



# PHTY302

## Biomechanics of Human Movement

S1 Day 2016

*Department of Health Professions*

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#### **Disclaimer**

Macquarie University has taken all reasonable measures to ensure the information in this publication is accurate and up-to-date. However, the information may change or become out-dated as a result of change in University policies, procedures or rules. The University reserves the right to make changes to any information in this publication without notice. Users of this publication are advised to check the website version of this publication [or the relevant faculty or department] before acting on any information in this publication.

## General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

39cp including (HLTH108 and (HLTH109 or MEDI203))

Corequisites

Co-badged status

Unit description

This unit will cover the basic principles of biomechanics and apply these to the analysis of human movement and the musculoskeletal system. This unit will integrate the student's understanding of mechanics with functional anatomy through the study of biomechanics of human locomotion (in two dimensions) including kinematics, kinetics, muscle function, work and power. The mechanics of tissues in the musculoskeletal system will also be introduced and discussed in the context of injuries and exercise prescription. The theoretical basis of methods for assessing movement, both quantitative and qualitative, will also be introduced enabling basic practical analysis of common movements to be performed.

## Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

## Learning Outcomes

On successful completion of this unit, you will be able to:

Explain key terminology and basic biomechanical principles as they apply to human movement

Describe the biomechanical characteristics of walking and running in healthy people

Describe common adaptations to walking in people with health conditions

Demonstrate an understanding of how changes of movement patterns and techniques

will influence the load on human tissues during movement

Discuss the mechanical properties of bones, muscles, tendons and ligaments

Analyse and interpret biomechanical data characterising human movement

Describe practical ways to measure common movements in a clinical and/or workplace settings

## General Assessment Information

### Assessment/Standards

Macquarie University uses the following grades in coursework units of study:

HD	High Distinction	85-100
D	Distinction	75-84
CR	Credit	65-74
P	Pass	50-64
F	Fail	0-49

Grade descriptors and other information concerning grading are contained in the Macquarie University Grading Policy, which is available at: <http://www.mq.edu.au/policy/docs/grading/policy.html>

To pass this unit, students must demonstrate sufficient evidence of achievement of the learning outcomes and complete all assessment tasks.

Further details for each assessment task will be available on iLearn including marking rubrics.

All final grades in the Department of Health Professions are determined by a grading committee and are not the sole responsibility of the Unit Convenor.

Students will be awarded one of these grades plus a Standardised Numerical Grade (SNG). The SNG is not necessarily a summation of the individual assessment components. The final grade and SNG that are awarded reflect the corresponding grade descriptor in the Grading Policy.

### Extensions for Assessment Tasks

Applications for assessment task extensions must be submitted via [www.ask.mq.edu.au](http://www.ask.mq.edu.au). For further details please refer to the Disruption to Studies Policy available at [http://mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://mq.edu.au/policy/docs/disruption_studies/policy.html)

### Late Submission of Work

All assignments which are officially received after the due date, and where no extension has been granted by the course convenor or tutor, will incur a deduction of 10% for the first day, and 10% for each subsequent day including the actual day on which the work is received. Weekends

and public holidays are included. For example:

Due Date	Date received	Days Late	Raw Mark	Deduction	Final Mark
Friday, 14th	Monday, 17 <sup>th</sup>	3	75%	30%	45%

## Assessment Tasks

Name	Weighting	Due
<u>Weekly Quizzes</u>	20%	From Week 2-12
<u>Written Report</u>	30%	Week 9
<u>Written Exam</u>	50%	Weeks 14/15/16

### Weekly Quizzes

Due: **From Week 2-12**

Weighting: **20%**

11 online quizzes in iLearn. Week 2 quiz will be practice only. Week 3-12 will be worth 2%, each quiz will contain 10 questions.

On successful completion you will be able to:

- Explain key terminology and basic biomechanical principles as they apply to human movement
- Describe the biomechanical characteristics of walking and running in healthy people
- Describe common adaptations to walking in people with health conditions
- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Discuss the mechanical properties of bones, muscles, tendons and ligaments
- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings

### Written Report

Due: **Week 9**

Weighting: **30%**

Written group report (Movement Analysis)

On successful completion you will be able to:

- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings

## Written Exam

Due: **Weeks 14/15/16**

Weighting: **50%**

Written exam (2 hours)

On successful completion you will be able to:

- Explain key terminology and basic biomechanical principles as they apply to human movement
- Describe the biomechanical characteristics of walking and running in healthy people
- Describe common adaptations to walking in people with health conditions
- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Discuss the mechanical properties of bones, muscles, tendons and ligaments
- Describe practical ways to measure common movements in a clinical and/or workplace settings

## Delivery and Resources

### Unit Organisation

This is a three credit point unit run over a 13 week session. There are lectures and tutorials/laboratories. Further information is available via the online Learning Management System (LMS) iLearn <http://ilearn.mq.edu.au>

### Assumed knowledge

This unit builds on your learning in the previous undergraduate units particularly in the area of Anatomy; In particular, HLTH108/9 or BIOL247.

