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1. **GENERAL POLICY STATEMENT ON SAFETY AND HEALTH MANAGEMENT**

This School full endorses the UWA OSH policy. This handbook supplements the main UWA policy (UWA Occupational Health and Safety Policy [www.safety.uwa.edu.au/policies](http://www.safety.uwa.edu.au/policies)) to provide and maintain safe and healthy working conditions, equipment and systems of work for its entire staff, students, contractors and visitors. To this end, information, instruction, training and supervision is provided as necessary. Responsibility is also accepted for the safety and health of other people who may be affected by the School’s activities, as far as is reasonably practicable. The evidence of accidents within the School is low due to the high quality of ongoing supervision and training of students and staff.

This laboratory induction document is to be read in conjunction with the School’s Safety and Health Manual and is to accompany a formal induction process.

*Research students and staff must have completed an induction prior to independent use of the Schools laboratories*

This manual will be kept up-to-date to take account of changes in the Laboratory’s activities.

2. **THE SCHOOL’S HEALTH AND SAFETY ORGANISATION**

- Ultimate responsibility for safety and health in the School lies with the Head of School.
- Processes for identifying and controlling risk are effectively achieved with the participation of all staff at all levels.
- The organisational chart for the safety and health management structure is as follows:

```
<table>
<thead>
<tr>
<th>HEAD OF SCHOOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winthrop Professor Bruce Elliott</td>
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</tbody>
</table>

| SCHOOL STAFF MEETING |

<table>
<thead>
<tr>
<th>SCHOOL SAFETY OFFICER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr Don Gordon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SSEH SAFETY AND HEALTH COMMITTEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Winthrop Professor Tim Ackland</td>
</tr>
</tbody>
</table>

| SAFETY AND HEALTH PEPRESENTATIVE |

<table>
<thead>
<tr>
<th>STAFF</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>STUDENTS</th>
</tr>
</thead>
</table>

| VISITORS |
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3. THE SCHOOL’S HEALTH AND SAFETY MANAGEMENT STRUCTURE

<table>
<thead>
<tr>
<th>DUTIES</th>
<th>MEMBER</th>
<th>CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWA Safety Committee</td>
<td>W/Professor Tim Ackland</td>
<td>6488 2668</td>
</tr>
<tr>
<td>School’s Safety &amp; Health Committee</td>
<td>W/Professor Tim Ackland (chair)</td>
<td>6488 2668</td>
</tr>
<tr>
<td></td>
<td>Professor Paul Fournier</td>
<td>6488 1356</td>
</tr>
<tr>
<td></td>
<td>Mr Don Gordon</td>
<td>6488 3504</td>
</tr>
<tr>
<td></td>
<td>Ms Elisa Robey</td>
<td>6488 1383</td>
</tr>
<tr>
<td>First Aid Officers</td>
<td>Mr Ollie Guttinger</td>
<td>6488 3333</td>
</tr>
<tr>
<td></td>
<td>Mr Nat Benjanuvatra</td>
<td>6488 2437</td>
</tr>
<tr>
<td></td>
<td>Mr Steve Franklin</td>
<td>6488 2266</td>
</tr>
<tr>
<td>Fire Wardens</td>
<td>Mr Don Gordon (Chief)</td>
<td>6488 3504</td>
</tr>
<tr>
<td></td>
<td>Mr Rob Hurn</td>
<td>6488 1865</td>
</tr>
<tr>
<td></td>
<td>Mr Steve Franklin</td>
<td>6488 2266</td>
</tr>
<tr>
<td></td>
<td>Mrs Inga Carr</td>
<td>6488 2360</td>
</tr>
<tr>
<td></td>
<td>Mr Alasdair Dempsey</td>
<td>6488 2370</td>
</tr>
<tr>
<td></td>
<td>Mr Jared Issott</td>
<td>6488 2653</td>
</tr>
<tr>
<td></td>
<td>Mr Tony Roby</td>
<td>6488 2371</td>
</tr>
<tr>
<td></td>
<td>Mrs Kerry Smith</td>
<td>6488 2474</td>
</tr>
<tr>
<td></td>
<td>Mrs Christine Page</td>
<td>6488 3510</td>
</tr>
<tr>
<td></td>
<td>Mrs Margaret Durling</td>
<td>6488 2361</td>
</tr>
</tbody>
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4. DOMESTIC SAFETY ARRANGEMENTS

For any activity/area in which staff have responsibility for the safety and health of others, they should familiarise themselves, and those within their care, with the basic domestic safety arrangements, such as:

- Location of First Aid Boxes
  - 2 x Pool Area (fixed)
  - 2 x Technical Area (1 portable and 1 fixed)
  - 1 x Unigym (portable)
  - 1 x Rehabilitation Clinic (fixed)

- Defibrillator in pool attendants’ office – G09

- Defibrillator in entrance between Physiology laboratory (1104) and Biochemistry laboratory (1105)

- All pool supervisors have valid and current Senior First Aid Certificates

- Wheelchair available in the Rehabilitation Clinic (G100)

- Emergency procedures and evacuation are listed at the following web site: [www.sseh.uwa.edu.au/Safety](http://www.sseh.uwa.edu.au/Safety)
5. GENERAL SAFETY AND HEALTH PROCEDURES

5.1 Reporting and Investigating Safety and Health Issues

Any person within the School noticing a safety or health issue that they are unable to rectify themselves should immediately inform their supervisor and the School's Safety and Health Officer. You may be asked to complete an Incident/Injury Report form, which may be downloaded from the Safety and Health Office web site on www.safety.uwa.edu.au/forms/incident.

5.2 Consultation for Safety and Health

All members of the School are encouraged to raise concerns about safety and health with the School's Safety and Health Officer.

Formal consultation regarding safety and health issues takes place through the School's staff meeting format. Should an issue involving health and safety be placed on the staff meeting agenda for discussion not be resolved at the meeting, it is then referred to the Safety and Health Committee for further action.

