



# ESSC12004 Exercise and Sport Biomechanics

## Term 1 - 2017

Profile information current as at 09/05/2024 12:38 am

All details in this unit profile for ESSC12004 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

## General Information

### Overview

This unit is designed so that students should be able to explain the fundamental concepts of mechanics that are applicable to the study of human motion. Students will be introduced to basic principles of mechanics to assess and analyse human motion as it relates to the musculoskeletal system. This unit will introduce basic biomechanical equipment and measurement techniques to devise safe and effective fitness programs, improve athletes' performance, recognise and correct improper technique during physical activity, prevent injuries and regain physical fitness after injury. Note: All flexible enrolled students are required to attend a compulsory Exercise and Sport Biomechanics residential school to promote development of unit learning outcomes.

### Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 10

Fraction of Full-Time Student Load: 0.125

### Pre-requisites or Co-requisites

BMSC11002 Human Body Systems 2 OR BIOH11005 Introductory Anatomy and Physiology AND ESSC11003 Skill Acquisition and Movement

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

### Offerings For Term 1 - 2017

- Distance
- Mackay
- Rockhampton

### Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

### Residential Schools

This unit has a Compulsory Residential School for distance mode students and the details are:  
Click here to see your [Residential School Timetable](#).

### Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

## Class and Assessment Overview

### Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

### Class Timetable

#### [Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

#### [Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

### Assessment Overview

#### 1. **Online Quiz(zes)**

Weighting: 25%

#### 2. **Written Assessment**

Weighting: 35%

#### 3. **On-campus Activity**

Weighting: Pass/Fail

#### 4. **Examination**

Weighting: 40%

### Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

## CQUniversity Policies

**All University policies are available on the [CQUniversity Policy site](#).**

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

## Previous Student Feedback

### Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

#### Feedback from Course Evaluation

##### Feedback

Student appreciated the Lab Summary Videos

##### Recommendation

Will continue to create Lab Summary Videos in future offerings.

##### Action

Laboratory summary videos were completed in 2017.

#### Feedback from Course Evaluation

##### Feedback

Students wish to see more practice problems particularly at an introductory level for those who have not taken physics/math in a long time.

##### Recommendation

Introductory and refresher material will continue to be provided in the Student Resources page of the Course Moodle site. We will also develop a specific list of practice problems from the textbook for students to complete which will accompany weekly lectures.

##### Action

Introductory and refresher material were provided via the Student Resources page. Students were also provided with practice problems each week based on lecture content.

## Unit Learning Outcomes

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

1. Explain the fundamental concepts of mechanics that are applicable to the study of human motion
2. Describe the significance and limitations imposed on the musculo-skeletal system by mechanical laws
3. Apply basic principles of mechanics to evaluate real-world biomechanical problems
4. Employ basic biomechanical equipment and measurement techniques to acquire and analyse data
5. Appraise the use of current biomechanical techniques, equipment, and training in the optimisation of human performance

## Alignment of Learning Outcomes, Assessment and Graduate Attributes



### Alignment of Assessment Tasks to Learning Outcomes

| Assessment Tasks             | Learning Outcomes |   |   |   |   |
|------------------------------|-------------------|---|---|---|---|
|                              | 1                 | 2 | 3 | 4 | 5 |
| 1 - Online Quiz(zes) - 25%   | •                 |   |   |   | • |
| 2 - Written Assessment - 35% | •                 | • | • | • | • |
| 3 - Examination - 40%        | •                 |   | • |   |   |

| Assessment Tasks            | Learning Outcomes |   |   |   |   |
|-----------------------------|-------------------|---|---|---|---|
|                             | 1                 | 2 | 3 | 4 | 5 |
| 4 - On-campus Activity - 0% |                   |   |   | • | • |

## Alignment of Graduate Attributes to Learning Outcomes

| Graduate Attributes                                 | Learning Outcomes |   |   |   |   |
|---|-------------------|---|---|---|---|
|   | 1                 | 2 | 3 | 4 | 5 |
| 1 - Communication                                   | •                 |   |   |   | • |
| 2 - Problem Solving                                 | •                 |   | • |   |   |
| 3 - Critical Thinking                               |                   |   | • |   |   |
| 4 - Information Literacy                            |                   | • |   |   |   |
| 5 - Team Work                                       |                   |   |   |   | • |
| 6 - Information Technology Competence               |                   |   |   | • |   |
| 7 - Cross Cultural Competence                       | •                 |   |   |   |   |
| 8 - Ethical practice                                |                   |   |   |   |   |
| 9 - Social Innovation                               |                   |   |   |   |   |
| 10 - Aboriginal and Torres Strait Islander Cultures |                   |   |   |   |   |

