Who should take this course?

In this course we explore the physical principles that underlie human movement. Topics covered include linear and rotational motion, forces and moments including the influences of friction and drag, momentum, mechanical work, and the material properties of bones. At the completion of the course, students will be able to qualitatively and quantitatively describe two-dimensional movements, and explain their causes, as well as quantitatively assess the stress applied to bones during simple movements. These techniques have applications that include sports performance and assessment, rehabilitation, ergonomics, and workplace design, and practical activities in the course will be related to these fields. EXERSCI 203 is a mandatory course in the Exercise Sciences programme.

Learning Outcomes

At the completion of this course, a student would be expected to:

- Fully understand the fundamental principles of biomechanics (kinematics and kinetics).
- Be able to quantitatively apply biomechanical principles to understand simple movements and
- Be able to apply biomechanics knowledge to qualitatively analyse more complex human movement, e.g. sporting events, gait analysis, ergonomics/human factors, etc.
- Be familiar with numerical calculations, data analysis, and presentation techniques used in biomechanics
**Learning and Teaching**

Students are expected to attend 3 1-hour classes each week and 7 3-hour labs throughout the semester.

This course uses the ‘flipped classroom’ method, where content is provided online, and classes are used for practical demonstrations, discussions, group and individual work to consolidate understanding. The laboratory sessions focus on demonstrating the practical implementation of theoretical concepts covered in the course.

Students with a limited background in mathematics (or physics) are strongly advised to seek out additional support in this area. This support may include accessing the Student Learning Centre, taking a course in basic mathematics or physics, forming a study group with your classmates, arranging for personal tutoring, and so on.

**Teaching Staff**

*Lecturer/Course co-ordinator*

Dr Angus McMorland  
(09) 923 6865  
a.mcmorland@auckland.ac.nz

*Lecturer*

Dr Yanxin Zhang  
(09) 923 6859  
yanxin.zhang@auckland.ac.nz

**Assessment**

Assessment is used to drive learning and participation, with pre-class quizzes, mathematical problem assignments, and lab reports. A short article review encourages students to look at current applications of biomechanics research. Together the mid-term test and exam account for 40% of the final course grade.