COURSE OUTLINE

SPX322 Biomechanics II

School: School of Health - Sport and Exercise Science

2026 | Trimester 1

UniSC Sunshine Coast
UniSC Moreton Bay

BLENDED LEARNING

Most of your course is on campus but you may be able to do some components of this course online.

Please go to usc.edu.au 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 II extends the applied mechanics knowledge from Biomechanics I to applied situations such as sporting, clinical and coaching applications, exercise efficacy, and workplace health and safety. In addition, Biomechanics II builds on the qualitative movement analysis skills introduced in Biomechanics I before introducing you to a number of biomechanical research techniques used for the quantification of human movement. A key component of the assessment for this course is completion of a small research project.

1.2. How will this course be delivered?

ACTIVITY	HOURS	BEGINNING WEEK	FREQUENCY
BLENDED LEARNING			
Learning materials – Online material consisting of pre-recorded lectures and a variety of other resources	1hr	Week 1	12 times
Tutorial/Workshop 1 – Question and answer sessions relating to the Learning Materials	2hrs	Week 1	12 times
Laboratory 1 – Face-to-face on campus laboratory activities designed to contextualise the Learning Materials	2hrs	Week 1	12 times

1.3. Course Topics

1. Analysing skill
2. Data interpretation
3. Techniques for recording and analysing sports movement
    1. Video analysis in biomechanics
    2. Kinovea
4. Workplace biomechanics
    1. Introduction to ergonomics
    2. Posture assessment
5. Techniques for recording and analysing sports movement
    1. Gait analysis using motion capture systems
    2. Pose recognition and GenAI in movement analysis
    3. Body segment parameters
    4. Data reduction techniques
    5. Force platforms and external force measurement
6. Clinical gait analysis
    1. Data processing in Qualisys
    2. Data analysis using Visual3D
    3. Introduction to OpenSim
7. Biomechanics and prosthetics
8. Introduction to podiatry
9. Research Careers in Biomechanics

2. What level is this course?

300 Level (Graduate)

Demonstrating coherence and breadth or depth of knowledge and skills. Independent application of knowledge and skills in unfamiliar contexts. Meeting professional requirements and AQF descriptors for the degree. May require pre-requisites where discipline specific introductory or developing knowledge or skills is necessary. Normally undertaken in the third or fourth full-time study 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?

COURSE LEARNING OUTCOMES On successful completion of this course, you should be able to...	GRADUATE QUALITIES MAPPING Completing these tasks successfully will contribute to you becoming...	PROFESSIONAL STANDARD MAPPING * Exercise and Sports Science Australia
1 Utilise biomechanical principles to interpret and analyse kinematic and kinetic data	Knowledgeable	2.2.1, 2.2.1, 2.2.3, 2.2.4, 3.2.3
2 Investigate the strengths and limitations surrounding data collection using standard biomechanical assessment tools and procedures	Creative and critical thinker	2.2.4, 2.2.5, 3.2.3, 3.2.8, 7.2.4
3 Communicate biomechanical findings effectively to both scientific and applied audiences and predict biomechanical assessment outcomes that may affect exercise prescription	Knowledgeable Communication	1.2.3, 2.2.5, 2.2.5, 2.2.6, 3.2.5, 4.2.12, 4.2.2
4 Design, conduct and critique a biomechanical assessment on someone with a clinical condition, analyse the data obtained and deliver a series of exercises prescribed by a health professional qualified in clinical exercise prescription	Empowered Applying technologies	2.2.1, 2.2.3, 2.2.4, 3.2.2, 3.2.3, 3.2.8, 4.2.12, 4.2.2
5 Develop collaborative research skills by working in small teams to evaluate and critique biomechanical data	Creative and critical thinker Collaboration	1.2.6, 2.2.5, 3.2.5, 4.2.8, 14.2.3