## Alignment of Assessment Tasks to Graduate Attributes

| Assessment Tasks             | Graduate Attributes |   |   |   |   |   |   |   |   |    |
|------------------------------|---------------------|---|---|---|---|---|---|---|---|----|
|                              | 1                   | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1 - Online Quiz(zes) - 25%   |                     | • | • |   |   | • |   |   |   |    |
| 2 - Written Assessment - 35% | •                   | • |   | • |   | • |   |   |   |    |
| 3 - Examination - 40%        | •                   | • |   |   |   |   |   |   |   |    |
| 4 - On-campus Activity - 0%  | •                   | • | • | • | • | • |   | • |   |    |

## Textbooks and Resources

### Textbooks

ESSC12004

#### Prescribed

##### Basic Biomechanics

Edition: 7th (2014)

Authors: Susan Hall

McGraw-Hill Education

New York , New York , USA

ISBN: 978-0-07-352276-0

Binding: Paperback

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

**You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- CG85 Program Portal (Moodle)
- PC/Mac computer with Microsoft Office (or equivalent) software

## Referencing Style

All submissions for this unit must use the referencing style: [American Psychological Association 6th Edition \(APA 6th edition\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Crystal Kean** Unit Coordinator

[c.kean@cqu.edu.au](mailto:c.kean@cqu.edu.au)

## Schedule

### Week 1 - 06 Mar 2017

| Module/Topic                | Chapter           | Events and Submissions/Topic |
|-----------------------------|-------------------|------------------------------|
| Measurement in Biomechanics | Chapters: 1, 2, 3 |                              |

### Week 2 - 13 Mar 2017

| Module/Topic                            | Chapter         | Events and Submissions/Topic |
|---|-----------------|------------------------------|
| Linear Kinematics and Projectile Motion | Chapters: 2, 10 |                              |

### Week 3 - 20 Mar 2017

| Module/Topic      | Chapter         | Events and Submissions/Topic |
|-------------------|-----------------|------------------------------|
| Linear Kinetics I | Chapters: 3, 12 |                              |

### Week 4 - 27 Mar 2017

| Module/Topic       | Chapter         | Events and Submissions/Topic |
|--------------------|-----------------|------------------------------|
| Linear Kinetics II | Chapters: 3, 12 |                              |

**Week 5 - 03 Apr 2017**

| Module/Topic       | Chapter         | Events and Submissions/Topic  |
|--------------------|-----------------|---|
| Angular Kinematics | Chapters: 2, 11 | Quiz 1 - Laboratory 1 (Linear Kinematics) and Quiz 2 - Laboratory 2 (Linear Kinetics) Open Wednesday (5 Apr 17) 08:00 AM AEST |

**Vacation Week - 10 Apr 2017**

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
|--------------|---------|------------------------------|

**Week 6 - 17 Apr 2017**

| Module/Topic       | Chapter             | Events and Submissions/Topic |
|--------------------|---------------------|------------------------------|
| Angular Kinetics I | Chapters: 3, 13, 14 |                              |

**Week 7 - 24 Apr 2017**

| Module/Topic        | Chapter             | Events and Submissions/Topic  |
|---------------------|---------------------|---|
| Angular Kinetics II | Chapters: 3, 13, 14 | Quiz 1 - Laboratory 1 (Linear Kinematics) and Quiz 2 - Laboratory 2 (Linear Kinetics) Close Wednesday (26 Apr 17) 05:00 PM AEST |

**Week 8 - 01 May 2017**

| Module/Topic     | Chapter   | Events and Submissions/Topic  |
|------------------|---|---|
| Muscle Mechanics | Main Chapter: 6<br>Supplementary Chapters: 7, 8, 9 and online reading | Quiz 3 - Laboratory 3 (Angular Kinematics) and Quiz 4 - Laboratory 4 (Angular Kinetics) Open Wednesday (3 May 17) 08:00 AM AEST |

