

KIN 6025-3
Advanced Sports Biomechanics
Department of Kinesiology
Number of Units: 3
Spring 2025

Meeting days: Tuesday	Instructor: Arnel Aguinaldo, PhD, ATC ("Dr. A")
Meeting times: 6PM - 8:30PM	Phone: 619-849-3007
Meeting location: Biomechanics Lab	Email: aaguinal@pointloma.edu
Final Exam: 05/6/2025	<u>Virtual Office Hours</u>
TA: Avery Takata, MS	Virtual Office Hours

PLNU Mission

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

COURSE DESCRIPTION

This course builds upon KIN 6015 (Biomechanical and Neurological Basis of Human Movement) and is designed to provide students with a breadth of theoretical concepts and applied problem-solving in the 3D kinematic, kinetic, and muscle activation patterns of athletic movements. Using advanced biomechanics technologies and methods, students will learn how to apply experimental and computational methods to evaluate how joints, bones, and muscles interact as a mechanical system.

INSTITUTIONAL LEARNING OUTCOMES (ILO)

1. **Learning, Informed by our Faith in Christ**

Students will acquire knowledge of human cultures and the physical and natural world

while developing skills and habits of the mind that foster lifelong learning.

2. **Growing, In a Christ-Centered Faith Community**

Students will develop a deeper and more informed understanding of others as they negotiate complex professional, environmental and social contexts.

3. **Serving, In a Context of Christian Faith**

Students will serve locally and/or globally in vocational and social settings.

PROGRAM LEARNING OUTCOMES (PLO)

The Point Loma Nazarene University MS-KIN graduate will be able to:

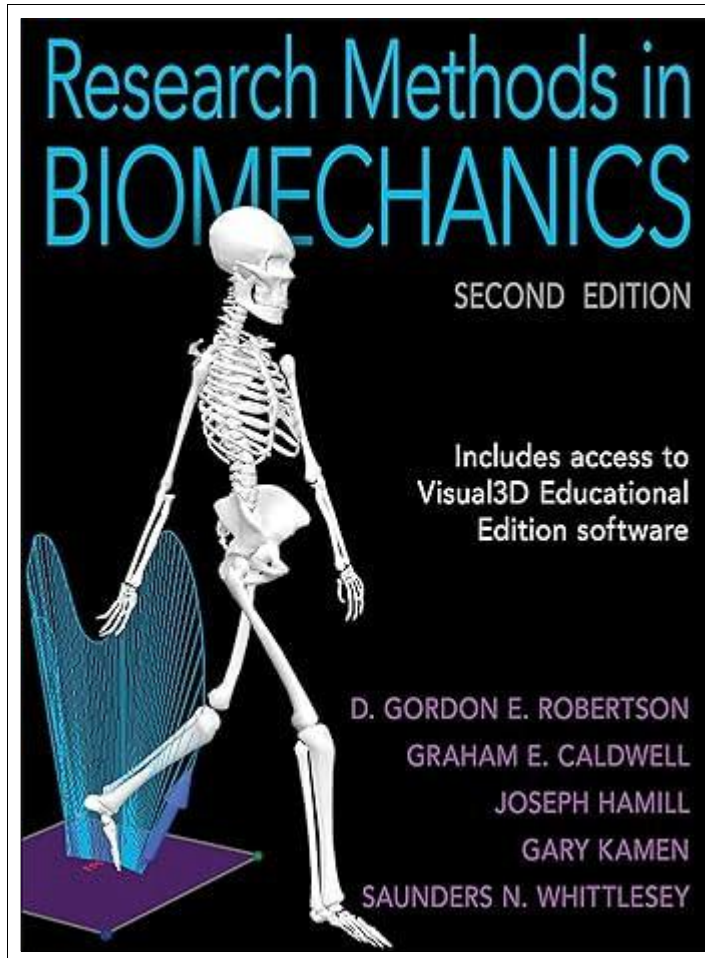
1. Appraise current research data in Kinesiology and integrate it into professional practice to solve relevant problems and make effective decisions.
2. Work independently and with a team to persuasively communicate essential information in their discipline.
3. Demonstrate appropriate breadth of knowledge of the background and principle research in their specialization in order to conduct an independent research project.
4. Serve various populations, integrating compassionate care and the Christian faith with their professional practice.
5. Pursue an active and growing involvement in their discipline by achieving advanced certification and/or membership in a related professional organization.

