BIOM9541

Mechanics of the Human Body

Term 3, 2022
## Course Overview

## Staff Contact Details

### Convenors

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Availability</th>
<th>Location</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matthew Brodie</td>
<td><a href="mailto:a.m.brodie@unsw.edu.au">a.m.brodie@unsw.edu.au</a></td>
<td>Reach out by email to make an appointment about BIOM9541 or related thesis topics or use the BIOM9541 Moodle Discussion Board.</td>
<td>Samuels Building (F25) Room 515c</td>
<td></td>
</tr>
</tbody>
</table>

### Demonstrators

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Availability</th>
<th>Location</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keng-Yin Lai</td>
<td><a href="mailto:keng-yin.lai@unsw.edu.au">keng-yin.lai@unsw.edu.au</a></td>
<td>Keng-Yin provides dedicated support for remote learning students. Please reach out to Keng-Yin through the BIOM9541 Moodle Discussion Board.</td>
<td>Online support for &quot;Flexible Learning&quot;</td>
<td></td>
</tr>
<tr>
<td>Astrid Crane</td>
<td><a href="mailto:astrid.crane@student.unsw.edu.au">astrid.crane@student.unsw.edu.au</a></td>
<td>Astrid is the Tuesday session demonstrator. Please reach out to Astrid through the BIOM9541 Moodle Discussion Board.</td>
<td>Samuels Building (F25) Room 518</td>
<td></td>
</tr>
<tr>
<td>Ray Gu</td>
<td><a href="mailto:ray.gu@student.unsw.edu.au">ray.gu@student.unsw.edu.au</a></td>
<td>Ray is the Wednesday session demonstrator. Please reach out to Ray through the BIOM9541 Moodle Discussion Board.</td>
<td>Samuels Building (F25) Room 518</td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Email</td>
<td>Availability</td>
<td>Location</td>
<td>Phone</td>
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</tr>
<tr>
<td>Joshua Najdzion</td>
<td><a href="mailto:j.najdzion@student.unsw.edu.au">j.najdzion@student.unsw.edu.au</a></td>
<td>Joshua is the Thursday session demonstrator. Please reach out to Joshua through the BIOM9541 Moodle Discussion Board.</td>
<td>Electrical Engineering (G03)</td>
<td></td>
</tr>
</tbody>
</table>

**School Contact Information**

Student Services can be contacted via [unsw.to/webforms](http://unsw.to/webforms).
Course Details

Units of Credit 6

Summary of the Course

Ever wondered how Lord of the Rings or Avatar were created? How athletes might analyse the biomechanics of their movements to improve performance? Or about how advances in wearable technology, phone apps and smart garments can be used to detect, analyse and predict injuries and health issues or even help people with Parkinson's disease walk with confidence?

This course introduces students to the methods used in the analysis of human movement in medicine and health, including applications in sport biomechanics and musculoskeletal modelling. Methods to analyse body segment and joint kinematics, joint kinetics, work and power, muscle forces and associated energy cost will be covered.

Applications of biomechanics in clinical, occupational and recreational areas will be presented. Highlights include access to Neuroscience Research Australia's state-of-the-art 3D motion capture lab for the MoCap laboratory sessions. In case of COVID restrictions, illness or misadventure, options will be available for students to participate remotely with dedicated online support provided for 2022. Our focus is to offer the best possible learning and teaching experience with a focus on hands on and in-person learning experiences where possible.

Course Aims

The aims of this course are to:

1. Develop understanding of the field of human movement science and diverse applications in medicine, health and sport.
2. Introduce students to the fundamentals of anatomy and biomechanics.
3. Develop fundamental understanding of 3D motion capture, gait analysis and musculoskeletal modeling.
4. Introduce students to advances in wearable and mobile technologies for biomechanical analysis of human movement.
5. Enable students to critically apprise technologies used for biomechanical analysis of human movement.
6. Provide an engaging environment for students to self-organise their learning and develop team collaboration skills for engineering projects.