**Week 9 - 08 May 2017**

| Module/Topic   | Chapter  | Events and Submissions/Topic |
|----------------|--|------------------------------|
| Bone Mechanics | Main Chapters: 4 and 5<br>Supplementary Chapters: 7, 8, 9 and online reading |                              |

**Week 10 - 15 May 2017**

| Module/Topic       | Chapter        | Events and Submissions/Topic   |
|--------------------|----------------|--|
| 3D Motion Analysis | Online reading | Quiz 3 - Laboratory 3 (Angular Kinematics) and Quiz 4 - Laboratory 4 (Angular Kinetics) Close Wednesday (17 May 17) 05:00 PM AEST<br><br><b>Biomechanical Problem-based Questions</b> Due: Week 10 Friday (19 May 2017) 5:00 pm AEST |

**Week 11 - 22 May 2017**

| Module/Topic    | Chapter     | Events and Submissions/Topic   |
|-----------------|-------------|--|
| Fluid Mechanics | Chapter: 15 | Quiz 5 - Laboratory 5 (Muscle Mechanics) and Quiz 6 - Laboratory 6 (3D Movement Analysis) Open Wednesday (24 May 17) 08:00 AM AEST |

**Week 12 - 29 May 2017**

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
| Review       |         |                              |

**Review/Exam Week - 05 Jun 2017**

| Module/Topic | Chapter | Events and Submissions/Topic |
|--------------|---------|------------------------------|
|--------------|---------|------------------------------|

**Exam Week - 12 Jun 2017**

**Module/Topic**

**Chapter**

**Events and Submissions/Topic**

## Assessment Tasks

### 1 Laboratory Quizzes

**Assessment Type**

Online Quiz(zes)

**Task Description**

You will complete a series of six (6) quizzes which are based on laboratory activities. The quizzes will consist of numerical, short answer (1-2 sentences) and long answer (3-5 sentences) questions. These questions will be based on the data, readings, and discussions related to the laboratory activities. You will also be required to submit the relevant completed Laboratory Worksheets with each quiz.

Detail for each quiz topic and the open/close dates are listed below.

1. **Quiz 1 - Laboratory 1 (Linear Kinematics)**  
Opens: Wednesday Week 5 at 08:00 AM AEST  
Closes: Wednesday Week 7 at 05:00 PM AEST
2. **Quiz 2 - Laboratory 2 (Linear Kinetics)**  
Opens: Wednesday Week 5 at 08:00 AM AEST  
Closes: Wednesday Week 7 at 05:00 PM AEST
3. **Quiz 3 - Laboratory 3 (Angular Kinematics)**  
Opens: Wednesday Week 8 at 08:00 AM AEST  
Closes: Wednesday Week 10 at 05:00 PM AEST
4. **Quiz 4 - Laboratory 4 (Angular Kinetics)**  
Opens: Wednesday Week 8 at 08:00 AM AEST  
Closes: Wednesday Week 10 at 05:00 PM AEST
5. **Quiz 5 - Laboratory 5 (Muscle Mechanics)**  
Opens: Wednesday Week 11 at 08:00 AM AEST  
Closes: Wednesday Review Week at 05:00 PM AEST
6. **Quiz 6 - Laboratory 6 (3D Movement Analysis)**  
Opens: Wednesday Week 11 at 08:00 AM AEST  
Closes: Wednesday Review Week at 05:00 PM AEST

**Number of Quizzes**

6

**Frequency of Quizzes**

Other

**Assessment Due Date**

Dates for quiz availability are listed above and provided on Moodle. It is your responsibility to log onto Moodle and complete the quiz within the given time periods and prior to quiz closing time.

**Return Date to Students**

Grade will be available 2 weeks after quiz closes

**Weighting**

25%

**Assessment Criteria**

For each quiz, 75% of the total marks will be for answers to quiz questions (short answer, numerical and long answer responses) and 25% of the total marks will be for responses on the completed Laboratory Worksheets. Further details for individual quizzes will be available on Moodle.

## Referencing Style

- [American Psychological Association 6th Edition \(APA 6th edition\)](#)

## Submission

Online

## Learning Outcomes Assessed

- Explain the fundamental concepts of mechanics that are applicable to the study of human motion
- Appraise the use of current biomechanical techniques, equipment, and training in the optimisation of human performance

## Graduate Attributes

- Problem Solving
- Critical Thinking
- Information Technology Competence

# 2 Biomechanical Problem-based Questions

## Assessment Type

Written Assessment

## Task Description

You will be presented with a series of detailed biomechanical problem-based questions via the ESSC12004 Exercise and Sport Biomechanics Moodle website during Week 3. The questions are specifically aimed at reinforcing and augmenting biomechanical topics covered through Weeks 1 to 7, inclusive.