COURSE LEARNING OUTCOMES

At the end of this course, students will be able to:

1. Articulate the concepts of linear and angular kinetics and their effects on human movement.
2. Describe the various experimental and computational tools employed to quantitatively measure joint kinematics, kinetics, and electromyography (EMG) signals
3. Describe the processes of kinematic, kinetic, and muscle activation data collection using markerless motion analysis, force platforms, and electromyography.
4. Analyze joint movement in sports performance assessment using biomechanical techniques
5. Perform exploratory and statistical analysis of biomechanics data using Visual3D, Python, and R (or JASP)
6. Understand the basics of how kinematics, kinetics, and EMG data can be presented and visualized
7. Critically evaluate biomechanical research

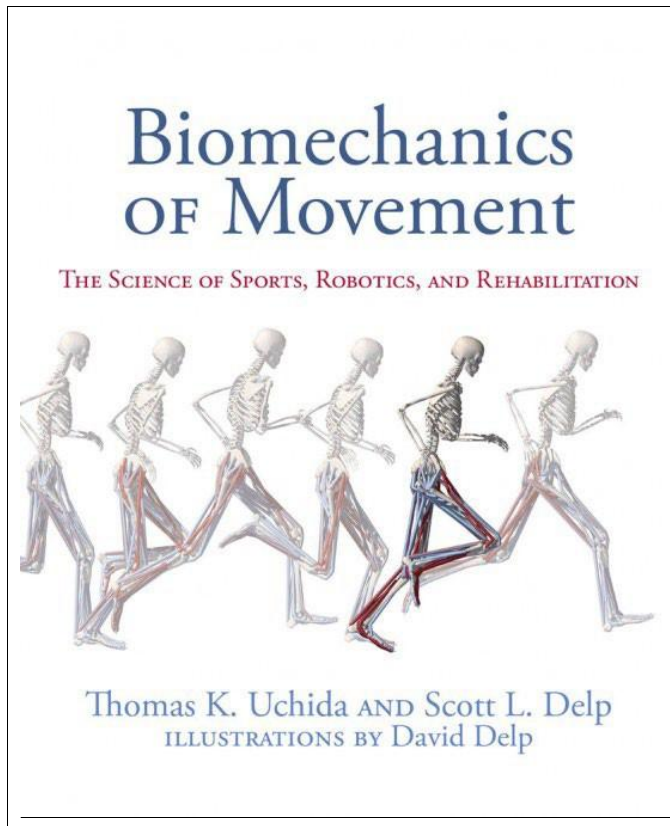
REQUIRED AND RECOMMENDED TEXTS



[Robertson, D. G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. \(2014\). *Research Methods in Biomechanics*. Champaign, IL: Human Kinetics.](#)

(Click on link for purchase and rental options)

This required text provides the “nuts and bolts” understanding of the mathematical/physics skills necessary for biomechanical analyses. The content forms the foundation on which Visual3D was developed.



[Uchida, T. & Delp, S. \(2020\). *Biomechanics of Movement*. Cambridge, MA: The MIT Press.](#)

(Click on link for purchase and rental options)

This recommended text (required in KIN 6015) provides an engaging introduction to human movement seen through the lens of mechanics.

ADDITIONAL RESOURCES:

- Visual3D (HAS-Motion, Kingston, ON)
- Statistical Packages: [JASP](#), [RStudio](#)
- Coding Interface: [Spyder Python](#)
- EMG Sensor Placement Guide
- Handouts will be provided throughout the quad via Canvas.

NOTE: Students are responsible to have the required textbooks prior to the first day of class. Students are also encouraged to begin reading the books in preparation for the class as soon as possible.

COURSE CREDIT HOUR INFORMATION

It is anticipated that students will spend a minimum of 50 participation hours per credit hour on their coursework. As a graduate course, students can expect the work in this class to be significant, and students should plan on spending 18-22 hours a week engaged in the course. The estimated time expectations for this course are shown below:

Category	Time Expectation in Hours
Online Participation in Discussions, Groups, etc.	50

Reading Assignments	25
Written Assignments	25
Other Assignments & Learning Activities	40
Quizzes, Surveys	8
Total Hours	50