Course Learning Outcomes

After successfully completing this course, you should be able to:

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>EA Stage 1 Competencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Analyse human movement using mechanical principles</td>
<td>PE1.1, PE1.2, PE1.3</td>
</tr>
<tr>
<td>2. Design and perform experiments that evaluate human movement</td>
<td>PE1.1, PE2.1, PE2.4, PE3.1, PE3.6</td>
</tr>
<tr>
<td>3. Critically analyse experimental outcomes in broader context</td>
<td>PE1.4, PE1.5, PE2.3</td>
</tr>
</tbody>
</table>
Learning Outcome | EA Stage 1 Competencies
---|---
4. Communicate experimental findings effectively using oral and written methods | PE2.1, PE3.2
5. Critically evaluate different types of wearable technologies used for analysing human movement | PE1.3, PE2.1, PE3.2
6. Engage in self learning practices and team collaboration to solve problems in biomechanics | PE2.2, PE2.4, PE3.1, PE3.3, PE3.5, PE3.6

OBJECTIVES

On completion of this course, you should:

- Have a broad understanding of the scope of biomechanics and its applications
- Understand the fundamental general mechanical principles used
- Be able to discuss, develop and apply mechanical principles to a range of problems and medical applications.
- Be able to describe and discuss the measurement, analysis and assessment of human movement.
- Critically review the literature in the area and apply knowledge gained from the course to analyse biomechanical applications
- Clearly summarise and communicate findings from literature research using oral and written methods.

Graduate attributes developed in this course include:

- The skills involved in scholarly inquiry
- An in-depth engagement with the relevant disciplinary knowledge in its inter-disciplinary context
- The capacity for analytical and critical thinking and for creative problem solving
- Information literacy – the skills to appropriately locate, evaluate and use relevant information
- An appreciation of and respect for diversity
- A capacity to contribute to and work within the international community
- The skills required for collaborative and multidisciplinary work
- A respect for ethical practice and social responsibility
- The skills of effective communication

Teaching Strategies

BIOM9541 Teaching and Learning uses many approaches to more effectively engage with students each week:

1. **Online lectures:** 1-hour self-paced lecture content delivered through Moodle;

2. **Laboratory sessions:** 2-hour face-to-face laboratory session (with online options depending on COVID19 restrictions and health advice);

3. **Free Discussions:** the option to engage in several "Free Discussion" sessions with the teaching and learning team throughout the course;
4. **Online Flexible Learning**: for remote students there is also the choice of participating through "Online Flexible Learning" approaches, whereby students can submit Powerpoint demonstrations of their work instead of attending scheduled laboratory sessions and doing in-person/ZOOM demonstrations.

5. **State-of-the-art Laboratories**: BIOM9541 is excited to have access to Neuroscience Research Australia's (NeuRA) state-of-the-art 10-camera VICON 3D Motion Capture Lab. In T3, three face-to-face lab sessions will be held at NeuRA a 5-minute walk from UNSW.

6. **Beta-testing mobile technologies**: BIOM9541 has also secured a beta testing licence for SPLYZA Motion an AI driven smart phone app for biomechanical analysis of human motion. This provides additional flexibility for online students to conduct experiments in the comfort of their home environments.

7. **Wearable technology** will be used to investigate different ways to analyse human movement.

8. **Fun Kahoot Quizzes** that provide light-hearted repetition of key concepts that will help you cement the new knowledge and revise for the final exam.

| Private Study | • Review lecture material and textbook  
• Do set problems and assignments  
• Join Moodle discussions of problems  
• Reflect on class problems and assignments  
• Download materials from Moodle  
• Keep up with notices and find out marks via Moodle |
| --- | --- |
| Online Lectures (self-paced learning) | • Find out what you must learn  
• See methods that are not in the textbook  
• Follow worked examples  
• Hear announcements on course changes |
| Software Laboratories | • Group collaboration and team work  
• Practice solving set problems  
• Ask questions |
| Assessments | • Demonstrate your knowledge and skills  
• Demonstrate higher understanding  
• Problem solving |
| MoCap Laboratory Work | • Hands-on work, to set studies in context  
• Group collaboration and team work |
| Feedback, reflection and discussion | • Online discussion forums  
• Post your feedback  
• Optional Free Discussion Sessions |

**Rationale**: BIOM9541 teaching and learning content comprises a lecture and small group exercises, group discussions and other methods to facilitate student learning. The moodle lectures will examine the science and engineering involved in basic biomechanics and will provide students with the basic knowledge to solve the tutorial problems as well as complete the assignments. Lecture notes will be available via Moodle and feedback on laboratory work will be regularly provided to the students. In addition online and ZOOM help is available through several "Free Discussion" sessions run each week by the teaching and learning team. Key learning points each week will be reinforced through Kahoot...
quizzes with incentives. Online help and class collaboration is further provided and encouraged to
develop engineering leadership and teamwork skills.

**Suggested approach to learning.** This course requires you to understand the lecture material and then
apply the knowledge to biomechanical applications. It is important to understand the fundamental
concepts as soon as possible and to ask for help if you do not understand. Complete all the lectures and
if something is unclear, please ask questions. Make sure you review lecture notes and read all material
that is suggested or handed out. Class participation through attendance at tutorials, laboratories and
group work is expected and will allow for alternative methods of absorbing the relevant information.

**No previous biomechanics experience?** Not a problem. As part of this course you also get access to
an online Introductory Biomechanics course for your reference.

**Additional Course Information**

Biomechanics is the study of the effect of mechanical phenomena (forces, velocities, accelerations,
energies, power, momenta, moments, friction, fatigue and failure) on human bodies. It relies on an
understanding of mechanics and applies the fundamentals of mechanics to the structure and function of
the human body.

Biomechanics is used in a diverse range of disciplines including biology, ergonomics, engineering,
physiology, medicine, and mechanical physics. Many professionals – engineers, designers, physical
therapists, oral and orthopaedic surgeons, cardiologists, and aerospace engineers – use practical
applications of biomechanics.

Biomechanics has application in all areas of health care and medical problem solving that require
physical manipulation. It may be the major area of concern in some instances (e.g. artificial joints,
prosthetics and orthoses, mechanisms of physical injury) or it may be a vital adjunct to another area (e.g.
design of an implantable pacemaker or specialist surgical tools).

This course covers in depth the methods used in the analysis of the biomechanics of the human
musculoskeletal system. Methods to analyse body segment and joint kinematics, joint kinetics, work and
power, muscle forces and associated energy costs will be covered. Applications of biomechanics in
clinical, occupational and recreational areas will be presented.
### Assessment

<table>
<thead>
<tr>
<th>Assessment task</th>
<th>Weight</th>
<th>Due Date</th>
<th>Course Learning Outcomes Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Weekly Online Quizzes and Discussion Board Posts</td>
<td>10%</td>
<td>Weekly</td>
<td>1, 4, 6</td>
</tr>
<tr>
<td>2. OpenSim Model Demonstrations</td>
<td>10%</td>
<td>Weeks 1, 3, 4 &amp; 7</td>
<td>1, 2, 4, 6</td>
</tr>
<tr>
<td>3. Industry Engagement and Mobile Technology Report</td>
<td>10%</td>
<td>Week 4</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td>4. Computational Laboratory Report</td>
<td>10%</td>
<td>Week 9</td>
<td>1, 4, 6</td>
</tr>
<tr>
<td>5. Individual Motion Capture Projects</td>
<td>30%</td>
<td>Weeks 6, 7 and 10</td>
<td>1, 2, 3, 4, 5, 6</td>
</tr>
<tr>
<td>6. Final Exam</td>
<td>30%</td>
<td>Exam Week</td>
<td>1, 2, 3, 4, 5</td>
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**Assessment 1: Weekly Online Quizzes and Discussion Board Posts**

**Due date:** Weekly

**Weekly Progress (7%).** The purpose is to ensure you are making timely progress through the online units. You will note that each online Moodle unit has a number of questions embedded throughout it. Your answers to these questions will be logged and recorded in the grade book. You will receive one credit (1%) for each unit if you complete with a score of at least 80% before your scheduled laboratory class of the same week (up to a maximum of 7 credits). It is expected that you complete the online Moodle unit before your laboratory session that week. You are then expected to enhance your learning experience by discussing the week's Moodle content with your demonstrator at the laboratory session.

**Yay and Boo (3%)** is a lighthearted assessment that will allow you to share your triumphs and failures with your colleagues by posting your results to the class Moodle forum. The purpose is to enhance BIOM9541 engagement. There will be three opportunities throughout the semester to participate in the Yay and Boo assessment. Yay and Boo opportunities will appear in three of the software laboratories (SL1, SL2 and SL3). You will be given the opportunity to share your triumph or failure with your colleagues on the discussion board. Each post published before the deadline will earn you one credit (1%). Don’t miss out!