Membership of the School's Safety and Health Committee

<table>
<thead>
<tr>
<th>ROLE</th>
<th>CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>W./Professor Tim Ackland (chair)</td>
<td>6488 2668</td>
</tr>
<tr>
<td>Professor Paul Fournier</td>
<td>6488 1356</td>
</tr>
<tr>
<td>Mr Don Gordon</td>
<td>6488 3504</td>
</tr>
<tr>
<td>Mr Nev Pires</td>
<td>6488 1383</td>
</tr>
</tbody>
</table>

5.3 Safety and Health Training

The School Manager ensures that all new staff and visiting academics are inducted as soon as practicable, by using for guidance, the UWA Safety and Health Office checklist (www.safety.uwa.edu.au/policies/../policies/induction) as a framework. All records of staff/visitor induction are maintained by the School Manager (delegated responsibility to School Safety Officer).

The School Manager ensures that all new postgraduate students are given the same information as for new staff, but are also made aware of the student guide to safety and health. All records of graduate student induction are maintained by the School Manager (delegated responsibility to School Safety Officer).

(www.safety.uwa.edu.au/policies/../policies/student_guide_to_safety_and_health)

Members of the School will not be expected to undertake any procedure for which they have not been adequately trained. The need for specialist training is identified by the School Manager as part of the safety and health induction process or by the student's supervisor, and all requests for such training are directed to either the Head of School or the UWA Safety and Health Office. Records are kept of these training sessions by the School Manager.
5.4 Fire and Emergency Procedures

The UWA Main Procedure is outlined at the following site:
www.safety.uwa.edu.au/policies/emergency_fire_and_evacuation

If the fire warning alarm sounds, wait one or two minutes then leave your area and proceed to the centre of the SSEH oval. Alternately, at the request of a Fire Warden leave immediately and proceed to oval.

1. Do not risk your own life.
2. If required and once instructed, evacuate the building calmly.
3. Close all windows
4. Turn off all electrical equipment (i.e. computers, fans, etc.)
5. Close the door behind you and proceed to the SSEH Oval.
6. Warn others on the way out.
7. Move at a quick walk: **Do not run.**
8. Do not use the Lift.
9. If a person is trapped, immediately inform a Fire Warden or Emergency Response Officer (Security) on 2222.
10. People who panic: take their hand and lead them out. If they refuse to go any further, leave them and report their location to Fire Warden.
11. People with a disability. In an evacuation, offer assistance, ask the person to tell you how you can best help them. This may involve lifting, carrying and escorting them from the building and may mean their wheelchair or walking aid needs to be left behind.
12. Move to the **centre of the SSEH Oval** and wait for further instructions.
13. **Do not** congregate in car park areas or around buildings.
14. **Do not return** to the building until cleared by Fire Brigade or Fire Wardens.

5.5 Manual Handling

Please refer to the Safety and Health policy web site:

Manual handling is one of the most common and costly of workplace injuries. Manual handling involves the use of human effort to lift, push, pull, carry, hold or restrain any object or animal. It does not just relate to the lifting of heavy objects.

UWA has a policy on manual handling which requires areas to undertake risk assessment of all manual handling hazards and implement strategies to reduce the level of risk. This includes, but is not limited to, the provision of training and ongoing supervision of staff and students involved in manual handling activities.

WorkSafe’s code of practice can be downloaded at

- No one should undertake any manual handling task that they feel that they are unable to manage; if in doubt, do not do the task and seek assistance. A safety first mentality should be adopted.
- Be aware of the risk factors – the safety of the general environment (e.g. is it cluttered, is lighting adequate, are there any slip or trip hazards?); the characteristics of the load (e.g. heavy, awkward, difficult to grasp); and be mindful of your own ability (e.g. fatigue, unwell, lacking in coordination).
- Where possible, use assistive equipment such as trolleys and lifting devices. Technical staff should be contacted for assistance and location of safety equipment.

- Always use correct manual handling technique – keep the spine neutral, bend with the knees using semi squat and avoid twisting, flexing forward with the spine, or sideways leaning of the spine.

Assistance with manual handling risk assessment and training in manual handling technique is provided by the Safety and Health Office, phone 2784. Staff are encouraged to phone if they have concerns.

Relying on training of staff is not as effective in reducing manual handling injuries as proper workplace design and provision of equipment – please keep this in mind!

5.6 Safety in the Use of Computer Workstations

Please refer to the Safety and Health web site: http://www.safety.uwa.edu.au/policies/computer_workstation_ergonomics and note that the same principles for adopting correct posture at the computer applies to laptop as well as desktop computers and monitors. Be aware that if you are working from home, you should also apply the same principles.

Most people seem to have difficulty checking whether they have correct posture when set up at a computer, even after reading a pamphlet! If you need assistance, or if at any time you start to develop symptoms, please contact the Occupational Therapist in the Safety and Health Office. Since there are many computer “ergonomic” accessories on the market, the UWA Safety and Health office provides free trial of equipment. It is a myth to think that using all things that are available will prevent problems, and likewise, what works for one person may not suit another. A professional opinion may be warranted if you are having any difficulty with comfort at the computer.

5.7 Working Alone

If you intend working in the laboratory beyond 9pm, please email the Security Office to notify them of your presence: security@uwa.edu.au

Also, please refer to the Safety and Health web site: http://www.safety.uwa.edu.au/policies/isolation

5.8 Action in the Event of an Incident – First Aid Procedures

- The UWA First Aid Procedure Flowchart is outlined at the following site: http://www.safety.uwa.edu.au/policies/first_aid_procedure_flowchart

In the event of an injury or sudden illness the nearest First Aid Officer needs to be contacted who will be able to assess the situation and provide first aid treatment. If a First Aid Officer is not available then the person should be brought to the Medical Centre if possible, or the Centre should be contacted on 6488 2118, or an ambulance called through the emergency number (2222) for severe illness or injury.

