

University of Nevada, Las Vegas
Department of Kinesiology and Nutrition Sciences
KIN 736: Biomechanical Applications in Kinesiology
3 credits

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Course Objective and Learning Outcomes

This primary objective of this course is to provide an in-depth investigation of the application of biomechanical concepts to understand, describe, interpret, analyze and evaluate human movement. This objective will be met via the following learning outcomes:

Learning Outcome	Learning Activities	Assessment Rubric*
Use precise, well-defined terminology to describe structure and function of the system (ie, movement assessment)	Lecture Content; Textbook Reading; Exploration of Biomechanics Research Literature	Homework; Midterm Exam; Semester Project Presentation; Application
Develop an appreciation of the scope and nature of biomechanics including biomechanics laboratory research and research literature	Lecture Content; Evaluation of sample research data; Research literature; WebCampus ancillary reference material; Semester project	Quizzes; Homework; Semester Project Comprehension
Develop an understanding of and ability to apply concepts of tissue mechanics to human movement	Lecture content; Textbook Reading (Ch 1-3)	Quizzes; Homework; Midterm and Final Exams Analysis
Develop an understanding of and ability to quantify linear and angular motion (kinematics)	Textbook Reading (Ch 8-9); Attend Lectures on Content; WebCampus Ancillary Study Materials; Study Problems	Quizzes; Homework; Midterm and Final Exams Synthesis
Develop an understanding of and ability to quantify the causes of linear and angular motion (kinetics) including Newton's laws of motion	Textbook Reading (Ch 10-11); Attend Lectures on Content; WebCampus Ancillary Study Materials; Study Problems	Quizzes; Homework; Final Exam Synthesis
Develop an understanding of the various applications of internal and external forces on the human body	Practice Problems; Lecture Content	Quizzes, Homework, Midterm and Final Exams Synthesis
Develop an understanding of measurement tools and	MaxTrac Software, Evaluation of biomechanical data provided	Quizzes, Homework; Semester Project; Midterm and Final

instrumentation techniques used in biomechanics	in course text; Practice problems; Semester project	Exams Analysis
Completion of semester project	Synthesis of a the biomechanics literature in a topical area;	Semester Project rubric, specified below Evaluation

***Bold** descriptor represents the highest level of learning (based upon Bloom’s taxonomy) you will need to demonstrate for satisfactory achievement of the specified learning outcome.
Recall: knowledge → comprehension → application → analysis → synthesis → evaluation.

Textbook (required)

Hamill, J. & Knutzen, K.M. (2009). Biomechanical Basis of Human Movement, 3rd edition. Lippencott, Williams & Wilkens: Philadelphia

Grading Elements

- 30% Quizzes/Homework/Mini Projects
- 30% Semester Project
- 20% Midterm Exam
- 20% Final Exam

Final Grade Rubric:

- A 90-100%
- A- 88-89%
- B+ 85-87%
- B 70-84%
- B- 65-69%
- C+ 60-64%
- C 55-59%

Semester Project

The purpose of the Semester Project is to allow you the opportunity to demonstrate mastery of biomechanics through comprehension, analysis, synthesis and evaluation of a specific area of human movement of your choosing. Successful completion of the project will require you to perform an in-depth, focused biomechanical evaluation the scientific literature leading to the present “state-of-the-science” of this area of inquiry. Specifically, you will be asked to identify and review 3-5 papers related to or demonstrating the evolution of your focused area of interest. The Semester Project will require you to develop a research question framed as the “next logical step” to advance scientific inquiry in this focused area, and will culminate with an in-class presentation.

Your semester project is to focus on biomechanics as it relates to one of the topics listed below:

<p>Locomotion</p> <ol style="list-style-type: none"> 1. Patterns of locomotion 2. Overuse injuries 3. Prosthetic/orthotics 4. Water locomotion 5. Backward locomotion 6. Clinical gait assessment 7. Fatigue 8. Obesity 9. Lifespan (child, older adult) 10. Mass-spring modeling of locomotion 11. Shock absorption 12. Segmental power transfer 13. Barefoot, footwear 14. Special populations 15. Added or reduced load <p>Tissue Mechanics</p> <ol style="list-style-type: none"> 16. Muscle mechanics and training adaptations 17. Tissue tolerance; bone adaptation to load 18. Muscle activation <p>Jumping/Landing</p> <ol style="list-style-type: none"> 19. Landing strategies 20. Jumping or landing variability 	<p>General</p> <ol style="list-style-type: none"> 21. Fall-avoidance/recovery strategies (balance and control mechanisms) 22. Variability of human movement 23. Exercise equipment evaluation 24. Slips/trips/falls 25. Performance strategies and variability 26. Modeling of human movement 27. Concussion/head impacts/head injury 28. Imaging techniques 29. Modeling (mechanical or statistical) 30. Individual differences, data analysis techniques, agent-based modeling, system dynamics, networks 31. Heart rate variability 32. Biomechanics of interactive (video) gaming 33. Your choice of an ergonomics/human factors topic (ie., warnings, user-machine interface, cell phones and driving) 34. Wearable technology 35. Unique topic mutually agreed upon between student and instructor
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Semester Project Assessment Rubric

Selection of Topic

In order to stay on task, you will select your topic early in the semester. This will be done in class to assure no duplication.

To be completed during the second class meeting (Week 3 of the semester)

20% Annotated Bibliography

Your annotated bibliography will begin with the process of completing a thorough review of current and classical biomechanics literature appropriately addressing your topic. From this review, you will identify 3-5 related papers which will form the basis of your project, and prepare an annotated bibliography of these references. You must also identify the style that you are using for your annotated bibliography.

Due Week 7

10% Statement of the Problem

Again to keep you on track, you will craft a succinct statement that characterizes the focus of your investigative research. Be sure that your “problem” has biomechanical underpinnings.

Due Week 8

- 30% Presentation Outline
An outline of your presentation will be required. You have the option to present this outline in text form, or as a rough start of a .ppt presentation.
Due Week 13
- 40% Presentation (culminating with your “next logical step”/research question)
You will give a 10-12 min podium presentation overviewing the underpinnings of your research. This presentation should include evolution of the concept from a biomechanical perspective, significance and need for the research, and the “next logical” step to advance the science in your focused area of inquiry.

Presentations will be held during the *final two weeks* of the semester (study week inclusive). Order of presentations will be announced once topics have been identified. However, everyone will be required to have an outline of their presentation completed by week 13.
Weeks 14 &15

Class/Classroom Policies

- Absences: Attendance will not be taken; you are expected to attend class sessions. As an individual student, you are responsible to obtain information/notes for any missed lectures. Instructor is available (after class, office hours) to clarify lecture material missed.
- Plagiarism/Cheating: Zero tolerance; No points (0) will be awarded for activity (quiz, homework, exam) and student will be referred to the Office of the Vice President for Student Life and Student Conduct for further review/penalty/punishment. This is a very serious matter and *can* result in expulsion. Again, zero tolerance.
- Cell/Smart Phones: Please turn *off* during class and put away (I do not want to see them); No texting during class. *If observed, you will be asked to leave the classroom.*
- iPod, MP3 player: Please *remove* any earphones/earbuds during lecture. If you must obtain auditory information from a source other than that generated in the classroom, *you will be asked to leave.*
- Extra Credit Policies: Extra credit not provided
- Make-Up Exams: Must be scheduled prior to date of exam administration for class
- Quizzes: No make-ups
- Homework: Due class period following assigned class, unless otherwise stated
- Classroom Visitors: Must be cleared with instructor prior to guest attending lecture

UNIVERSITY POLICIES:

Academic Misconduct – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <http://studentconduct.unlv.edu/misconduct/policy.html>.

Copyright – The University requires all members of the University Community to familiarize themselves with and to follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you nor assume any responsibility for employee or student violations of fair use laws.

Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC) – The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor before or after class to discuss your accommodation needs.

Religious Holidays Policy – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the end of the first two weeks of classes, **September 22, 2015** of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Incomplete Grades - The grade of I – Incomplete – can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student’s control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade. Please note – Students cannot enroll in other nursing courses if they have an incomplete (I) in a course that is designated as a prerequisite to that course. (Per School of Nursing Policy C-12).

Tutoring – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located across from the Student Services Complex (SSC). Students may learn more about tutoring services by calling 702- 895-3177 or visiting the tutoring web site at: <http://academicsuccess.unlv.edu/tutoring/>.

UNLV Writing Center – One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student’s Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>

Rebelmail – By policy, faculty and staff should e-mail students’ Rebelmail accounts only. Rebelmail is UNLV’s official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students’ e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. Emailing within WebCampus is acceptable.

Library Resources –Students may consult with a librarian (www.library.unlv.edu/ consultation) about research needs. For this class, the subject librarian is Xan Goodman. UNLV Libraries provides resources to support students’ access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at www.library.unlv.edu/