The assignment will consist of questions requiring written and computational style answers. The assessment questions are designed to evaluate your abilities to use various mathematical equations and logical methods to solve biomechanical problems; apply knowledge and interpret the findings; and synthesise and evaluate material. You are encouraged to seek additional reference material where necessary. Marks will be awarded as per assessment criteria listed below.

This assessment task is to be completed individually and submitted electronically (via Moodle) as a Word document (.doc or .docx). Submission must include a cover sheet (with assessment title, your full name and student number). Further information will be available on Moodle.

## Assessment Due Date

Week 10 Friday (19 May 2017) 5:00 pm AEST

## Return Date to Students

Week 12 Friday (2 June 2017)

A graded copy of your assessment will be returned to you via Moodle, along with worked solutions to any incorrect answers.

## Weighting

35%

## Assessment Criteria

The assessment questions are designed to evaluate your abilities to use various mathematical equations and logical methods to solve biomechanical problems; apply knowledge and interpret the findings; and synthesise and evaluate material. You will receive weighted marks for work completed on each question based on correct selection and application of formulas and maths, correct use of terminology, units and conventions, clear presentation of graphical information and written interpretation of results, and use of references (if required).

## Referencing Style

- [American Psychological Association 6th Edition \(APA 6th edition\)](#)

## Submission

Online

## Submission Instructions

You are required to submit the assessment document via the course Moodle site. All submissions are to be complete individually.

## Learning Outcomes Assessed

- Explain the fundamental concepts of mechanics that are applicable to the study of human motion
- Describe the significance and limitations imposed on the musculo-skeletal system by mechanical laws
- Apply basic principles of mechanics to evaluate real-world biomechanical problems



- Employ basic biomechanical equipment and measurement techniques to acquire and analyse data
- Appraise the use of current biomechanical techniques, equipment, and training in the optimisation of human performance

#### **Graduate Attributes**

- Communication
- Problem Solving
- Information Literacy
- Information Technology Competence

### **3 On-campus Activity**

#### **Assessment Type**

On-campus Activity

#### **Task Description**

This assessment involves compulsory attendance to all laboratory sessions of the unit. You are required to attend (and actively participate in) the on-campus laboratories held throughout the term (on Rockhampton North or Mackay City campuses), or during the residential school block.

#### **Assessment Due Date**

At compulsory laboratory sessions and/or at residential school as scheduled.

#### **Return Date to Students**

Final grading will be available at end of term upon completion of unit on-campus activities.

#### **Weighting**

Pass/Fail

#### **Minimum mark or grade**

Pass

#### **Assessment Criteria**

This assessment item is based on Pass/Fail grading. If you attend and actively participate in all laboratory sessions you will pass this assessment piece. If you fail to attend any of the on-campus laboratory sessions (or residential school) without deferral you may fail this assessment piece.

#### **Referencing Style**

- [American Psychological Association 6th Edition \(APA 6th edition\)](#)

#### **Submission**

Offline

#### **Submission Instructions**

No documentation is required to be submitted. You will be required to sign attendance sheets for the laboratory sessions

#### **Learning Outcomes Assessed**

- Employ basic biomechanical equipment and measurement techniques to acquire and analyse data
- Appraise the use of current biomechanical techniques, equipment, and training in the optimisation of human performance

#### **Graduate Attributes**

- Communication
- Problem Solving
- Critical Thinking
- Information Literacy
- Team Work
- Information Technology Competence
- Ethical practice

### **Examination**

#### **Outline**

Complete an invigilated examination.

**Date**

During the examination period at a CQUniversity examination centre.

**Weighting**

40%

**Length**

120 minutes

**Exam Conditions**

Closed Book.

**Materials**

Calculator - non-programmable, no text retrieval, silent only

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

## Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

**What is a breach of academic integrity?**

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

**Why is academic integrity important?**

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

**Where can I get assistance?**

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

**What can you do to act with integrity?**

**Be Honest**

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own

**Seek Help**

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)

**Produce Original Work**

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem