



Western University  
Faculty of Health Sciences  
School of Kinesiology



**KIN 3353B – Biomechanical Analysis of Human Locomotion  
Winter 2023**

<b>Instructor:</b> Derek Pamukoff <b>Office:</b> Thames Hall 4173 <b>Email:</b> <a href="mailto:dpamukof@uwo.ca">dpamukof@uwo.ca</a> <b>Phone:</b> 519/661-2111 x88385 <b>Office Hrs:</b> TBD  <b>TAs:</b> TBD	<b>Lectures:</b> TBD <b>Labs:</b> TBD  <b>Instruction Mode:</b> In-person  <b>Labs:</b> Blended
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**NOTE:** All course information including grades, assignment outlines, deadlines, etc. are available via OWL. Check the website regularly for course announcements.

**Calendar Course Description (including prerequisites/anti-requisites):**

A laboratory-oriented, quantitative approach to the study of activities of a cyclic or repetitive nature by which individuals propel themselves over ground.

Anti-requisites KIN 3343A/B

**Extra Information:** 2 lecture hours, 2 laboratory hours.

*You are responsible for ensuring that you have successfully completed all course pre-requisites, and that you have not taken an anti-requisite course.*

*Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.*

**NOTE:** If you wish to enroll in this course without the stated pre-requisite(s), you must obtain written approval from the course instructor. The approval should then be forwarded to your academic counsellor.

**My Course Description**

This course provides foundational skills in quantitative biomechanical analyses. Modules will expose students to basic elements of motion capture analyses. Lectures and applied laboratory experience will focus on kinematic and kinetic data analyses during linear and angular motions. Students will be exposed to basic data reduction, analysis and visualization methods. Finally, students will be exposed to biomechanical research and peer-reviewed literature.

**Learning Outcomes/Schedule:**

1. Students will be able to quantify human movement using appropriate biomechanical principles.
2. Students will be able to use motion analysis principles to characterize selected movement patterns in laboratory settings.
3. Students will participate in quantitative and qualitative analysis of selected movement forms for the purpose of improving analytic skills.
4. Students will develop the ability to read, understand and apply scientific methods of research

toward biomechanical analyses, and in addition will be able to initiate research in the area of biomechanics.

**Required Course Material/Text:**

All materials will be posted on OWL. Students are expected to have moderate proficiency with Microsoft Excel and obtaining/reviewing scientific literature.

**NOTE the following important dates:**

**Winter 2022**

Mon Jan 8:	Second term begins
Sat Feb 19 – Sun Feb 25	Reading Week NO CLASS
Mon April 8:	Last Day of Class

Proposed Course Schedule (\*see detailed calendar on OWL)

Week 1 (Jan 8) – Introduction to Motion Capture, Linear Kinematics Review

Week 2 (Jan 15) – Linear Kinematics, Reading Discussion

Week 3 (Jan 22) – Angular Kinematics Review, Joint Angle Calculations

Week 4 (Jan 29) – Applications of Kinematics, Reading Discussion

\*Laboratory 2 Data Collection (Wed Jan 31 – attendance required)

Week 5 (Feb 5) – Review and Midterm (Feb 9)

Week 6 (Feb 12) – Linear Kinetics Review, Force Plates

Week 7 (Feb 19) – Reading Week

Week 8 (Feb 26) – Take-up Midterm, Reading Discussion

\*Laboratory 3 Data Collection (Wed Feb 28 – attendance required)

Week 9 (March 4) – Angular Kinetics Review, Inverse Dynamics

Week 10 (March 11) – Inverse Dynamics, Reading Discussion

\*Laboratory 4 Data Collection (Wed March 13 – attendance required)

Week 11 (March 18) – Inverse Dynamics, Applications of Angular Kinetic Analyses

Week 12 (March 25) – Spatiotemporal gait analyses, Reading Discussion

Laboratory 5 Data Collection (Wed March 27 – attendance required)

Week 13 (April 1) – Special Topics

Week 14 (April 8) – Review

Notes – The order and dates of topics may change at the discretion of the instructor