If an incident or injury occurs at the University or during normal University activities, it must be reported to your School Safety Officer – Don Gordon on 6488 3504. If the incident occurs elsewhere, you should report it to the responsible person: Warden of a College, Manager of UWA Sports or Manager at the Sport Centre as appropriate. Alert UWA Security (2222) if outside normal University hours, but inform the appropriate person as soon as possible.
FIRST AID AND INCIDENT PROCEDURES NOTICE

All hazards and injuries must be reported, investigated and resolved. Any unresolved issues should be dealt with in accordance with the following:

1. Notify Immediate Supervisor
   - *Issue still unresolved*

2. Notify Safety and Health Representative or School Safety Officer
   - Don Gordon (6488 3504)
   - *Issue still unresolved*

3. If a First Aid Officer is not available contact the Medical Centre on 6488 2118.
   - Apply first aid at scene and contact ambulance if necessary.

4. Notify Head or Manager of School
   - *Issue still unresolved*

5. Notify Safety and Health Office
   - *Issue still unresolved*

6. Referred to the University Safety Committee

The above process should be followed at all times. WorkSafe can be notified if there is a risk of imminent and serious harm.

All injuries must have an Incident/Injury Report completed

6.0 GENERAL SAFETY IN LABORATORIES

It is the duty of supervising academic staff members and technical staff to familiarise themselves with the safety and health legislation and Codes of Practice which are relevant to the work being undertaken in their area of responsibility and to ensure that other members of staff and students comply with these requirements.

Laboratories can be places of danger, as a lack of experience and knowledge may contribute to a safety and health incident. We can never totally eliminate the risk of injury; however, you can reduce them by abiding by a number of safety and health rules, as follows.

1. Ensure that you follow all instructions that your supervisor gives you.
2. Wear the correct clothing such as covered shoes and laboratory coats. Laboratory coats can easily be forgotten and thought of as waste of time, however, they provide valuable protection against such things as spills.
3. Use appropriate personal protective equipment such as safety glasses, hearing and respiratory protection when needed. Remember to always wear your laboratory coat and other protective equipment.
4. Eating, chewing, drinking, smoking, taking medication, or applying cosmetics is forbidden in laboratories, as is mouth pipetting.

5. Never undertake potentially hazardous activities whilst working alone.

6. Familiarise yourself with the emergency preparedness procedures. Know the location of the nearest emergency shower, eyewash station, first aid kit, fire fighting equipment and emergency exits.

7. If a chemical spill occurs and you are unsure of how to deal with it, STOP and immediately contact your supervisor or School Safety Officer (Don Gordon, 6488 3504). You should however always know how to clean up the chemicals you are working with prior to beginning your task.

8. Never undertake repairs of electrical equipment. Unauthorised modification to electrical equipment is not allowed; only qualified persons are permitted to carry out electrical work.

9. Ensure you know how to operate equipment and machinery safely before beginning your task.

10. When planning a new experiment always consider the hazards that might occur and take the necessary precautions to eliminate or reduce these hazards.

11. Always report all known or observable hazards, incident and injuries to your supervisor and complete and submit the necessary report forms.

12. Be aware of posture ergonomics. Maintaining prolonged postures without regular breaks or changes are to be avoided.

Please refer to the Safety & Health web site for emergency procedures: http://www.safety.uwa.edu.au/policies/laboratory_emergency_response

6.1 Laboratory Housekeeping
- Good housekeeping in the laboratory can reduce the risk of injury. Keep corridors and doorways clear.
- Store chemicals in an appropriate cabinets or storeroom areas to ensure proper segregation.
- Always use the sharp disposal containers provided.
- Clean up all spills immediately.
- Keep laboratory free from clutter, clean up work surfaces
- Store gas bottles in the correct manner.

6.2 Cleanliness and tidiness
- Leave equipment and workspace as found. When you leave, the laboratory should be cleaner and tidier than you found it.
- Clean and sterilise surfaces and equipment after use. Be sure to come back and put the clean equipment away (e.g. do not leave mouthpieces and hoses in the sterilizing solution for more than 60 minutes!).
- Clean not only the equipment, but also the floor around the equipment you used (blood, sweat etc.)

6.3 Breakages/Malfunctions
Everyone must report all breakages and malfunctions. In the first instance, inform your supervisor and then the technical staff, and also place a sign on the equipment to let other lab users know there is a problem. Sign and date this notice. Be sure to record the performance of the major pieces of equipment in their respective logs to make it easier for the monitoring of consumables as well as the actual machinery.
6.4 Computers
- Do not install any software on a computer in the lab without informing the Chief Technician.
- Do not use the computers in the lab as storage space. Take the files you need to your own computer. Do not leave files on lab computers without filing them in a folder with your name. Occasionally the hard drives will be cleaned and files with no clear purpose will be deleted.

6.5 Emergency Procedures
Lab users should be familiar with the locations of safety and emergency equipment such as fire extinguishers, fire alarms, first-aid kits, emergency telephones, exits and the School Evacuation Plan.
- Don Gordon is the School's designated Safety Officer and should be contacted (3504) in the event of an accident.
- The UWA emergency phone no. (2222) is shown on the handset.
- A first aid kits are located in the technical area, pool office, rehabilitation clinic, gym and water polo store room.
- Defibrillators are located in the Pool Office (G09) and entrance between Physiology Lab. (1104) and Biochemistry Lab. (1105).
- Showers for rapid washing in the event of a chemical spill on skin are located in the Exercise Biochemistry lab and also downstairs in the technical storage area.

6.6 Safety Considerations
- Loose clothing and long hair must be kept away from moving equipment.
- Closed shoes must be worn when working in the lab.
- Always wear protective gloves when handling chemicals or biological samples and/or waste. Safety glasses are also recommended.
- DO NOT risk needle stick injury by attempting to re-sheath needles. For more information on needle and syringe disposal/needle stick injuries.

6.7 Security
- Do not remove anything from the lab without permission.
- Always lock the laboratory door when unoccupied. Things can disappear very quickly.
- Keep your valuables safe while working in the lab.