* Competencies by Professional Body

CODE	COMPETENCY
EXERCISE AND SPORTS SCIENCE AUSTRALIA	
1.2.3	Differentiate and select verbal and non-verbal communication strategies that are contextually appropriate, timely, accessible, and respectful to clients, population groups, and relevant others.
1.2.6	Practise collaboratively and effectively with other professionals, including seeking feedback and input to inform decision-making, delegating tasks, and referring to other professionals and services where appropriate.
2.2.1	Integrate knowledge of anatomy, physiology, pathophysiology, and other determinants of health and function and apply these to inform safe and effective movement, physical activity, and exercise-based interventions for individuals and population groups throughout all stages of their life.
2.2.3	Analyse biomechanical problems and develop and implement relevant intervention strategies to the movement context.
2.2.4	Choose and interpret biomechanical measurements relevant to client's needs.
2.2.5	Evaluate research findings and apply exercise prescription principles to develop recommendations and interventions, including targeted exercise prescription for the purposes of optimising health status, function, recovery, independence, and participation.
2.2.6	Apply clinical, ethical, and evidence-based decision-making to formulate appropriate interventions and recommendations and communicate the expected outcomes.
3.2.3	Formulate appropriate assessments and outcome measures relevant to treatment and client goals, and evaluate health status, function, capacity, and progress, to inform clinical reasoning and to monitor the delivery and outcomes of interventions.
3.2.8	Choose and use relevant technology and equipment efficiently, effectively, and safely.
3.2.5	Evaluate and record assessment outcomes in a timely and accurate manner to inform practice and communicate outcomes and relevance to goals effectively to clients and relevant others.
3.2.2	Formulate safe, effective, and culturally sensitive assessments to collect relevant information, social and cultural determinants of health, client history, and client needs, preferences, barriers, facilitators, and goals.

CODE	COMPETENCY
4.2.12	Deliver an exercise-based intervention for clients with medical conditions, injuries or disabilities that have been prescribed by a health professional qualified in clinical exercise prescription.
4.2.2	Interpret data obtained during a client assessment to prescribe, deliver and monitor physical activity and exercise-based interventions.
4.2.8	Evaluate effectiveness of interventions and their outcomes including the selection, interpretation, and reporting of outcome measures to inform future practice.
7.2.4	Explain the scientific rationale, reliability, validity, assumptions and limitations of common assessments.
14.2.3	Appraise research methods and reports, including statistical results to understand methodological and ethical aspects of research, and integrate this knowledge into all areas of exercise science practice.

5. Am I eligible to enrol in this course?

Refer to the UniSC Glossary of terms for definitions of "pre-requisites, co-requisites and anti-requisites".

5.1. Pre-requisites

SPX202

5.2. Co-requisites

Not applicable

5.3. Anti-requisites

Not applicable

5.4. Specific assumed prior knowledge and skills (where applicable)

Not applicable

6. How am I going to be assessed?

6.1. Grading Scale

Standard Grading (GRD)

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

6.2. Details of early feedback on progress

At the start of Week 4 you are required to submit Assessment Task 1. This Assessment Task takes the form of a brief research proposal for the major project in this course, and has been designed to ensure you will be given feedback on your proposed project prior to undertaking data collection, etc.

6.3. Assessment tasks

DELIVERY MODE	TASK NO.	ASSESSMENT PRODUCT	INDIVIDUAL OR GROUP	WEIGHTING %	WHAT IS THE DURATION / LENGTH?	WHEN SHOULD I SUBMIT?	WHERE SHOULD I SUBMIT IT?
All	1a	Plan	Group	15%	Maximum 750 words	Week 4	Online Submission
All	1b	Oral and Written Piece	Group	45%	Approximately 500 words, plus a 10 min viva	Week 12	Online Submission
All	2	Practical / Laboratory Skills	Individual	20%	The video should be approximately 10 mins in duration	Week 8	Online Submission
All	3	Examination - Centrally Scheduled	Individual	20%	90 mins	Exam Period	Online Test (Quiz)

All - Assessment Task 1a: Research Proposal

GOAL:	You will work in pairs to develop a research proposal for the project that you will undertake in Assessment Task 1b.
PRODUCT:	Plan
FORMAT:	This assessment piece is the precursor to the major assessment task in this course (Task 1b). You and your partner will submit a brief research proposal for Task 1b at the start of Week 4 prior to undertaking your major project. You may choose your own topic, with this proposal briefly indicating the reason (value) in undertaking the project, your proposed research question(s) and methodology.
CRITERIA:	