**Course Evaluation Summary (Due Dates listed below):**

1. Reading Quizzes (4 @ 2.5% - drop lowest) 10%  
Administered via OWL; can be completed at any time prior to due date; single attempt, timed, linear advancement.
  - Lab 1 Linear Kinematics, due Jan 19 12:30pm
  - Lab 2 Joint Kinematics, due Feb 2 12:30pm
  - Lab 3 Ground Reaction Forces, due March 1 12:30pm
  - Lab 4 Joint Moments, due March 15 12:30pm
  - Lab 5 Spatiotemporal Gait Analyses, due March 29 12:30pm
2. Laboratory Assignments (1 @ 2%, 4 @ 7%) 30%
  - Lab 1 Linear Kinematic/Excel introduction (2%), due Jan 26 midnight via OWL
  - \*Lab 2 Joint Kinematics (7%), due Feb 6 midnight via OWL
  - \*Lab 3 Ground Reaction Forces (7%), due March 6 midnight via OWL
  - \*Lab 4 Joint Moments (7%), due March 20 midnight via OWL
  - \*Lab 5 Spatiotemporal Gait Analysis (7%), due April 3 midnight via OWL

\*Laboratory attendance is mandatory at assigned time; missed laboratory data collection sessions must be made up via additional assignment that is due at the same time as the lab report

3. Midterm Exam (Feb 9) 25%
  - Administered virtually using Proctortrack
4. Final Exam (TBD) 35%
  - Administered virtually using Proctortrack

### **Course Evaluation:**

Assignments are due as stated in the course syllabus and will not be accepted late. Submitting a late assignment without appropriate documentation will result in a zero (0) grade. A missed quiz or mid-term examination, without appropriate documentation will result in a zero (0) grade. Acceptable reasons might include hospital stays, serious illness, family emergencies (like serious accidents, illness or death) or similar circumstances. In the case of a missed assignment, a 1-day extension will be provided beyond the reported absence. In the case of a missed quiz, weighting is re-distributed evenly to the other quizzes. In the case of a missed midterm, the weighting is shifted to the final exam.

### **Course/University Policies**

#### **1. Statement on Use of Personal Response Systems (“Clickers”)**

If Personal Response Systems (“Clickers”) are used in the course, a reference to the Guidelines for their use (Guidelines are shown below). Instructors are to communicate clearly to students information on how clickers are used including: how the student’s privacy will be protected, how clickers may be used by the instructor for data gathering and for evaluating the students, and why they cannot be used by anyone but the student (since the students involved in misuse of a clicker may be charged with a scholastic offence).

2. **Academic offences:** They are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/scholastic\\_discipline\\_undergrad.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf)

A) Students must write their essays and assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see Scholastic Offence Policy in the Western Academic Calendar). All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between Western University and Turnitin.com <http://www.turnitin.com>

B) Computer marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

#### **3. Electronic Device Usage:**

**During Exams** - Unless you have medical accommodations that require you to do so, or explicit permission from the instructor of the course, you may not use any of the following electronic devices during ANY of the tests, quizzes, midterms, examinations, or other in-class evaluations: cellphones, smart phones, smart watches, smart glasses, audio players or recorders of any sort, video cameras, video games, DVD players, televisions, laptop/notebook/netbook computers, flashlights or laser pointers.

**During Lectures and Tutorials:** Although you are welcome to use a computer during lecture and tutorial periods, you are expected to use the computer for scholastic purposes only, and refrain from engaging in any activities that may distract other students from learning. Please be respectful to your fellow students and turn the sound off. If the professor receives complaints from other students

regarding noise or other disruptive behavior (e.g. watching videos on YouTube.com, updating your Facebook status, playing Solitaire), your classroom privileges will be revoked. From time to time, your professor may ask the class to turn off all computers, to facilitate learning or discussion of the material presented in a particular class. **Unless explicitly noted otherwise, you may not make audio or video recordings of lectures – nor may you edit, re-use, distribute, or re-broadcast any of the material posted to the course website.**

#### 4. **Health and Wellness:**

Information regarding health and wellness-related services available to students may be found at <http://www.health.uwo.ca/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<http://www.health.uwo.ca/>) for a complete list of options about how to obtain help.

#### 5. **Support Services**

There are various support services around campus and these include, but are not limited to:

1. *Student Development Centre* -- <http://www.sdc.uwo.ca/ssd/>
2. *Student Health & Wellness* -- <http://www.health.uwo.ca/>
3. *Registrar's Office* -- <http://www.registrar.uwo.ca/>
4. *Ombudsperson Office* -- <http://www.uwo.ca/ombuds/>

#### 6. **Accommodation, Illness Reporting and Academic Considerations:**

[http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page\\_12](http://www.westerncalendar.uwo.ca/PolicyPages.cfm?Command=showCategory&PolicyCategoryID=1&SelectedCalendar=Live&ArchiveID=#Page_12)

### **Accommodation Policies**

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The accommodation policy can be found here: [Academic Accommodation for Students with Disabilities](#).

### **Religious Accommodation**

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the [Western Multicultural Calendar](#).

7. **Examination Conflicts:** A student with examinations having flexible submission times (e.g., where one or more examination is a take-home examination) cannot request alternative arrangements unless a conflict cannot be avoided by rescheduling writing the exam to a different time within the window specified by the instructor. This applies to direct conflicts as well as “heavy load” conflicts (e.g., three exams within a 23-hour period). The student should discuss any concerns about a potential conflict and/or request accommodation with their academic counselling unit prior to the deadline to drop a course without academic penalty

In the case of online examinations, an “Examination Conflict Room,” which may be assigned when a student is scheduled to write two proctored exams concurrently, will be interpreted as arrangements for continuous proctoring.

8. **Grades:** Where possible assignment objectives and rubrics will be posted on OWL. Should you have a concern regarding the grade you received for an assignment or feel that it is unfair in any way, you must wait 24 hours from the receipt of the assignment to approach the instructor or TA. In doing so, please make an appointment and prepare in writing, with evidence, why you feel your

grade is inappropriate. Please be aware that in requesting a grade reassessment, your grade could go up/down/or stay the same. Note that calculations errors (which do occur!) should be brought to my attention immediately.

Generally, students can expect some form of feedback on their performance in a course before the drop date.

- November 12th, 2020 (for first term half-courses)
- November 30th, 2020 (for full-year courses)
- March 7th, 2021 (for second term half-or full year courses)

A+	90-100	<i>One could scarcely expect better from a student at this level</i>
A	80-89	<i>Superior work that is clearly above average</i>
B	70-79	<i>Good work, meeting all requirements and eminently</i>
C	60-69	<i>Competent work, meeting requirements</i>
D	50-59	<i>Fair work, minimally acceptable.</i>
F	below 50	<i>Fail</i>

**Rounding of Grades** (for example, bumping a 79 to 80%):

This is a practice some students request. **This practice will not occur here.** The edges of this course are clear and sharp. The mark attained is the mark you achieved and the mark assigned; there is no rounding to the next grade level, or 'giving away' of marks. Please don't ask me to do this for you; the response will be "please review the course outline where this is presented".

**9. Contingency Plan for an In-Person Class Pivoting to 100% Online Learning:** In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor

**10. Online Etiquette:** Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- please "arrive" to class on time
- please use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, kindly mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- [suggested for classes larger than 30 students] In order to give us optimum bandwidth and web quality, please turn off your video camera for the entire class unless you are invited to speak
- [suggested for cases where video is used] please be prepared to turn your video camera off at the instructor's request if the internet connection becomes unstable
- unless invited by your instructor, do **not** share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- if you wish to speak, use the "raise hand" function and wait for the instructor to acknowledge you before beginning your comment or question
- remember to unmute your microphone and turn on your video camera before speaking
- self-identify when speaking.
- remember to mute your mic and turn off your video camera after speaking (unless directed otherwise)

General considerations of "netiquette":

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor, your colleagues, and authors whose work you are discussing.
- Be respectful of the diversity of viewpoints that you will encounter in the class and in your readings. The exchange of diverse ideas and opinions is part of the scholarly environment. “Flaming” is never appropriate.
- Be professional and scholarly in all online postings. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

### **11. Online Learning Support**

If you require support with online learning tools and resources, please refer to the Faculty of Health Sciences Online Teaching and Learning Support [Jira request links](#) for students

### **12. Student Code of Conduct**

The purpose of the Code of Student Conduct is to define the general standard of conduct expected of students registered at Western University, provide examples of behaviour that constitutes a breach of this standard of conduct, provide examples of sanctions that may be imposed and set out the disciplinary procedures that the University will follow. For more information, visit <https://www.uwo.ca/univsec/pdf/board/code.pdf>