- DO NOT leave polar heart rate monitors and stopwatches in the lab.

7.0 LABORATORY-SPECIFIC SAFETY ISSUES

7.1 Laboratory Booking Procedures
The following are the rules for booking the Biomechanics Sports Laboratory and Biomechanics Gait Laboratory via the web based booking system. This allows all registered users (see below) the right to freely book either laboratory, but must do so in accordance with the rules set out below. If a user violates these rules then they will cease to have the privileges that this booking system provides and will have to rely upon the School Manager, Chief Technician, Executive Assistant or Financial Administrator of the School to make their bookings for them.

Priority of bookings:
Following are the categories for priority of bookings and is the overriding guideline upon which all bookings are made. This list also specifies the level of negotiation possible between users within the different categories wishing to make bookings for the same dates and times.
- Scheduled teaching - Non-negotiable
- Grant-related Research / Contracted Research - Possible negotiation
c. Other staff / student related research - Negotiable

d. Other purposes - Very flexible

Register of users:
There will be a list of every person that uses the biomechanics sports laboratory and the biomechanics gait laboratory. This register is kept by Dr Siobhan Reid.
This register will include the following info:
• Name
• Colour code
• Mobile number
• E-mail
• Contact avail/unavailability
• What project they’re participating in (if available)

The types of bookings:
Generally there are **confirmed** and **unconfirmed** laboratory bookings. There is also a block booking that is generally unconfirmed (but may be confirmed), and is > 9 hours per week and/or have repeat bookings more than 2 weeks in a row. It is **NOT** considered a block booking if the unconfirmed booking is < 9 hours per week and/or is not a repeat booking.

Rules for general booking and block bookings:
a. Bookings can be only made by registered users of the Biomechanics Sports Laboratory and Biomechanics Gait Laboratory.
b. Every booking must have the booker’s name, contact number, e-mail and what study they’re involved in.
c. Bookings for scheduled teaching must be confirmed ASAP or as soon as the semester timetable is finalised.
d. Any confirmed booking that is cancelled or if there is an un-used, unconfirmed booking, it must be removed ASAP and the booker must notify the registered users immediately of the new availability.
e. Rules for making a block booking
   i. If anyone plans on making a block booking, notification about when and for how long the booking will stand, must be given to all registered users ASAP via e-mail.
   ii. Generally, a block booking can occupy no greater than 3 days per week.
   iii. Longer block bookings can be only be made for scheduled teaching, grant-related or contracted research. However this can only be done with no less than 3 weeks prior notification of all registered users and with full negotiation with all potential registered users.
   iv. If 1 week prior to possible testing, some free booking periods are available that would enable a user to have greater 3 days for that week, that user may book greater than 3 days for that week. However, that user must notify all registered users.
f. To signify a confirmed booking, the word “CONFIRMED” must be written in the ‘Pop up or URL text’ section. This will underline the details of your booking and will make it visible to all users.

Overbooking an unconfirmed booking:
a. The general rule is that an unconfirmed/block booking must be confirmed no later than 48 hours before the booked time. If the original booker fails to do so, that time slot is deemed available.
b. Another person can overbook the booking in the 48 hours before the booked time, but they must contact the original booker via mobile phone/office number. If the original booker is not available on their mobile/office number, the over-booker then has right to take that time slot. They must then notify the original booker and the registered users of the change that has been made. If the original booker is reached on their mobile/office number, then it is up to those two people to reach a compromise on the booking. However, the new booker has every right to take the booking.
c. If a compromise cannot be reached, their academic supervisors will ultimately make the decision and/or an Emergency Meeting (see below) is held.
d. The main principle of overbooking is communication and courtesy.
Emergencies:
An emergency meeting must be called immediately if a situation arises, where there is:
a. equipment failure in a laboratory that delays many research projects and scheduled teaching; or
b. there is an unresolved clash of bookings where 2 or more users cannot reach a compromise booking solution

Dr Jacque Alderson has been appointed chair of these meetings with the affected users in attending and an emergency plan will be put in place to rectify booking issues and to ultimately avoid compromising the function of the other labs. In these meetings the “Priority of Bookings” order is the overriding guideline upon which the rescheduled bookings will be based.

Web page design:
The web based booking system will be accessed via the SSEH homepage with a username and password. Navigate from the home page via “Current Students” > “Facilities” tabs to booking calendars for Biomechanics lab, Gait lab, or Biodex lab.

Registered users list:
Could everyone please e-mail their registered user details to Dr Siobhan Reid at the following e-mail address: siobhan.reid@uwa.edu.au

7.2 Specific Requirements for Research Students
As part of your research proposal, you will need to check the appropriate boxes on the Laboratory Usage form (a required attachment to your proposal document) to (a) confirm that you have completed your laboratory induction, and (b) have performed a risk assessment in regard to your proposed methodology.

7.3 Laboratory Safe Working Practices
Data back-up
Please try to back up your data as soon as you have collected an experimental session. For moving data you should all have an external drive of your own. If you do not have one please let me know and we can arrange for this. Even if you have your own back-up the School also needs its own (Standard NHMRC procedure).

- There are two back-up drives available on the Computer in the Biodex area (the MFLL computer). One is dedicated to raw data from your experiments. The other is dedicated space for your processed data for your projects.
- The Ultrasound computer has its own external drive (G:). This is where all local data on that computer should be stored. Data on the C drive should be moved to the G: drive and then cleared from C:. This is so that the Ultrasound can write to disk during capture. This drive should not leave the Ultrasound computer trolley. It should be backed up on to the back-up drive on MFLL computer (using your own drives to transfer).
- Data from the Vicon computer also has its own dedicated external drive. This drive can live by the MFLL computer. The data on the Vicon local drives will need to be cleared periodically. After clearing the Vicon local drive please ensure there are 2 copies of the Vicon data, one on the dedicated Vicon external drive and one on the back-up drive on MFLL.