**Assessment 2: OpenSim Model Demonstrations**

**Due date:** Weeks 1, 3, 4 & 7

Attendance for all Software Laboratory sessions (SL1, SL2, SL3 and SL4) is compulsory. Failure to attend the laboratory class will mean that you cannot receive a grade for any of the assignments associated with this assessment component.

The four software laboratories provide you with an opportunity to analyse and simulate human...
movement. You will be introduced to the analysis of human movement using OpenSim, a freely available software. You will use the 3D MoCap data you collect during the laboratory session at NeuRA in week 2 as well as sample data provided to perform various analyses of human movement. You will be assessed based on your model and your group responses.

The mark breakdown for each Software Laboratory (2.5%) will be as follows:

- **Model quality (1.5%)**
  - 0 for no model
  - 0.5 for working model with major errors
  - 1 for working model with minor errors
  - 1.5 for working model without errors

- **Group responses (1%)**
  - 0 for minimal effort
  - 0.5 for some effort, but more required
  - 1 for good effort (Note all group members will receive the same mark)

"Online Flexible Learning" Students will be required to submit through Moodle a working demo of their model using PowerPoint instead of attending a session and will submit group reports to the dedicated online support demonstrator.

**Assessment 3: Industry Engagement and Mobile Technology Report**

**Start date:** Week 3  
**Due date:** Week 4

Your team must **choose between** Beta testing the SPLYZA motion app (Apple users only) or Investigating the accuracy of another health app (all phone users). Only one report per team is required and should focus on either:

**Beta test the SPLYZA Motion (10%)**

Students will beta test the SPLYZA Motion mobile phone app and produce a short report for SPLYZA. The app will be used to analyse the biomechanics of different sporting movements in the students home environment. The biomechanical analysis of different sports capture by the students' laboratory team can be compared and contrasted with what would be possible in NeuRA's state-of-the-art motion capture laboratory. A systems usability scale (SUS) assessment should be carried out by each team member and the results compiled. Students will be required to discuss the pitfalls and benfits of SPLYZA Motion and make recommendations to SPLYZA about the apps usability, bugs, potential uses, and priority improvements. A two to three page group report including images showing the analyses completed is required. The CEO of SPLYZA will mark your team reports. Teams without access to an iPhone can request to borrow one from Dr Matthew A. Brodie

Or:

**Investigating the accuracy and usability of the ARGUS phone app or other health app (10%)**

The ARGUS app was used to measure global activity levels in over 700,000 people as published in Nature. Resulting country by country step counts were compared to national obesity levels, but was the step counting app accurate? In your lab team you will test the ARGUS app or choose another similar health app to test. The team will be expected to develop and use appropriate scientific methods for app testing. A systems usability scale (SUS) assessment should be carried out by each team member and
the results complied. Students will be required to discuss the pitfalls and benefits of their chosen health
app and make recommendations to the app developers about the app’s usability, bugs, potential uses,
and priority improvements. A two to three page group report including images showing the analyses
completed is required. Reports will be marked by Dr Matthew A. Brodie, course coordinator of
BIOM9541.

Assessment 4: Computational Laboratory Report

Due date: Week 9

Plotting MoCap Data and Calculations (10%). Here you will plot the data you collected during your
laboratory class in week 2. You will then apply the theory of what you’ve learned in the 3D Kinematics
unit to manually calculate joint centres, coordinate systems and joint angles from the data you collected
during your laboratory class in week 2. You will be required to submit a report that includes MoCap data,
plotted figures, calculations and results.

Assessment 5: Individual Motion Capture Projects

Start date: Week 5
Due date: Weeks 6, 7 and 10

Wearable technology project (10%). Based on the interactive experiment and NeuRA titled "Texting is
threatening" that looks at the risk of accidental falls while texting. You will use wearable technology to
assess how texting while walking may change a participant’s gait pattern, cognitive processing speed
and ability to recover and avoid hazards. Data of human movement will be collected using wearable
technology in Week 5, which you will use to create and test a hypothesis of your own choosing. After
your subsequent analysis, you will submit a 1-page scientific abstract on your findings in Week 6.

