



Course Outline

Code: SPX202

Title: Biomechanics I

School:	Health & Sport Science
Teaching Session:	Semester 2
Year:	2019
Course Coordinator:	Max Stuelcken Tel: 5459 4629 Email: mstuelck@usc.edu.au
Course Moderator:	Rebecca Mellifont

Please go to the USC website for up to date information on the teaching sessions and campuses where this course is usually offered.

1. What is this course about?

1.1 Description

Biomechanics 1 is designed to introduce you to the field of biomechanics. In this course you will explore, describe, analyse and predict the characteristics of movement for the human body. Biomechanics 1 is divided into two sections. In the first section, the laws of physics are addressed and then applied to human motion, while the second section is based on the application of these principles to gait analysis and specific sport and exercise activities.

1.2 Course topics

Linear and angular kinematic principles

Projectile motion

Laws of motion – linear and angular kinetics, rotation and leverage

Equilibrium, centre of mass and stability

Mechanics of human locomotion – walking and running

Mechanics of dynamic sporting movements – jumping, throwing, hitting, and kicking

Motion within a fluid medium

2. What level is this course?

200 level Developing - Applying broad and/or deep knowledge and skills to new contexts. May require pre-requisites and introductory level knowledge/skills. Normally undertaken in the 2nd or 3rd year of an undergraduate program

3. What is the unit value of this course?

12 units

4. How does this course contribute to my learning?

Specific Learning Outcomes On successful completion of this course you should be able to:	Assessment Tasks You will be assessed on the learning outcome in task/s:	Graduate Qualities or Professional Standards mapping Completing these tasks successfully will contribute to you becoming:
Describe human movement using appropriate terms and concepts	1. Mid semester exam 2. Applied Biomechanics Workbook 3. Final exam	Knowledgeable.
Use the laws of motion to explain the cause of human movement	1. Mid semester exam 2. Applied Biomechanics Workbook 3. Final exam	Knowledgeable.
Apply biomechanical principles to human locomotion, activities of daily living, and dynamic sporting skills	2. Applied Biomechanics Workbook 3. Final exam	Empowered.
Identify inter-relationships between biomechanics variables	1. Mid semester exam 2. Applied Biomechanics Workbook 3. Final exam	Knowledgeable. Empowered.
Perform calculations based on biomechanical data	1. Mid semester exam 2. Applied Biomechanics Workbook	Empowered.
Disseminate the findings of biomechanical experiments ethically, clearly and succinctly	2. Applied Biomechanics Workbook	Ethical. Empowered.

5. Am I eligible to enrol in this course?

Refer to the [USC Glossary of terms](#) for definitions of “pre-requisites, co-requisites and anti-requisites”.

5.1 Enrolment restrictions

Nil

5.2 Pre-requisites

LFS122

5.3 Co-requisites

Nil

5.4 Anti-requisites

Nil

5.5 Specific assumed prior knowledge and skills (where applicable)

N/A

6. How am I going to be assessed?

6.1 Grading scale

Standard – High Distinction (HD), Distinction (DN), Credit (CR), Pass (PS), Fail (FL)

6.2 Details of early feedback on progress

In week 3 you will receive formative feedback on your progress in completing the calculations section of your Applied Biomechanics Workbook. This will help you to prepare for the type of questions that you are likely to receive in the mid semester exam in week 6.

6.3 Assessment tasks

Task No.	Assessment Tasks	Individual or Group	Weighting %	What is the duration / length?	When should I submit?	Where should I submit it?
1	Mid semester exam	Individual	30%	105 minutes	Week 6	In Lecture time-slot
2	Applied Biomechanics Workbook	Individual	30%	Completed over the course of the semester	Online and in the tutorial class in Week 13	Tutorial classes
3	Final exam	Individual	40%	120 minutes	Central examination period	Central exam venue
			100%			

Assessment Task 1: Mid semester exam

Goal:	To provide you with an opportunity to demonstrate your knowledge, understanding, and ability to apply basic biomechanical concepts and principles covered during the theoretical component of the course.
Product:	Written examination held during the lecture time-slot in week 6.
Format:	The examination will include all material covered within the theory and practical components of the course during the first 5 weeks. The structure will consist of multiple choice and short answer questions mainly requiring you to apply theoretical concepts, perform calculations and interpret graphs. The duration of the examination is 105 minutes (plus 5 minutes reading time). In preparation for the type of questions that you will receive in this examination you will have thirteen pages of practice questions in the applied biomechanics workbook to complete during the first five weeks of the course. This task will be formative and you will have the opportunity to check your answers and receive feedback.
Criteria:	You will be assessed on your ability to: <ul style="list-style-type: none"> • Use correct terms and concepts • Select the appropriate equation, substitute known data into the equation, manipulate the equation to isolate the unknown, and solve for the unknown variable • Use the appropriate scientific units in your answer • Convey information clearly and succinctly