7.4 Equipment Item: Biodex – Standard Operating Procedure
These equipment safety points relate to the operation of the Biodex System 3 (Sports Biomechanics Laboratory) and the Biodex System 4 Pro (Gait Laboratory). Biodex Operation Manuals can be found on the computer portable cart with full instruction on operation in panel and PC modes. A copy of each manual is kept in the Technical office.

Equipment set-up
- Ensure the Biodex control panel and drive shaft is plugged into 15 amp power socket at the wall.
- The Biodex should not be operated via a power board.
- Ensure Biodex cables are tidy and aren't trip hazards for operators or participants.
All attachments when not in use should be placed on the attachment rack in the recommend position.

Operator safety
- Follow Biodex Operator manual for safe boot up and shut down of Biodex dynamometer.
- When using portable PC cart ensure wheel locks are applied to prevent cart from moving during assessment.
- Ensure trip hazards are removed from operator’s work area.
- Ensure operator has access to emergency stop button during each assessment.

Participant safety
- Ensure trip hazards are removed from participants’ path in getting on and off the Biodex.
- Ensure all necessary safety straps are used for each particular assessment performed (refer to Biodex Operation Manual).
- Ensure Biodex plinth, drive shaft and attachments are locked into position prior to commencement of assessment.
- Ensure patient has received full safety briefing on emergency stop procedures should the assessment need to be aborted. Ensure patient has access to emergency stop button during each assessment.
- If operating in eccentric mode, ensure appropriate limit settings are selected in assessment set-up for patient safety (refer to Biodex Operator Manual).
- Ensure participant is at a safe distance when Biodex attachments are placed on/or removed from drive shaft.

Operating in conjunction with other equipment
- The Biodex can be operated in conjunction with Vicon (and other camera systems), Ultrasound or EMG, please refer to the safety guidelines for these pieces of equipment if using in conjunction with Biodex.

7.5 Equipment Item: Treadmill – Standard Operating Procedure
This document aims to provide instruction on how to safely collect biomechanical data using the Force-plate Instrumented Treadmill. Collection of ground reaction force data is essential to measuring biomechanical loading (e.g. inverse dynamics) during human movement. The use of a force-plate instrumented treadmill permits ground reaction force data to be collected continuously during walking and running. The current protocol is for collecting data on older adults. However, it should be applicable to other groups.

Cautions
There are several precautions that should be followed to ensure safe measurements with respect to both the participant and equipment safety.
- Never operate the left and right treadmills independently. To ensure this, only use the middle control slider on the treadmill control panel.
- Make sure the forward speed limit is set to a suitable speed that is not greater than the fastest comfortable speed of the subject.
- Limit the backwards speed to 0 m/s to prevent unexpected backwards tread-belt movement.
- Do not use a stop deceleration of more than 0.5 m/s. Never stop the treadmill in an emergency by using the control slider. **ALWAYS** use the stop button.
- Do not use a speed adjustment step of greater than 0.1 m/s
- Do not use an acceleration adjustment step greater than 0.5 m/s².
- Do not use incline with incline clamps set.
- Combined ultrasound imaging can be performed up to a maximum running speed of 3.5 m/s. Ensure that there is suitable length between probe and beam former to allow unrestricted movement.
- If using combined ultrasound imaging, **ALWAYS** use a spotter.
- Ensure the treadmill emergency safety stop is within reach of participant.
Always use the safety bars when operating the treadmill with older adults or any group with stability problems. If these bars are removed for Vicon calibration please replace for data collection.

Take caution with data and power cabling. In particular, ensure data cables from D-A and A-D boards are connected properly and are not a trip hazard.

Materials
- Bertec Instrumented Treadmill (T08I w/incline).
- Bertec Treadmill Control Panel software (V 1.8).
- Vicon Data Acquisition system.

Methods
- Turn the three-phase power on. This should always be turned off at the end of testing and will require key access.
- Undo treadmill incline clamps.
- Turn on main treadmill power switch. The treadmill will undergo an internal diagnostic. When the power lights on the left and right treadmill power units and the incline units turn solid press the green lit button on the emergency stop unit. This will engage the treadmill communication with the control software. All lights should turn white on power units. Never turn the power switch on and off quickly. Always let the diagnostic complete. Turning the power on-off quickly will result in blown fuses.
- Home the treadmill from the Treadmill Control panel. To do this hold the down button on the incline control until the treadmill is “homed”.
- Tighten the incline clamps on the treadmill.
- Zero the left and right force plates using the zero buttons on the D-A boards.
- Check the velocity and acceleration settings and the stop deceleration settings.
- Check the maximum forward and backwards speed limits.
- Start treadmill slowly, only using simultaneous belt operation.
- Stop test by pressing the stop button.
- Turn off main treadmill power.
- Turn off three-phase power and lock.
- Ensure that the treadmill belts are lubricated (by technicians) every month.

7.6 Equipment Item: Ultrasound – Standard Operating Procedure
This document aims to provide instruction on how to safely collect dynamic ultrasound images of skeletal muscle fascicles and tendon in human subjects. Dynamic imaging of muscle fascicles and tendons is essential to understanding in vivo musculoskeletal function. The current protocol is for imaging calf muscle and tendon, one of the most common muscle groups for musculoskeletal and biomechanics imaging. However, it should be applicable to other muscles (e.g. tibialis anterior, arm muscles).

Cautions
Ultrasound is considered safe and has no major risks associated with the imaging modality. However, there are several precautions that should be followed to ensure safe measurements for both the participant and equipment safety.

- Use non-allergenic tape or strapping material to secure probe (if using low profile probe) to leg.
- Avoid over tightening strapping to prevent occlusion of blood flow.
- If using ultrasound in combination with treadmill experiments or over-ground walking it is essential to ensure that the ultrasound cable does not interfere with walking/running.
- Dynamic imaging can be performed up to a maximum running speed of 3.5 m/s.
- The ultrasound Beamformer unit must NEVER leave its housing on the back of the computer trolley. The only exception is during treadmill trials where it can be taken out to be placed next to the treadmill.
- Do not leave the ultrasound collecting data continuously when you are setting up the subject. Please hit stop collection.
- Be careful when placing probes on the trolley. Probes can fall and can get scratched. There are sleeves for the ultrasound probes that should be used.
- Never disconnect the probe from beam former with software running.
Materials
- Ultrasound Beamformer (Telemed, EchoBlaster128)
- Ultrasound probe: Linear array/6mm/low profile 64 elements
- Ultrasound probe: Linear array/6mm/hand-held 128 elements
- Probe cover sleeves
- Ultrasound gel
- Ultrasound stand-off pads
- Sync cable
- Echo Wave II Software

Methods
- Connect desired probe into beamformer while the operating software is off.
- Turn on Echo Wave II software. Echo Wave III software can be used but will not provide sync capabilities for linking with other data.
- Apply ultrasound gel or stand-off pad to area being imaged (and place gel on probe).
- Place probe on desired scanning location. Avoid running probe in scan mode for prolonged time when probe is not imaging muscle or tendon.
- Secure probe using suitable strapping.
- Adjust image acquisition parameters. Avoid using maximum gain setting. If a brighter image is required reduce the probe scan frequency or increase brightness/contrast.
- Select multiple focal points, filtering, frame averaging if desired. Note that these will reduce capture frame rate. For muscle/tendon imaging we generally avoid frame averaging.
- If using dynamic imaging set movie capture parameters (cine loop settings). Make sure that you have set the desired image capture rate.
- Save images as uncompressed avi files (dynamic) jpg or tiff for static images.

7.7 Equipment Item: Electromyography (EMG) – Standard Operating Procedure
These equipment safety points are relevant for the operation of the Noraxon single differential telemetry system (Sports Biomechanics Laboratory), custom UWA double differential system (Biodex Laboratory) and the Delsys double differential system (Gait Laboratory). Hard copies of the operation manuals for the Noraxon single differential telemetry system and Delsys double differential system can be found in the technical office. Operation manuals for the custom UWA double differential system are currently being developed by Dr Jonas Rubenson.

Equipment

General instructions
You will require Ag/AgCl electrodes, a razor, a scouring pad and alcohol whips for data collection. These materials can be accessed through the technical office with a project grant (PG) number.
- The razors, scouring pads and alcohol wipes are used to prepare the skin for electrode placement. See your supervisor for instruction on appropriate skin preparation training.
- Prior to electrode placement, the hair in the placement area will be shaved with a new disposable razor; the skin is then lightly abraded and sterilized with an alcohol wipe. Please ensure that all of these materials are placed into a biological waste disposal bin after being used on the participant. Do not place these items in a general waste disposal bin (See below for information of biological waste disposal).
- Any hair that is shaved from the participant should also be disposed of in either the biological waste disposal bin or vacuumed with the laboratory vacuum. The laboratory vacuum can be accessed through the technical office.
- Two or three electrodes (EMG system dependent) will then be placed over the skin of each muscle you would like to record. See you supervisor for training on appropriate electrode placement.

If using the EMG system with a dynamometer or a muscle stimulation machine for example, be aware that the single and double differential leads attached to the participants are tripping hazards. Please ensure the participant and experimenter mind these leads when the participant is getting on/off these pieces of equipment.
Specific to the custom UWA and Delsys double differential systems
- Ensure the EMG system is plugged into a surge protected power board or RCD protected wall socket. In each lab RCD protected wall sockets are green in colour.
- For this system you will require double differential leads and three electrodes for each muscle you wish to collect. You will also need a separate earth electrode, which is used to remove environmental noise during the data collection process. Please see your supervisor for the correct use of both types of leads during the data collection process.
- As you will require three electrodes per muscle to record an EMG signal. You will require training from your supervisor on the preparation of the electrodes to ensure a 3 cm inter-electrode distance is maintained between the centre and adjacent electrodes.
- When using these EMG systems, participants will be tethered to the recording system. As this represents a serious tripping hazard, ensure that both the participant and experimenter are aware of the location of this lead at all times. If feasible, it is recommended a research assistant is used to help mind this lead throughout the experiment.

Specific to the telemetry system
- Ensure the EMG system is plugged into a surge protected power board or RCD protected wall socket. In each lab RCD protected wall sockets are green in colour.
- Before use and prior to turning the EMG system on, ensure the frequency or channel of the EMG pack is the same as the receiver.
- If the channels from the EMG pack and receiver do not match, please see a technician to make these changes.
- For this system you will require single differential leads and two electrodes for each muscle you wish to collect. You will also need a single differential lead with an earth electrode, which is used to remove environmental noise during the data collection process. Please see your supervisor for correct use during the data collection process.

Operator safety
- All instrumentation attached to the participant has been electrically isolated as per manufacturing guidelines.
- Follow the EMG operator manuals for safe boot up and shut down.
- When using a tethered EMG recording systems, ensure the participant is aware of the location of this lead at all times as it represents a serious tripping hazard.
- Ensure all other potential trip hazards are removed from the operators work area.

Participant safety
- All instrumentation attached to the participant has been electrically isolated as per manufacturing guidelines.
- Each potential participant is asked if he/she is allergic to, or has a skin sensitivity, to methanol. If s/he is allergic s/he will be excluded from participating in the study as methanol is used prior to the placement of electrodes on the skin.
- Ensure participants are aware that they may feel a stinging sensation when alcohol is used to sterilize the skin prior to the placement of electrodes.
- Ensure participants are aware that electrodes can leave a red mark after removal. In this event inform participants that these marks will fade away within 1 – 2 days.
- Ensure trip hazards are removed from participants’ path during any dynamic moments or when they are getting on and off a dynamometer.
- When using a tethered EMG recording system, ensure that both the participant and experimenter are aware of the location of this lead as it represents a serious tripping hazard.
- If using the EMG system with a dynamometer or a muscle stimulation machine, ensure the participant and experimenter mind the leads attached to the participant when getting on/off these pieces of equipment.