Individual Motion Capture Project (20%). You will design, perform and analyse a motion-capture
experiment of your choosing, using a published research paper to guide your hypothesis. There are
three assessment items that comprise this assessment item:

- Proposal (5%). The proposal is a short document that outlines your plans for your individual
  assignment (Week 7).
- Presentation (5%). You will give a three-minute peer-reviewed presentation (Week 10) using
  Powerpoint slides that contain an OpenSim model video of your experiment and the data you
  collected in Week 8.
- Project data and outcomes (10%). Based on your submitted powerpoint presentation slides,
  experimental data, OpenSim models, analysis and discussion, which aims to put your project in
  context of previous research (Week 10).

"Online Flexible Learning" students or those unable to attend NeuRA will have an option to use the
SPLYYZA MOTION app (see Industrial Reports above) to conduct a home-based experiment instead or
use existing data collected previously at NeuRA’s motion capture laboratory.

Assessment 6: Final Exam

Due date: Exam Week

The final examination will be held online during the formal examination period. It will assess all content of
the course and will be open-book. You will be provided with an equation sheet during the exam, which will be made available to you well before to the exam so you know what to expect. Marks will be awarded for correct answers and for the quality of your working, which will have to be photographed and uploaded during the exam period. Practice exam questions will be released in Week 6.
Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

**Welcome to BIOM9541 Mechanics of the Human Body.** We know it is still possible that there will be disruptions from COVID19 in T3 2022. The BIOM9541 team is dedicating to providing students with a world class, flexible and engaging learning experience. For students unable to attend face to face because of illness or other circumstances online options will be available.

**Students are strongly encouraged to complete all learning activities on time and participate in all class discussions.** Attendance at the tutorials and laboratories is compulsory. Non-attendance for reasons other than misadventure will preclude you from submitting the assignment related to the activity you missed. Your demonstrator will record attendance. Online students will have to submit a powerpoint demonstrations of their work to prove remote engagement.

**Complete the online modules** before your lab sessions for credit and then ask questions during the lab sessions or using the discussion board to help you cement your new knowledge.

*View class timetable*

**Timetable**

<table>
<thead>
<tr>
<th>Date</th>
<th>Type</th>
<th>Content</th>
</tr>
</thead>
</table>
| O-Week: 5 September - 9 September | Module   | • Complete the Welcome & Introduction Module via Moodle  
• Get ahead by starting on the Gait Analysis Module |
|                        | Homework | • Join a Lab Team for either the Tuesday, Wednesday or Thursday weekly sessions at UNSW or join a "Flexible Online Learning" Lab Team  
• Select a time slot for the Weeks 2, 5 and 8 MoCap Labs at NeuRA state-of-the-art facilities, don't miss out! |
<p>|                        | Web      | Please try to download OpenSim and other recommended software early. It can take a couple of days to register and get the password for the download of OpenSim, so please get onto this task early. You will need to have access to OpenSim in Week 1 and it is a core software program BIOM9541. OpenSim is available on the SAM518 computers, but students that attend the Thursday laboratory session or online flexible learning students will need OpenSim on their laptops. We recommend everyone downloads OpenSim. |</p>
<table>
<thead>
<tr>
<th>Week 1: 12 September - 16 September</th>
<th>Module</th>
<th>Complete the Gait Analysis Module before your lab for credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Software Laboratory 1. Before this laboratory session, make sure you have access to the core biomechanical modelling software OpenSim.</td>
<td></td>
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</tbody>
</table>
| Homework                          | • Practice Question 1  
• Select a time slot for the Weeks 2, 5 and 8 MoCap Labs at NeuRA state-of-the-art facilities, don't miss out! |
| Assessment                        | • OpenSim SL1 Model and Team Report  
• Yay and Boo post 1 |

<table>
<thead>
<tr>
<th>Week 2: 19 September - 23 September</th>
<th>Module</th>
<th>Complete Anthropometrics before your lab for credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Introduction to MoCap at NeuRA's state-of-the-art facilities. NeuRA policy currently requires proof of vaccination to attend onsite.</td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>Practice Question 2</td>
<td></td>
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<tr>
<td>Assessment</td>
<td>Enjoy! No assessments in Week 2</td>
<td></td>
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<table>
<thead>
<tr>
<th>Week 3: 26 September - 30 September</th>
<th>Module</th>
<th>Complete 3D Mathematics before your lab for credit</th>
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</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Software Laboratory 2</td>
<td></td>
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</tbody>
</table>
| Homework                          | • Team beta testing of SPLYZA Motion or other Health App  
• Practice Question 3 |
| Assessment                        | • OpenSim SL2 Model and Team Report  
• Yay and Boo post 2 |