Assessment Task 2: Applied Biomechanics Workbook

Goal:	This workbook has been designed to develop your biomechanical communication skills through the application of biomechanical knowledge to different scenarios. This workbook contains laboratory activities that will require you to demonstrate practical skills in biomechanical data collection, perform calculations, analyse and interpret data, and answer discussion questions using an understanding of the concepts and principles presented in the course. The completion of the workbook will enable you to demonstrate your competency of key professional skills and practices in the field of Sports and Exercise Science.
Product:	Completed workbook
Format:	<p>The workbook will be able to be purchased from Mail and Print Services (USC MAPS).</p> <p>The workbook will be completed individually, however, certain tasks will require you to work collaboratively with your peers. There should be time to complete most of the tasks, activities and discussion questions within the two-hour tutorial/laboratory classes. However, some tasks will need to be completed online outside of the scheduled class times. The task in week 6 will however require you to undertake a more comprehensive assessment involving calculations, statistical analysis, and data interpretation and report presentation. This component should be done in groups of 3.</p> <p>Throughout the semester you will receive feedback on the quality, comprehensiveness, and accuracy of your work. It is very important that you make sure that you are keeping up with the material and ask questions when you are having difficulties.</p>
Criteria:	<p>You will be assessed on your ability to:</p> <ul style="list-style-type: none"> • Communicate effectively using correct terms and concepts • Perform calculations on the data collected • Identify inter-relationships between variables • Use a structured approach to reasoning when analysing and interpreting data • Convey information clearly and succinctly

Assessment Task 3: Final exam

Goal:	To provide you with an opportunity to demonstrate your knowledge, understanding, and ability to apply basic biomechanical concepts and principles covered during the theory and practical components of the course – with particular emphasis on their application to human locomotion, activities of daily living, and dynamic sporting skills.
Product:	Written examination held during the central examination period.
Format:	The examination will include all material covered within the theory and practical components of the course. The structure will consist of multiple choice and short answer questions. The duration of the examination is 2 hours (plus reading time)
Criteria:	<p>You will be assessed on your ability to:</p> <ul style="list-style-type: none"> • Use correct terms and concepts • Interpret kinematic and kinetic data • Explain inter-relationships between biomechanical variables • Apply mechanical principles to human locomotion, activities of daily living, and dynamic sporting skills • Convey information clearly and succinctly

7. What are the course activities?

7.1 Directed study hours

The directed study hours listed here are a portion of the workload for this course. A 12 unit course will have total of 150 learning hours which will include directed study hours (including online if required), self-directed learning and completion of assessable tasks. Directed study hours may vary by location. Student workload is calculated at 12.5 learning hours per one unit.

Location: Specific Campus(es) or online:	Directed study hours for location:
USC Sunshine Coast	Four hours contact per week over the 13 weeks of semester, which is broken down as follows: 1 x 2 hr lecture (The lecture content will be presented in a way that will incorporate different blended learning strategies) 1 x 2 hr laboratory session

7.2 Course content

Week # / Module #	What key concepts/content will I learn?
Week 1	Introduction to Biomechanics – What is it? Biomechanics terminology Linear kinematics 1 Laboratory 1: Workbook calculations
Week 2	Linear kinematics 2 and angular kinematics Laboratory 1 (cont.): Excel and SPSS skills
Week 3	Projectile motion Laws of motion – linear kinetics Laboratory 2: A comparison between methods used to measure vertical jump performance
Week 4	Laws of motion – angular kinetics Rotation and leverage Laboratory 3: Introduction to computer-based video analysis using Kinovea
Week 5	Centre of mass Equilibrium Laboratory 4: Centre of mass – Reaction board and segmental methods
Week 6	Exam Laboratory 5: Biomechanical assessment of spinal loading during various lifting tasks
Week 7	Biomechanics of Human Gait – Walking Laboratory 6: Spatiotemporal analysis of the lower limb during walking
Week 8	Biomechanics of Human Athletic Gait – Running and sprinting 1 Laboratory 6: Spatiotemporal analysis of the acceleration phase of running
Week 9	Biomechanics of Human Athletic Gait – Running and sprinting 2 Laboratory 7: Footfall pattern in running
Week 10	Biomechanics of throwing, kicking & striking 1 Laboratory 9: Force summation and throwing
Week 11	Online / student directed learning – Biomechanics of shoe design Laboratory 8: Online / student directed learning – Biomechanics of shoe design
Week 12	Biomechanics of throwing, kicking & striking 2 Laboratory 10: Kicking and striking
Week 13	Movement through a fluid medium Laboratory 11: Workbook completion and Review

Please note that the course activities may be subject to variation.