Operating in conjunction with other equipment
- All EMG systems can be operated in conjunction with Vicon (and other camera systems), ultrasound, dynamometry and muscle stimulation devices. Please refer to the safety guidelines for these pieces of equipment if using in conjunction with the EMG systems.
Biological (soiled) waste
- All (non-sharp) items that have blood, tissue, saliva or sweat on or in them are to be placed into plastic bags marked for “Biological Waste”. This includes razors, scouring pads and alcohol whips used to prepare the skin for electrode placement. Unsoiled paper waste, such as tissue boxes, alcohol swab covers, etc. must not be placed in these bags.
- When full (or finished for the day) a biological waste bag should be clearly labelled with the appropriate sticker, firmly sealed and placed in the large Medi-Collect bin for removal from the lab.

Paper and general (unsoiled) waste
- Other than sharps or soiled waste, all other paper and general waste that is unsoiled, must be placed into a general waste bin. DO NOT mix this type of rubbish with biological waste.
- General waste bins will be emptied by the cleaners.

7.8 Equipment Item: Transcutaneous Electrical Stimulation - Standard Operating Procedure
This document aims to provide instruction on how to safely induce muscle twitch forces through transcutaneous muscle stimulation. Measuring twitch force response in skeletal muscle is fundamental to understanding several aspects of in vivo muscle function (e.g. specific tension, muscle inactivity, force-length relationships). The current protocol is for inducing twitch force in the calf muscle, one of the most common muscle groups for muscle stimulation. However, it should be applicable to other muscles (e.g. tibialis anterior, arm muscles).

Cautions
Muscle stimulation is considered safe and has no major risks if operated properly. There are several precautions that should be followed to ensure safe measurements with respect to both the participant and equipment safety.
- Never use the equipment if you are aware or suspect that it has been exposed to excessive moisture. In this case unplug and report to technical staff.
- Do not prevent proper ventilation of the stimulator unit.
- Do not place stimulator unit close to heat sources such as radiators.
- ALWAYS use the stimulator output through the isolation unit. The main stimulator unit output is not isolated and is not suitable for human use.
- Use appropriate muscle stimulation electrodes. Do not use electrodes smaller than 1 cm² as these can cause localized burns.
- Always use electrodes in conjunction with conductive gel unless pre-gelled electrodes are used.
- Always turn the voltage to zero at the start of the muscle stimulation protocol.
- Refer to manufacturer’s manual for further general safety requirements.

Materials
- GRASS stimulator (Model S88K).
- GRASS stimulation isolation unit (SIU8T).
- Muscle stimulating electrodes (Carbo Stim).
- Conductive gel

Methods
- Apply conductive gel generously to the stimulating electrodes.
- Place the larger electrode (rectangular electrode) over the proximal musculature. This is the anode electrode. Place the smaller electrode (square electrode) over the distal portion of the calf muscle. This is the cathode electrode.
- In order to ensure that the electrode does not shift secure using transpore tape.
- FROM THE ISOLATION UNIT, connect the positive lead into the anode electrode and the negative lead into the cathode electrode.
- Set the number of pulses to be delivered per minute. This is set using the S1 rate. This will set the inter-pulse delay. Nominally set this to 100 pulses per second (0.01 s between pulses).
- Set the pulse delay. This is the delay after the trigger. This is set using the S1 delay dial. Nominally set to zero.
Set the pulse duration. This will set the time of a single stimulus pulse. This is set using the S1 Duration dial. Nominally set to 1ms.

Set the Train Duration. This is done using the TRAIN DURATION dial. This sets the length of time in which single stimulation pulses will be delivered. This function will determine the number of pulsed generated per “twitch”. e.g. for a “doublet” twitch using the parameters in E-G. use 15 ms. This will only allow enough time to generate two pulses.

Set the Train Rate. This is done using the TRAIN RATE dial. This will determine the frequency of the twitch stimulation (in this example the frequency of doublet stimulation). Nominally set this to 1s.

Choose whether you want to apply a repeated stimulation (train) by using the TRAIN MODE SWITCH in repeat or if you want to apply a single twitch (a single doublet stimulus) by using the TRAIN MODE SWITCH in single mode.

If you apply a train of twitches using this approach it will continue until the TRAIN MODE SWITCH is turned to the off position.

Begin by applying a twitch at 0 Voltage.

Rest a minimum of 20 s. between twitches.

Apply a second twitch with an increased voltage of 10V. Continue this process until the recorded force (or joint torque) ceases to increase. Turn the voltage up 10V past the plateau voltage. DO NOT INCREASE VOLTAGE FURTHER.

Continue twitch protocol as per specific experimental protocol.

7.9 Equipment Item: Mobile Eye (eye tracking equipment) – Standard Operating Procedure

This document aims to provide instruction on how to safely collect eye-tracking data using the MobileEye. The current protocol is for collecting data on older adults. However, it should be applicable to other groups.

Equipment:

Spectacle Mounted Unit (SMU)  Recorder Mounted Unit (RMU)
Eye camera  Scene camera

Normally, the spectacle mounted unit (SMU) is stored preassembled on the spectacle and the recorder mounted unit (RMU) preassembled on the Sony DVCR.

Methods: Basic set-up instructions

Fit to the user.

- Put the SMU and Spectacles on the user. Adjust the tension of the headband so that the spectacles are stable and comfortable.
  - A loose fit will allow Spectacle movements that will degrade tracking accuracy and precision.
  - A fit that is too tight will lead to user discomfort and fatigue.
- Switch on the DVCR.
  - The display screen will show the interleaved eye and scene camera images (if the Interleave Switch is set to Interleave).

Adjust the scene image

- Adjust the pitch of the Scene Camera mount to suit the task.
For many tasks, having the Scene Camera centred on the user’s midline point of view (eyes looking straight ahead) is appropriate.

However, for tasks in which peripheral activity is common, a skewed Scene Camera angle may be desirable.

- Check the focus of the scene image. If necessary, slacken the clamp screw (see Manual) and rotate the scene lens to get sharpest focus possible and retighten the clamp screw gently. Do not over-tighten.