ASSESSMENT AND GRADING

- **Lab Reports:** There will be six labs worth 10 points each to be scheduled throughout the quad. Each lab will require students to collect and/or analyze biomechanics data and write up an abstract. All lab reports must be submitted via Canvas on the respective due dates.
- **In-Video Quizzes:** There will be multiple in-video quizzes worth 5 points each to be scheduled throughout the quad using Canvas Studio. These quizzes will vary in difficulty depending on the readings covered in class but they gauge your knowledge of the material to be discussed in class.
- **Article Reviews:** Each student will write two article reviews worth 15 points each that utilize biomechanical tools discussed and used in this course. Each article review will be at least 2 pages (double spaced, 12-point font) and consist of a summary of the introduction, methods, results, and discussion sections of the article.
- **Final Exam:** A “take-home” comprehensive exam will be administered on the scheduled final exam date consisting of multiple-choice, T/F, and essay type questions, addressing material covered over the entire course. The exam will be available the week before it is due.
- **Team Pilots:** You will be assigned to a team of 7-8 students, with whom you will collaborate on a research pilot. The pilot will involve collecting data with the systems in the Biomechanics Lab as well as data analysis, interpretation, and write-up. Topics may include, but not limited to, gait analysis, throwing, jumping, lifting, footwear testing, and kicking. Each team will be required to submit a written manuscript and present a brief talk on your pilot on the date stated below.
- **Participation:** In addition to the live lab sessions, participation will be measured using lab and pilot discussions as well as attending the oral presentations of the pilots. Discussions require you to post a response to the prompt and replies to at least two of your peers. Your posts should be substantive in nature and foster a healthy dialogue between peers about the material. Your initial post should be at least 250 words while replies to peers should be at least 100 words. In some cases, video responses will be welcomed.

ASSESSMENT	PERCENT	COURSE OBJECTIVES
Lab Assignments	20	1,2,3,4,5,6
Quizzes	10	1,2,3,5,6
Final Exam	25	1,2,3,4,7
Article Reviews	10	4,7
Pilot	25	1-7
Participation	10	1-7
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Total	100	

PERCENT	GRADE	POINTS	GRADE
93-100	A	73-76	C
90-92	A-	70-72	C-
87-89	B+	67-69	D+
83-86	B	63-66	D
80-82	B-	60-62	D-
77-79	C+	0-59	F

STATE AUTHORIZATION

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on [State Authorization](#) to view which states allow online (distance education) outside of California.

CONTENT WARNING

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive various types of information. In this course, all of the class content, including that which may be intellectually or emotionally challenging, has been

intentionally curated to achieve the learning goals for this course. The decision to include such material is not taken lightly. These topics include classical physics, pathological movements, injury etiologies, and exercise-related stress. If you encounter a topic that is intellectually challenging for you, it can manifest in feelings of discomfort and upset. In response, I encourage you to come talk to me or your friends or family about it. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of biomechanics, and I will support you throughout your learning in this course.

TRIGGER WARNING

I acknowledge that each of you comes to PLNU with your own unique life experiences. This contributes to the way you perceive several types of information. In this course, we will cover a variety of topics, some of which you may find triggering. These topics include pathological movements, injury etiologies, and exercise-related stress. Each time this topic appears in a reading or unit, it is marked on the syllabus. The experience of being triggered versus intellectually challenged are different. The main difference is that an individual must have experienced trauma to experience being triggered, whereas an intellectual challenge has nothing to do with trauma. If you are a trauma survivor and encounter a topic in this class that is triggering for you, you may feel overwhelmed or panicked and find it difficult to concentrate. In response, I encourage you to take the necessary steps for your emotional safety. This may include leaving class while the topic is discussed or talking to a therapist at the Counseling Center. Should you choose to sit out on discussion of a certain topic, know that you are still responsible for the material; but we can discuss if there are other methods for accessing that material, and for assessing your learning on that material. Class topics are discussed for the sole purpose of expanding your intellectual engagement in the area of kinesiology, and I will support you throughout your learning in this course.

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due, including assignments posted in Canvas. Incompletes will only be assigned in extremely unusual circumstances.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU Recording Notification

In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel.

Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See [Academic Policies](#) for definitions of kinds of academic dishonesty and for further policy information.

ARTIFICIAL INTELLIGENCE (AI) POLICY

You are allowed to use Artificial Intelligence (AI) tools (e.g, ChatGPT, iA Writer, Marmot, Botowski) to generate ideas, but you are not allowed to use AI tools to generate content (text, video, audio, images) that will end up in any work submitted to be graded for this course. If you have any doubts about using AI, please gain permission from the instructor

PLNU ACADEMIC ACCOMMODATIONS POLICY

While all students are expected to meet the minimum standards for completion of this course as established by the instructor, students with disabilities may require academic adjustments, modifications or auxiliary aids/services. At Point Loma Nazarene University (PLNU), these students are requested to register with the Disability Resource Center (DRC), located in the Bond Academic Center. (DRC@pointloma.edu or 619-849-2486). The DRC's policies and procedures for assisting such students in the development of an appropriate academic adjustment plan (AP) allows PLNU to comply with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act. Section 504 (a) prohibits discrimination against students with special needs and guarantees all qualified students equal access to and benefits of PLNU programs and activities. After the student files the required documentation, the DRC, in conjunction with the student, will develop an AP to meet that student's specific learning needs. The DRC will thereafter email the student's AP to all faculty who teach courses in which the student is enrolled each semester. The AP must be implemented in all such courses. If students do not wish to avail themselves of some or all of the elements of their AP in a particular course, it is the responsibility of those students to notify their professor in that course. PLNU highly recommends that DRC students speak with their professors during the first two weeks of each semester about the applicability of their AP in that particular course and/or if they do not desire to take advantage of some or all of the elements of their AP in that course.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Hybrid Format