No.		Learning Outcome assessed
1	Presentation of the proposal (visual presentation, written expression and referencing)	3 4 5
2	Justification for the project	4
3	Depth and breadth of proposed project	4
4	Appropriate sample size, with justification for the test variables	3 4
5	Demonstration of analytical and problem solving skills	1 3
6	Meeting time guidelines	5

GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies, Information literacy

All - Assessment Task 1b: Poster Presentation

GOAL:	You will demonstrate your skills in both conducting quantitative technique analyses and then your understanding of these data during a brief viva
PRODUCT:	Oral and Written Piece
FORMAT:	In this assessment piece you will work in pairs to demonstrate your safe completion of biomechanical assessment, and prepare and then present a research poster on the video-based quantitative biomechanical analysis that you have undertaken. You will need to include a critical evaluation of your choice of assessment. Within your biomechanical analysis, you will need to assess function, capacity, and progress using appropriate assessments and outcome measures. You may choose your own topic, although it must be approved by the Course Coordinator. You must collect your own video and complete your analysis using Kinovea® (or a similar program). Students will produce a scientific poster that adheres to the formatting and submission guidelines typical of a professional biomechanics conference. These guidelines are available on the Course Canvas page and must be followed precisely. Instead of delivering a formal presentation, each student pair will participate in a panel interview during Week 12, where they will be asked to discuss and defend various aspects of their project. The interview will include questions based on issues such as; the rationale and design of the study, your data collection procedures, and/or your interpretation of results and understanding of the underlying biomechanical principles. The majority of marks will be awarded based on your ability to respond to panel questions, demonstrating a deep understanding of your project and its outcomes. An electronic version of your poster must be submitted via Canvas by the end of Week 11.
CRITERIA:	

No.		Learning Outcome assessed
1	The overall presentation of the poster (visual presentation, written expression and referencing)	3
2	Interpretation of current research and application to the specific topic investigated	3 4
3	Depth and breadth of data analysis and development of appropriate conclusions	1 3
4	Appropriate use of key elements including: Introduction, Methods, Results, Conclusion, Formatting/ Referencing	1 4
5	Demonstration of analytical and problem solving skills	1
6	Meeting time guidelines	5

GENERIC SKILLS:	Communication, Collaboration, Problem solving, Organisation, Applying technologies, Information literacy

All - Assessment Task 2: Exercise delivery

GOAL:	The purpose of this assessment piece is for you to show your competency at delivering exercises that have been prescribed by a health professional.
PRODUCT:	Practical / Laboratory Skills
FORMAT:	Throughout the trimester you have been exposed to a number of different biomechanical assessment methodologies, all of which are used commonly throughout sport and exercise science practice. Exercise professionals such as Physiotherapists and Accredited Exercise Physiologists use these assessments to develop individualised exercises designed to address any movement issues identified during testing (e.g. exercises to address issues with posture, or gait). This assessment item will take the form of a video of you taking a colleague (e.g. a fellow student) through a series of exercises suited to a person with an injury, that will be prescribed by either a Physiotherapist or Accredited Exercise Physiologist. Note, you will not need to develop these exercises yourself.
CRITERIA:	

No.		Learning Outcome assessed
1	Demonstrates accurate and correct delivery of exercises prescribed by a qualified health professional	4
2	Delivery of exercises prescribed by a qualified health professional are safe at all times during the assessment of competency	4
3	Effectively communicates exercise instructions and provides appropriate feedback to ensure correct technique and client understanding.	4

GENERIC SKILLS:	Communication, Problem solving

All - Assessment Task 3: Final Exam

GOAL:	To assess you knowledge and understanding of key biomechanical principles discussed during the laboratory sessions
PRODUCT:	Examination - Centrally Scheduled
FORMAT:	A 90 minute online exam, held during the exam period, that consists of Multiple Choice and short answer questions.
CRITERIA:	

No.		Learning Outcome assessed
1	Describe human movement using standard biomechanical terminology	1
2	Apply biomechanical principles in the analysis of human movement.	1 2
3	Describe the various methods and equipment used in biomechanical assessment and evaluate critically the relative advantages and limitations for each.	2