### Teaching and Learning Strategy

This unit will have a two hour lecture weekly and a two hour tutorial/laboratory fortnightly.

### Attendance

You may make a request to attend a different tutorial/laboratory on a one-off basis for extenuating circumstances. In most cases lectures are recorded however, attendance is expected at both lectures and tutorials/laboratories, as this is where the majority of learning

occurs. Failure to attend may impact your final results. It is the responsibility of the student to contact the unit convenor by email to inform them if they are going to be absent. The timetable for classes can be found on the University web site at: <http://www.timetables.mq.edu.au/>.

### **Textbooks**

The following textbook will be used heavily in the teaching of this unit and the library hold an online copy of it:

**Sports biomechanics: the basics: optimising human performance / Anthony J. Blazeovich, 2nd ed., A & C Black Publishers: London**

Additionally the following text will be used to a lesser extent; the library also holds an online version:

**Fundamentals of Biomechanics / Duane Knudson, 2nd ed., Springer US: Boston, MA**

### **Readings**

Readings may be referred to throughout the semester and a reference to these will be provided as needed.

### **Technology and equipment**

#### On-campus

Teaching rooms are equipped with state of art audio-visual and ICT equipment including iPads, internet connection, high quality video cameras and multiple LCD screens.

#### Off-campus

To study optimally when off campus you will need to have access to a reliable internet connection to retrieve unit information & at times to submit assessment tasks via iLearn.

## **Policies and Procedures**

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy [http://mq.edu.au/policy/docs/academic\\_honesty/policy.html](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

**New Assessment Policy in effect from Session 2 2016** [http://mq.edu.au/policy/docs/assessment/policy\\_2016.html](http://mq.edu.au/policy/docs/assessment/policy_2016.html). For more information visit [http://students.mq.edu.au/events/2016/07/19/new\\_assessment\\_policy\\_in\\_place\\_from\\_session\\_2/](http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/)

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.html>

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public [http://www.mq.edu.au/policy/docs/complaint\\_management/procedure.html](http://www.mq.edu.au/policy/docs/complaint_management/procedure.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](http://www.mq.edu.au/policy/docs/disruption_studies/policy.html) *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special*

### *Consideration Policy.*

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

## **Student Code of Conduct**

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: [https://students.mq.edu.au/support/student\\_conduct/](https://students.mq.edu.au/support/student_conduct/)

## **Results**

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit [ask.mq.edu.au](http://ask.mq.edu.au).

## **Student Support**

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

## **Learning Skills**

Learning Skills ([mq.edu.au/learningskills](http://mq.edu.au/learningskills)) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

## **Student Services and Support**

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

## **Student Enquiries**

For all student enquiries, visit Student Connect at [ask.mq.edu.au](http://ask.mq.edu.au)

## **IT Help**

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

#### Learning outcomes

- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings

#### Assessment tasks

- Weekly Quizzes
- Written Report
- Written Exam

### Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

#### Learning outcomes

- Explain key terminology and basic biomechanical principles as they apply to human movement
- Describe the biomechanical characteristics of walking and running in healthy people
- Describe common adaptations to walking in people with health conditions
- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Discuss the mechanical properties of bones, muscles, tendons and ligaments
- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings



## Assessment tasks

- Weekly Quizzes
- Written Report
- Written Exam

## Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

## Learning outcomes

- Describe the biomechanical characteristics of walking and running in healthy people
- Describe common adaptations to walking in people with health conditions
- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings

## Assessment tasks

- Weekly Quizzes
- Written Report
- Written Exam

## Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

## Learning outcomes

- Describe common adaptations to walking in people with health conditions
- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement

- Analyse and interpret biomechanical data characterising human movement
- Describe practical ways to measure common movements in a clinical and/or workplace settings

## **Assessment tasks**

- Weekly Quizzes
- Written Report
- Written Exam

## **Effective Communication**

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

## **Learning outcomes**

- Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement
- Analyse and interpret biomechanical data characterising human movement

## **Assessment tasks**

- Weekly Quizzes
- Written Report
- Written Exam

## **Changes from Previous Offering**

Not applicable.