<table>
<thead>
<tr>
<th>Week 4: 3 October - 7 October</th>
<th>Module</th>
<th>Complete Introduction to Wearable Technology before your lab for credit</th>
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</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Software Laboratory 3</td>
<td></td>
</tr>
</tbody>
</table>
| Assessment                      | • OpenSim SL3 Model and Team Report  
• Team report for Beta testing SPLYZA Motion or other Health App |

<table>
<thead>
<tr>
<th>Week 5: 10 October - 14 October</th>
<th>Module</th>
<th>Complete Advanced Wearable Technology before your lab for credit</th>
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<tbody>
<tr>
<td>Laboratory</td>
<td>&quot;Texting is threatening&quot; investigates why texting while walking may cause accidents and uses wearable technology at NeuRA.</td>
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<tr>
<td>Assessment</td>
<td>Enjoy! No assessments in Week 5</td>
<td></td>
</tr>
<tr>
<td>Week 6: 17 October - 21 October</td>
<td>Module</td>
<td>Flex Week - No new content!</td>
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</tr>
<tr>
<td>Assessment</td>
<td></td>
<td>• Individual MoCap Report for &quot;Texting is threatening&quot;</td>
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<td></td>
<td></td>
<td>• Yay and Boo post 3</td>
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<table>
<thead>
<tr>
<th>Week 7: 24 October - 28 October</th>
<th>Module</th>
<th>Complete 3D Kinematics before your lab for credit</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>Practice Question 4</td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td>Software Laboratory 4</td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>• OpenSim SL4 Model and Team Report</td>
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<tr>
<td></td>
<td>• Individual MoCap Project, submit your proposal for your Week 8 experiment at NeuRA’s state-of-the-art MoCap lab.</td>
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<table>
<thead>
<tr>
<th>Week 8: 31 October - 4 November</th>
<th>Laboratory</th>
<th>Individual MoCap Project at NeuRA’s state-of-the-art MoCap Lab. Online flexible students may conduct an experiment in the home environment using SPLYZA motion, submit a proposal for another team to complete, or combine data from several pre-recorded experiments to come up with a new hypothesis to test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module</td>
<td>Complete 3D Kinetics before your lab for credit</td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>Practice Question 5</td>
<td></td>
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<tr>
<td>Assessment</td>
<td>Enjoy! No assessments in Week 8</td>
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<table>
<thead>
<tr>
<th>Week 9: 7 November - 11 November</th>
<th>Module</th>
<th>Complete Muscle Mechanics before your lab for credit</th>
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<tbody>
<tr>
<td>Laboratory</td>
<td>Computational Laboratory</td>
<td></td>
</tr>
<tr>
<td>Homework</td>
<td>Practice Question 6</td>
<td></td>
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<tr>
<td>Assessment</td>
<td>Computational Laboratory Individual Report</td>
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<table>
<thead>
<tr>
<th>Week 10: 14 November - 18 November</th>
<th>Module</th>
<th>Complete Musculoskeletal Modelling before your lab for credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>Presentation of your Individual MoCap Project (from Week 8) using Power Point slides (you will be marked by your peers). Online Flexible Learning students will be required to submit a recorded video presentation.</td>
<td></td>
</tr>
<tr>
<td>Assessment</td>
<td>Individual MoCap Project (from Week 8) data, OpenSim models, results, discussion and Power Point slides.</td>
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Resources

Prescribed Resources

Online Flexible Learning students and Thursday Laboratory students should bring their own laptop computer to Software and Computational Laboratories with OpenSim and other core software installed. OpenSim and other core software is available on the SAM518 computers and these will be used for the Tuesday and Wednesday laboratory sessions.

Recommended Resources

The recommended background text for this course are:


Other useful reference books that are held in the UNSW Library are:


Students seeking additional resources can also obtain assistance from the UNSW Library at [http://library.unsw.edu.au/](http://library.unsw.edu.au/).

Additional readings and recommended websites will be listed on Moodle when required.

Course Evaluation and Development

Student feedback has helped to shape and develop this course, including feedback obtained from online evaluations as part of UNSW’s myExperience process. Your feedback is much appreciated and taken very seriously. Continual improvements are made to the course based in part on such feedback and this helps us to improve the course for future students. Informal student feedback is also sought frequently throughout the semester and used to assist in the progression of the course.