GENERIC SKILLS:	Problem solving, Organisation, Information literacy

6.4. Assessment to competency mapping

PROGRAMME DELIVERY MODE	ASSESSMENT TYPE	TITLE	COMPETENCY	TEACHING METHODS
ESSA ACCREDITED EXERCISE PHYSIOLOGIST PROFESSIONAL STANDARDS 2021				
All delivery modes	Examination - Centrally Scheduled	Final Exam	2.2.1	Taught, Practiced, Assessed
			2.2.5	Taught, Practiced, Assessed
			3.2.3	Taught, Practiced, Assessed
			3.2.8	Taught, Practiced, Assessed
	Oral and Written Piece	Poster Presentation	1.2.3	Taught, Practiced, Assessed
			1.2.6	Taught, Practiced, Assessed
			2.2.1	Taught, Practiced, Assessed
			2.2.5	Taught, Practiced, Assessed
			2.2.6	Taught, Practiced, Assessed
			3.2.2	Taught, Practiced, Assessed
			3.2.3	Taught, Practiced, Assessed
			3.2.5	Taught, Practiced, Assessed
			3.2.8	Taught, Practiced, Assessed
			4.2.2	Taught, Practiced, Assessed
			4.2.8	Taught, Practiced, Assessed
	Plan	Research Proposal	1.2.6	Taught, Practiced, Assessed
			2.2.1	Taught, Practiced, Assessed
			2.2.5	Taught, Practiced, Assessed
			3.2.2	Taught, Practiced, Assessed
			3.2.3	Taught, Practiced, Assessed
			3.2.5	Taught, Practiced, Assessed
			3.2.8	Taught, Practiced, Assessed
			4.2.2	Taught, Practiced, Assessed
			4.2.8	Taught, Practiced, Assessed
	Practical / Laboratory Skills	Exercise delivery	2.2.1	Taught, Practiced, Assessed
			3.2.2	Taught, Practiced, Assessed
			3.2.3	Taught, Practiced, Assessed
			3.2.8	Taught, Practiced, Assessed
			4.2.2	Taught, Practiced, Assessed
ESSA ACCREDITED EXERCISE SCIENTIST PROFESSIONAL STANDARDS 2020				
All delivery modes	Examination - Centrally Scheduled	Final Exam	2.2.1	Taught, Practiced, Assessed
			2.2.3	Taught, Practiced, Assessed
			2.2.4	Taught, Practiced, Assessed
			7.2.4	Taught, Practiced, Assessed
	Oral and Written Piece	Poster Presentation	2.2.1	Taught, Practiced, Assessed
			2.2.3	Taught, Practiced, Assessed
			2.2.4	Taught, Practiced, Assessed
			2.2.5	Taught, Practiced, Assessed
			4.2.2	Taught, Practiced, Assessed
			4.2.12	Taught, Practiced, Assessed
			7.2.4	Taught, Practiced, Assessed
			14.2.3	Taught, Practiced, Assessed
	Plan	Research Proposal	2.2.3	Taught, Practiced, Assessed
			2.2.4	Taught, Practiced, Assessed
			4.2.12	Taught, Practiced, Assessed
			14.2.3	Taught, Practiced, Assessed
	Practical / Laboratory Skills	Exercise delivery	2.2.3	Taught, Practiced, Assessed
			2.2.4	Taught, Practiced, Assessed
			4.2.12	Taught, Practiced, Assessed

7. Directed study hours

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. Student workload is calculated at 12.5 learning hours per one unit.

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

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

8.1. Prescribed text(s) or course reader

Please note that you need to have regular access to the resource(s) listed below. Resources may be required or recommended.

REQUIRED?	AUTHOR	YEAR	TITLE	EDITION	PUBLISHER
Recommended	Susan J. Hall	0	Basic Biomechanics	(9th Ed)	n/a
Recommended	Iwan W. Griffiths	2006	Principles of Biomechanics & Motion Analysis	n/a	Lippincott Williams & Wilkins

8.2. Specific requirements

This course includes an assessment of a professional competency task deemed necessary to meet the Exercise and Sports Science Australia (ESSA) Professional Standards. Therefore, your attendance and participation in practicals/laboratory's and tutorials is expected. Feedback will be provided to you during each of your classes and will provide you with support and guidance to become competent in the ESSA Professional Standards addressed in this course. For any work that is missed you will need to demonstrate to your course provider that you have covered the required material. This will usually take the form of a detailed summary and reflection of the directed study activities and practical skills for the missed class or placement.

