaluated as demonstrated in forum discussions.

Supplemental Readings:

Forum Assignments: Introduction forum will require a post of at least 300 words due by Sunday 11:59 PM EST week one. All other forums require an initial post of at least 300 words due by Thurs 11:59 PM EST of the assigned week and at least 2 responses to classmates of at least 200 words by Sunday 11:59 PM EST of the assigned week. Please see forum description for rubric.

Homework Assignments: Please see description in class for evaluation procedures and rubric.

Quizzes:

- Quizzes cover the reading each week and are multiple choice and fill in the blank/essay questions.
- Please see description in class for evaluation procedures and rubric.

Field Experience Assignments: NA

Final Project: Your required course paper should be between 8-10 pages in length and you may not include the title page or reference pages as part of your 8-10 pages of required content. The paper should be presented in APA format and double spaced. You must have approval of your topic by your professor prior to beginning your course paper.

You will select a specific movement pattern in a sport. You will provide information on how to perform the movement correctly. This is to be determined by researching how to do it properly, not using your personal experience. You will observe someone perform this movement. You must be with the person while they perform it and be able to discuss the performance with the

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person. YouTube videos or other videos from the internet can not be used for this project. After observing the individual, you will make recommendations for that specific person to improve the performance. Plagiarism in any form is not acceptable. Plagiarism is subject to current APUS policies. Your paper should have at least 5 references . Your textbook can be used for the paper but does not count as one of the 5 references. Only peer reviewed journals and textbooks may be used. Websites are not allowed to be used for this paper. Please see description in class for rubric.

Evaluation Procedures	
Graded Items	Percent of Grade
Forums 1-8	26.67
Quizzes	40
Final Project	33.33
Total	100

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8 – Week Course Outline

Please see the [Student Handbook](#) to reference the University's [grading scale](#).

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<u>Week</u>	<u>Topic</u>	<u>Learning Objectives</u>	<u>Readings</u>	<u>Assignment</u>
1	Introduction to biomechanics	LO 1	<p>Text Readings: Hall, Chapter 1 What is Biomechanics</p> <p>In Course Materials:</p>	<p>Forum Post #1</p> <p>Quiz 1</p>

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			<i>Lesson Packet 1</i>	
2	Kinematic and Kinetic Concepts for analyzing human motion	LO 2,8	Text Readings: Hall, Chapters 2 & 3 In Course Materials: <i>Lesson Packet 2</i>	Forum Post #2 Quiz #2
3	Linear Kinematics	LO 3,5,6	Text Readings: Hall, Chapter 10 In Course Materials: <i>Lesson Packet 3</i>	Forum Post #3 Quiz 3
4	Angular Kinematics	LO 5	Text Readings: Hall, Chapter 11 In Course Materials: <i>Lesson Packet 4</i>	Forum Post #4 Quiz 4
5	Linear Kinetics	LO 9,12	Text Readings: Hall, Chapter 12 In Course Materials: <i>Lesson Packet 5</i>	Forum Post #5 Quiz 5
6	Equilibrium and Human Movement	LO 8,11	Text Readings: Hall Chapter 13 In Course Materials: <i>Lesson Packet 6</i> Website:	Forum Post #6 Quiz 6
7	Angular Kinetics	LO 7, 10	Text Readings: Hall, Chapter 14 In Course Materials:	Forum Post #7 Quiz 7

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			<i>Lesson Packet 7</i>	
8	Human Movement in a fluid medium	LO 4	Text Readings: Hall, Chapter 15 In Course Materials: <i>Lesson Packet 8</i>	Forum Post #8 Final Paper) Quiz 8

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Policies

Please see the [Student Handbook](#) to reference all University policies. Quick links to frequently asked question about policies are listed below.

[Drop/Withdrawal Policy](#)

[Plagiarism Policy](#)

[Extension Process and Policy](#)

[Disability Accommodations](#)

Writing Expectations

All written submissions should be submitted in a font and page set-up that is readable and organized. It is recommended that students try to adhere to a consistent format, which is described below.

- Typewritten in double-spaced format with a readable style and font submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- Arial 12-point font or Times New Roman styles.
- Page margins Top, Bottom, Left Side and Right Side = 1 inch, with reasonable accommodation made for special situations and online submission variances.

Citation and Reference Style

Attention Please: Students will follow the APA format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in APA format.

Late Assignments

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Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. As adults, students, and working professionals, I understand you must manage competing demands on your time. Should you need additional time to complete an assignment, please contact me before the due date so we can discuss the situation and determine an acceptable resolution. Routine submission of late assignments is unacceptable and may result in points deducted from your final course grade. Late forum assignments are not accepted. If you post an initial post after Thursday at midnight (except for week 1), you will not receive any points for the post. Responses are due by Sunday at midnight. Any responses submitted after that will receive a zero.

Netiquette

Online universities promote the advancement of knowledge through positive and constructive debate – both inside and outside the classroom. Forums on the Internet, however, can occasionally degenerate into needless insults and “flaming.” Such activity and the loss of good manners are not acceptable in a university setting – basic academic rules of good behavior and proper “Netiquette” must persist. Remember that you are in a place for the rewards and excitement of learning which does not include descent to personal attacks or student attempts to stifle the Forum of others.

- **Technology Limitations:** While you should feel free to explore the full-range of creative composition in your formal papers, keep e-mail layouts simple. The Sakai classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.
- **Humor Note:** Despite the best of intentions, jokes and especially satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add “emoticons” to help alert your readers: ;-), :), ☺

Disclaimer Statement

Course content may vary from the outline to meet the needs of this particular group.

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Online Library

The Online Library is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search

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engines on the open Web. In addition, the Online Library provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to librarian@apus.edu.

- **Charles Town Library and Inter Library Loan:** The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.
- **Electronic Books:** You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- **Electronic Journals:** The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.
- **Tutor.com:** AMU and APU Civilian & Coast Guard students are eligible for 10 free hours of tutoring provided by APUS. [Tutor.com](http://tutor.com) connects you with a professional tutor online 24/7 to provide help with assignments, studying, test prep, resume writing, and more. Tutor.com is tutoring the way it was meant to be. You get expert tutoring whenever you need help, and you work one-to-one with your tutor in your online classroom on your specific problem until it is done.

Request a Library Guide for your course (<http://apus.libguides.com/index.php>)

The AMU/APU Library Guides provide access to collections of trusted sites on the Open Web and licensed resources on the Deep Web. The following are specially tailored for academic research at APUS:

- Program Portals contain topical and methodological resources to help launch general research in the degree program. To locate, search by department name, or navigate by school.
- Course Lib-Guides narrow the focus to relevant resources for the corresponding course. To locate, search by class code (e.g., SOCI111), or class name.

If a guide you need is not available yet, please email the APUS Library: librarian@apus.edu.

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Turnitin.com

Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. Typically the course professor will establish a Turnitin.com access code for his/her classes. If the code has

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not been established, those who wish to use Turnitin.com may ask their professor to establish the code.

Selected Bibliography

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