8. What resources do I need to undertake this course?

Please note that course information, including specific information of recommended readings, learning activities, resources, weekly readings, etc. are available on the course Blackboard site. Please log in as soon as possible.

8.1 Prescribed text(s)

Please note that you need to have regular access to the resource(s) listed below as they are required:

Author	Year	Title	Publisher
Hall, Susan	2018	Basic Biomechanics Eighth edition	McGraw-Hill

8.2 Specific requirements

You must have access to a calculator capable of performing trigonometric functions and bring it to all teaching sessions. While calculators can be shared in teaching sessions this practice will not be allowed during exams. Acceptable calculators are available through the USC shop for under \$40. It will be beneficial to have a USB memory stick / flash drive (at least 4GB) for this and future courses so you can compile the relevant lecture notes, podcasts, and additional learning materials. These can be purchased relatively cheaply (less than \$15) from most major outlets.

9. Risk management

Risk assessments have been performed for all tutorial and laboratory classes and a low level of health and safety risk exists. Some risk concerns may relate to the requirement for a small amount of physical activity (e.g. walking, running, jumping, throwing and kicking), a small amount of physical contact (e.g. palpation of anatomical landmarks), the use of equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to research and understand the risks associated with your specific course of study and to familiarise yourself with the University's general health and safety principles by reviewing the online induction training for students. It is important that you follow the instructions of the teaching staff, adhere to laboratory rules, and behave professionally and respectfully towards your peers.

10. What administrative information is relevant to this course?

10.1 Assessment: Academic Integrity

Academic integrity is the ethical standard of university participation. It ensures that students graduate as a result of proving they are competent in their discipline. This is integral in maintaining the value of academic qualifications. Each industry has expectations and standards of the skills and knowledge within that discipline and these are reflected in assessment.

Academic integrity means that you do not engage in any activity that is considered to be academic fraud; including plagiarism, collusion or outsourcing any part of any assessment item to any other person. You are expected to be honest and ethical by completing all work yourself and indicating in your work which ideas and information were developed by you and which were taken from others. You cannot provide your assessment work to others. You are also expected to provide evidence of wide and critical reading, usually by using appropriate academic references.

In order to minimise incidents of academic fraud, this course may require that some of its assessment tasks, when submitted to Blackboard, are electronically checked through SafeAssign. This software allows for text comparisons to be made between your submitted assessment item and all other work that SafeAssign has access to.

10.2 Assessment: Additional requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:

- The final mark is in the percentage range 47% to 49.4%
- The course is graded using the Standard Grading scale
- You have not failed an assessment task in the course due to academic misconduct

10.3 Assessment: Submission penalties

Late submission of assessment tasks will be penalised at the following maximum rate:

- 5% (of the assessment task's identified value) per day for the first two days from the date identified as the due date for the assessment task.
- 10% (of the assessment task's identified value) for the third day
- 20% (of the assessment task's identified value) for the fourth day and subsequent days up to and including seven days from the date identified as the due date for the assessment task.
- A result of zero is awarded for an assessment task submitted after seven days from the date identified as the due date for the assessment task.

Weekdays and weekends are included in the calculation of days late.

To request an extension, you must contact your Course Coordinator and supply the required documentation to negotiate an outcome.

10.4 Study help

In the first instance, you should contact your tutor, then the Course Coordinator. Additional assistance is provided to all students through Academic Skills Advisers. To book an appointment or find a drop-in session go to [Student Hub](#).

Contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au

10.5 Links to relevant University policy and procedures

For more information on Academic Learning & Teaching categories including:

- Assessment: Courses and Coursework Programs
- Review of Assessment and Final Grades
- Supplementary Assessment
- Administration of Central Examinations
- Deferred Examinations
- Student Academic Misconduct
- Students with a Disability

Visit the USC website:

<http://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching>

10.6 General Enquiries

In person:

- **USC Sunshine Coast** - Student Central, Ground Floor, Building C, 90 Sippy Downs Drive, Sippy Downs
- **USC South Bank** - Student Central, Building A4 (SW1), 52 Merivale Street, South Brisbane
- **USC Gympie** - Student Central, 71 Cartwright Road, Gympie
- **USC Fraser Coast** - Student Central, Student Central, Building A, 161 Old Maryborough Rd, Hervey Bay
- **USC Caboolture** - Student Central, Level 1 Building J, Cnr Manley and Tallon Street, Caboolture

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au