The data files that we use in biomechanics can be quite large and so I strongly recommend that you purchase a USB stick specifically for use in this Course. Fortunately, these are quite cheap, with 4 GB sticks available for less than $10 from most major outlets. Some of the laboratory classes in this course (Labs in Weeks 4-11 inclusive) require students to take part in practical sport and exercise science activities, which may include physical contact with other members of the class, require wearing specialist clothing, using sports equipment, partial disrobing, or connection to instruments for scientific measurement require student volunteers to be assessed doing some simple, non-fatiguing activities. Also remember that OH&S rules require that appropriate shoes be worn in our laboratories at all times.

9. How are risks managed in this course?

Risk assessments have been performed for all studio and laboratory classes and a low level of health and safety risk exists. Some risk concerns may include equipment, instruments, and tools; as well as manual handling items within the laboratory. It is your responsibility to review course material, search online, discuss with lecturers and peers 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, and following the instructions of the University staff.

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 Canvas, are electronically checked through Turnitin. This software allows for text comparisons to be made between your submitted assessment item and all other work to which Turnitin has access.

10.2. Assessment: Additional Requirements

Eligibility for Supplementary Assessment

Your eligibility for supplementary assessment in a course is dependent of the following conditions applying:
(a) The final mark is in the percentage range 47% to 49.4%; and
(b) The course is graded using the Standard Grading scale

10.3. Assessment: Submission penalties

Late submissions may be penalised up to and including the following maximum percentage of the assessment task's identified value, with weekdays and weekends included in the calculation of days late:
(a) One day: deduct 5%;
(b) Two days: deduct 10%;
(c) Three days: deduct 20%;
(d) Four days: deduct 40%;
(e) Five days: deduct 60%;
(f) Six days: deduct 80%;
(g) Seven days: A result of zero is awarded for the assessment task.

The following penalties will apply for a late submission for an online examination:
Less than 15 minutes: No penalty
From 15 minutes to 30 minutes: 20% penalty
More than 30 minutes: 100% penalty

10.4. SafeUniSC

UniSC is committed to a culture of respect and providing a safe and supportive environment for all members of our community. For immediate assistance on campus contact SafeUniSC by phone: 07 5430 1168 or using the SafeZone app. For general enquires contact the SafeUniSC team by phone 07 5456 3864 or email safe@usc.edu.au.

The SafeUniSC Specialist Service is a Student Wellbeing service that provides free and confidential support to students who may have experienced or observed behaviour that could cause fear, offence or trauma. To contact the service call 07 5430 1226 or email studentwellbeing@usc.edu.au.

10.5. Study help

For help with course-specific advice, for example what information to include in your assessment, you should first contact your tutor, then your course coordinator, if needed.

If you require additional assistance, the Learning Advisers are trained professionals who are ready to help you develop a wide range of academic skills. Visit the Learning Advisers web page for more information, or contact Student Central for further assistance: +61 7 5430 2890 or studentcentral@usc.edu.au.

10.6. Wellbeing Services

Student Wellbeing provide free and confidential counselling on a wide range of personal, academic, social and psychological matters, to foster positive mental health and wellbeing for your academic success.

To book a confidential appointment go to Student Hub, email studentwellbeing@usc.edu.au or call 07 5430 1226.

10.7. AccessAbility Services

Ability Advisers ensure equal access to all aspects of university life. If your studies are affected by a disability, learning disorder mental health issue, injury or illness, or you are a primary carer for someone with a disability or who is considered frail and aged, AccessAbility Services can provide access to appropriate reasonable adjustments and practical advice about the support and facilities available to you throughout the University.

To book a confidential appointment go to Student Hub, email AccessAbility@usc.edu.au or call 07 5430 2890.

10.8. 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
- Central Examinations
- Deferred Examinations
- Student Conduct
- Students with a Disability

For more information, visit https://www.usc.edu.au/explore/policies-and-procedures#academic-learning-and-teaching

10.9. Student Charter

UniSC is committed to excellence in teaching, research and engagement in an environment that is inclusive, inspiring, safe and respectful. The Student Charter sets out what students can expect from the University, and what in turn is expected of students, to achieve these outcomes.

10.10. General Enquiries

In person:

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

Tel: +61 7 5430 2890

Email: studentcentral@usc.edu.au