At Point Loma Nazarene University, attendance is required at all scheduled classes. Adult Degree Completion courses are taught in the hybrid format, which means some class meetings will be face-to-face and some will be online.

Attendance in the face-to-face classes is to be for the entire time of the class. Arriving late or leaving early will be considered a partial absence. A day of attendance in an online class is determined as contributing a substantive note, assignment, discussion, or submission that adds value to the course as determined by the instructor. Three days of attendance are required each week. (It may be any three days during the week.)

Face-to-face Portion of the Hybrid course

In blended or hybrid courses, if a student misses one face-to-face class then the faculty member will send an email to the student and the Director of Student Success warning of attendance jeopardy. There are no exceptions to this policy.

If a student misses two face-to-face classes, the faculty member or Vice Provost for Academic Administration (VPAA) will initiate the student's de-enrollment from the course without further advanced notice to the student. If the date of de-enrollment is past the last date to withdraw from a class, the student will be assigned a grade of "F" and there will be no refund of tuition for that course.

Online Portion of the Hybrid Course

If a student misses two online classes (fails to contribute to a discussion board) during the course, then the faculty member will send an email to the student and the Director of Student Success warning of attendance jeopardy. There are no exceptions to this policy.

If a student misses three online classes (fails to contribute to a discussion board by the due date) during the course, then the faculty member or Vice Provost for Academic Administration (VPAA) will initiate the student's de-enrollment from the course without further advanced notice to the student. If the date of de-enrollment is past the last date to withdraw from a class, the student will be assigned a grade of "F" and there will be no refund of tuition for that course.

- 1 missed F2F class = warning
- 2 missed F2F classes = de-enrollment
- 2 missed online classes = warning
- 3 missed online classes = de-enrollment

Online Format

Students taking online courses are expected to attend each week of the course. Attendance is defined as participating in an academic activity within the online classroom which includes posting in a graded activity in the course. (Note: Logging into the course does not qualify as participation and will not be counted as meeting the attendance requirement.)

Students who do not attend at least once in any 3 consecutive days will be issued an attendance warning. Students who do not attend at least once in any 7 consecutive days will be dropped from the course retroactive to the last date of recorded attendance.

Asynchronous Attendance/Participation Definition

A day of attendance in asynchronous content is determined as contributing a substantive note, assignment, discussion, or submission by the posted due date. Failure to meet these standards will result in an absence for that day. Instructors will determine how many asynchronous attendance days are required each week.

SPIRITUAL CARE

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact the [Office of Spiritual Development](#)

LANGUAGE AND BELONGING

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups. To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official PLNU records, please let me know!
- If you feel like your performance in the class is being impacted by your experiences outside of class, please don't hesitate to come and talk with me. I want to be a resource for you.
- I (like many people) am still in the process of learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.

Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward

precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

You may also report an incident(s) using the [Bias Incident Reporting Form](#).

SEXUAL MISCONDUCT AND DISCRIMINATION

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix.

USE OF TECHNOLOGY

In order to be successful in the online or hybrid environment, you'll need to meet the minimum technology and system requirements; please refer to the [Technology and System Requirements](#) information. Additionally, students are required to have headphone speakers, microphone, or webcams compatible with their computer available to use. Please note that any course with online proctored exams requires a computer with a camera (tablets are not compatible) to complete exams online.

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

LOMA WRITING CENTER

The Loma Writing Center exists to help all members of the PLNU community cultivate transferable writing skills to engage their academic, professional, personal, and spiritual communities. We work toward this goal by conducting one-on-one consultation sessions, supporting writing education across the PLNU community, and participating in ongoing writing center research.

Getting feedback from the Loma Writing Center while you're in the process of working on an assignment is a great way to improve the quality of your writing and develop as a writer. You are encouraged to talk with a trained writing consultant about getting started on an assignment, organizing your ideas, finding and citing sources, revising, editing for grammar and polishing final drafts, and more. For information about how to make in-person or online appointments, see Loma Writing Center webpage or visit the Loma Writer Center on the first floor of the Ryan Library, room 221.

ASSIGNMENTS AT-A-GLANCE