Laboratory Workshop Information

Students will be required to sign COVID19 safe declarations before attending any face-to-face laboratory sessions at NeuRA’s state-of-the-art MoCap lab, which includes evidence of vaccination.
Submission of Assessment Tasks

Laboratory reports and major assignments will require a Non Plagiarism Declaration Cover Sheet.

Assignments should be submitted on time. A daily penalty of 5% of the marks available for that assignment will apply for work received after the due date. Any assignment more than 5 days late will not be accepted. The only exemption will be when prior permission for late submission has been granted by the Course coordinator. Extensions will be granted only on medical or compassionate grounds under extreme circumstances.
Academic Honesty and Plagiarism

PLAGIARISM
Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise will have their names entered on a plagiarism register and will be liable to disciplinary action, including exclusion from enrolment.
It is expected that all students must at all times submit their own work for assessment. Submitting the work or ideas of someone else without clearly acknowledging the source of borrowed material or ideas is plagiarism.
All assessments which you hand in must have a Non Plagiarism Declaration Cover Sheet. This is for both individual and group work. Attach it to your assignment before submitting it to the Course Coordinator or at the School Office.
Plagiarism is the use of another person’s work or ideas as if they were your own. When it is necessary or desirable to use other people’s material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at: https://student.unsw.edu.au/plagiarism
Academic Information

COURSE EVALUATION AND DEVELOPMENT
Student feedback has helped to shape and develop this course, including feedback obtained from on-line evaluations as part of UNSW's myExperience process. You are highly encouraged to complete such an on-line evaluation toward the end of Term. Feedback and suggestions provided will be important in improving the course for future students.

DATES TO NOTE
Refer to MyUNSW for Important Dates, available at:
https://my.unsw.edu.au/student/resources/KeyDates.html

ACADEMIC ADVICE
For information about:
• Notes on assessments and plagiarism,
• Special Considerations,
• School Student Ethics Officer, and
• BESS

refer to the School website available at
http://www.engineering.unsw.edu.au/biomedical-engineering/

Supplementary Examinations:
Supplementary Examinations for Term 1 2022 will be held on (TBC) should you be required to sit one.

This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up to date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit
Joseph Gatt as "Kratos" on the set of "God of War: Ascension". Posted on behalf of Joseph Gatt. This image is free to use under the Creative Commons Attribution-Share Alike 3.0 Unported license.

CRICOS
CRICOS Provider Code: 00098G

Acknowledgement of Country
We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.
## Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

### Program Intended Learning Outcomes

<table>
<thead>
<tr>
<th>Knowledge and skill base</th>
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<tbody>
<tr>
<td>PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline</td>
<td>✔</td>
</tr>
<tr>
<td>PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline</td>
<td>✔</td>
</tr>
<tr>
<td>PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline</td>
<td>✔</td>
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<tr>
<td>PE1.4 Discernment of knowledge development and research directions within the engineering discipline</td>
<td>✔</td>
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<tr>
<td>PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline</td>
<td>✔</td>
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<tr>
<td>PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline</td>
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<tr>
<th>Engineering application ability</th>
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<tbody>
<tr>
<td>PE2.1 Application of established engineering methods to complex engineering problem solving</td>
<td>✔</td>
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<tr>
<td>PE2.2 Fluent application of engineering techniques, tools and resources</td>
<td>✔</td>
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<tr>
<td>PE2.3 Application of systematic engineering synthesis and design processes</td>
<td>✔</td>
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<tr>
<td>PE2.4 Application of systematic approaches to the conduct and management of engineering projects</td>
<td>✔</td>
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<tr>
<th>Professional and personal attributes</th>
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<tbody>
<tr>
<td>PE3.1 Ethical conduct and professional accountability</td>
<td>✔</td>
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<tr>
<td>PE3.2 Effective oral and written communication in professional and lay domains</td>
<td>✔</td>
</tr>
<tr>
<td>PE3.3 Creative, innovative and pro-active demeanour</td>
<td>✔</td>
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<tr>
<td>PE3.4 Professional use and management of information</td>
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</tr>
<tr>
<td>PE3.5 Orderly management of self, and professional conduct</td>
<td>✔</td>
</tr>
<tr>
<td>PE3.6 Effective team membership and team leadership</td>
<td>✔</td>
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