- The scene image can be seen more easily by turning the Interleaving Switch on the RMU to produce a non-interleaved scene image. Remember to switch it back to the interleaved image afterwards or the system will not record gaze information.

Align the eye image on the monitor

- Slide the SMU along the mounting frame until the eye camera is directly above the eye. You will need to loosen the diagonal screw in order to allow for movement of the SMU housing. The Mobile Eye ships with the SMU positioned in a location that is suitable for most users.
- Pitch the Combiner gently to move the eye vertically in the image until the eye image is centred vertically. You can also slightly adjust the pitch adjustment of the camera mount.
- Twist the combiner gently to move the eye horizontally until the eye is reasonably central in the image.

Statement on Safe Levels of Infrared Illumination (from Mobile Eye Manual)
One of the most comprehensive and authoritative sources on the subject of light source safety is a handbook entitled Safety with Lasers and Other Optical Sources, by David Sliney and Myron Wolbarsht, first published in 1980 by Plenum Press. Quoting from page 147 of this book, “However, safe chronic ocular exposure values, particularly to IR-A, probably are of the order of 10 mW/cm² or below”. “IR-A” refers to the spectral band between 760 and 1400 nanometers, the range in which the ASL Mobile Eye Optics Modules operate. We are aware of no data, made available since the book was published, that would challenge this conclusion. Most people might wish to be more conservative than the figure cited above, and the Mobile Eye Optics Modules operate at least an order of magnitude below this level. The power of the LED’s used varies somewhat from sample to sample. The largest irradiance value that will be produced with the ASL Mobile Eye Optics is 0.50 - 0.60 mW/cm² (@ 880nm Wavelength), at the plane of the eye. The Mobile Eye uses non-coherent illumination. There are no lasers in the system.

7.10 Equipment Item: VICON System – Standard Operating Procedure

These equipment safety points are relevant for the operation of motion capture systems housed in three locations within Sport Science, Exercise & Health;

- 7 Camera system located in the Clinical Biomechanics Laboratory (G105).
- 12 Camera system located in the Sports Biomechanics Building (G19).
- 14 camera portable system for outdoor use.

No student is permitted to use any of these systems until induction is competed and authorisation has been provided by a staff member.

Both in-situ laboratories housing Vicon systems have emergency telephones installed. In the event of an emergency in either of these laboratories please dial UWA security on 2222. UWA staff will liaise directly with the relevant emergency service personnel.

Students using the outdoor system in the field should dial 2222 when on campus and 000 in the event they are using the system off-site.
Equipment
All Vicon supplied equipment has been cleared by the European Medical Devices Act under the second highest category, the highest reserved for surgical instruments.

Hardware
All SSEH VICON motion capture systems may include a variety of hardware as listed below. It is expected that all students undertake extensive familiarisation (commonly undertaken in the SSEH7633 Unit) prior to using any of the systems.

- MX Cameras (including strobe units and connection cables):
- MX Units (including connection cables):
  - MX Bridge
  - MX Control
  - MX Link
  - MX Net
  - MX Sync
  - MX Ultranet
- VICON Cameras emit a near infra-red signal from the strobes surrounding the camera. This strobe is passive light and invisible to the naked eye. There is no known risk of exposure to this spectrum of near infra-red light to the operator or participant.
- Retro-reflective markers reflect passive white light to the cameras via retro-reflective tape (with small glass beads attached). These markers can be attached as single markers or attached to semi-rigid material for application as a marker cluster.
- You will require medical grade hypo-allergenic tape to affix the retro-reflective markers to the participant. Prior to affixing the tape to the participant you should enquire as to the individual’s allergy status of the participant. If the participant has an adverse history to the application of tape or adhesives then seek further advice from your supervisor and/or medical personnel prior to affixing any tape or adhesive to the participant.
- In some instances, the hair in the marker placement area will be required to be shaved with a new disposable razor.
- Prior to marker placement the skin should be sterilized with an alcohol wipe prior to marker fixation. This facilitates a stronger cure to the skin in circumstances where high amounts of perspiration might be expected.

Operator safety
- No instrumentation with an active electrical charge is attached to the participant under generic motion capture data collection conditions. In instances where third party hardware such EMG, or eye-tracker is concurrently collected, please refer to the relevant sections of this manual.

Participant safety
- The primary risk to participant safety Ensure trip hazards, such as camera leads are removed from participants’ path during any dynamic moments.
- Each potential participant is asked if he/she has an allergy or skin sensitivity, to methanol. If s/he is allergic s/he will be excluded from participating in the study as methanol is used prior to the placement of markers on the skin.
- Ensure participants are aware that they may feel a stinging sensation when alcohol is used to sterilize the skin prior to the placement of markers.
- Ensure participants are aware that the tape attached to the markers may leave a red mark on the skin after removal. In this event inform participants that these are short term in nature.
Operating in conjunction with other equipment

- A large number of third-party equipment is often dual collected with motion capture data. Please refer to the relevant section of this manual for specific safety instructions. The single largest risk to a participant during a data collection session using a combination of VICON and other equipment is a serious trip hazard due to camera cables and tethered wires and cables. This relates to cables and wiring paced directly on the participant and those leading back to the data station.

- It is important to ensure that all possible VICON camera cables and tethered third-party system cabling is appropriately secured (in the laboratory and on the participant) to minimise the risk of tripping.

Biological (soiled) waste

- All (non-sharp) items that have blood, tissue, saliva or perspiration on or in them are to be placed into plastic containers marked for “Biological Waste”. This includes razors, and alcohol whips used to prepare the skin for marker placement, and also the hypo-allergenic tape that is removed from the markers following testing. Unsoiled paper waste, such as tissue boxes, alcohol swab covers, marker backing tape etc. must not be placed in these bins.

- When full (or finished for the day) a biological waste bag should be clearly labelled with the appropriate sticker, firmly sealed and placed in the large Medi-Collect bin for removal from the lab.