



**UNSW**  
THE UNIVERSITY OF NEW SOUTH WALES

FACULTY OF SCIENCE

School of Biological, Earth and Environmental Sciences



# **BIOS 2123**

# **Ecosystem Conservation and Management**

Field Course Manual, Trimester 3, 2022

## Contents

<b>1.</b>	<b>Information about the course</b> .....	<b>3</b>
1.1	<i>Background</i> .....	3
<b>2.</b>	<b>Staff contacts</b> .....	<b>4</b>
<b>3.</b>	<b>Staff profiles</b> .....	<b>4</b>
<b>4.</b>	<b>Course details</b> .....	<b>6</b>
<b>5.</b>	<b>Teaching strategies</b> .....	<b>8</b>
<b>6.</b>	<b>Rationale for content and teaching approach</b> .....	<b>9</b>
<b>7.</b>	<b>Schedule overview</b> .....	<b>10</b>
<b>8.</b>	<b>Additional resources and support</b> .....	<b>14</b>
<b>9.</b>	<b>Course evaluation and development</b> .....	<b>15</b>
<b>10.</b>	<b>Logistics</b> .....	<b>16</b>
10.1	<i>Location:</i> .....	16
10.2	<i>Travel overview</i> .....	16
10.3	<i>Accommodation Amenities</i> .....	16
<b>11.</b>	<b>Required equipment and training</b> .....	<b>17</b>
<b>12.</b>	<b>Assessment tasks</b> .....	<b>18</b>
12.1	<i>Short presentation of organisms in the environment (during the course) and post-course reading and short-answer questions (moodle) (individual)</i> .....	18
12.2	<i>Goals, objectives and data requirements for environmental management or reintroduction plan (Short presentation, group)</i> .....	20
12.3	<i>Adaptive environmental management plan (group)</i> .....	21
12.4	<i>Reflective exercise (individual)</i> .....	22
<b>13.</b>	<b>UNSW academic honesty and plagiarism policy</b> .....	<b>24</b>
<b>14.</b>	<b>BEES academic honesty and plagiarism policy</b> .....	<b>25</b>
<b>15.</b>	<b>Administration</b> .....	<b>26</b>

# 1. Information about the course

## 1.1 Background

This field-based course is designed to provide students with the opportunity to learn from academic and industry professionals about the challenges and opportunities presented by ecosystem conservation and management in two different contexts. This unique 7-day course consists of a combination of talks and case studies from experienced industry professionals, and practical hands-on field survey work in the Macquarie Marshes. You will spend significant amounts of time conducting ecological surveys in the Macquarie Marshes ecosystem and gaining exposure to a range of ecosystems and real-world conservation challenges. The course aims to stimulate students to consider a holistic approach, including the importance of identifying and engaging diverse stakeholders. It also aims to provide a practical introduction to key survey techniques.

<b>Year of Delivery</b>	2022		
<b>Course Code</b>	BIOS 2123		
<b>Course Name</b>	Ecosystem Conservation and Management		
<b>Academic Unit</b>	School of Biological, Earth and Environmental Sciences		
<b>Level of Course</b>	2 <sup>nd</sup> Year		
<b>Units of Credit</b>	6		
<b>Session(s) Offered</b>	Term 3		
<b>Assumed Knowledge, Prerequisites or Co-requisites</b>	Prerequisites: 1 of 3: BIOS1101 (Evolution & Functional Biology), BEES2041 (Data Analysis for Life and Earth Sciences). BIOS1101; BEES2041.		
<b>Number of Weeks</b>	1.2		
<b>Commencement Date</b>			
<b>Summary of Course Structure (for details see 'Course Schedule')</b>			
<b>Component</b>	<b>Hours</b>	<b>Time</b>	<b>Day</b>
Field Trip	80		Dubbo / Macquarie Marshes
<b>TOTAL</b>	<b>80</b>		
<b>Special Details</b>	This is primarily a field-based course. It is run over 8 days in the mid-semester break between Trimesters 2 and 3, with some pre-course lectures. Estimated cost of field trip, inclusive of travel from Sydney to Dubbo and surrounding field sites, and including accommodation and catering will be approximately \$400/student payable in advance. All costs are included, apart from getting to and from Wellington (arrival) and Dubbo (departure).		
<b>Students should check <i>Moodle</i> regularly for content, instructions and announcements.</b>			

## 2. Staff contacts

Staff	Role	Name	Contact Details	Consultation Times
<b>Course Convenor</b>		Richard Kingsford	richard.kingsford@unsw.edu.au	By appointment
<b>Additional Teaching Staff</b>	Lecturers & Demonstrators	Jodi Rowley	Jodi.rowley@unsw.edu.au	By appointment
		Gilad Bino	Gilad.bino@unsw.edu.au	
	Technical & Laboratory Staff	Gary Truong	g.truong@unsw.edu.au	By appointment

## 3. Staff profiles

	<p><b>Professor Richard Kingsford (Course co-convenor)</b>            I am a conservation biologist, working in river basin management and conservation. I worked for the NSW National Parks and Wildlife Service for nearly 20 years, before coming to UNSW. I am particularly interested in the effects of river flows on wetland ecology, waterbirds and long-term sustainability of rivers. I have also worked on adaptive management of river basins and am involved in a number of advisory committees for governments in Australia. I am also part of the Lake Eyre Basin Partnership which has an agreement with the Okavango River Basin Commission to learn about different models of river management.</p>
	<p><b>Dr Jodi Rowley</b>            I am the Curator of Amphibian &amp; Reptile Conservation Biology at the Australian Museum and UNSW (the first joint-appointment between the institutions). I have previously worked in Cambodia as a wildlife biologist with Conservation International. I moved to the Australian Museum in 2008, and my research seeks to uncover and document biodiversity, understand its drivers, and inform conservation decisions. I have greatly expanded knowledge about amphibian species diversity in Southeast Asia, having led over 25 expeditions in the region and co-discovered more than twenty new frog species. My recent work in NSW focuses on resolving mysteries surrounding three threatened frog species, and includes searching for the Peppered Tree Frog, a species not seen since the 1970's.</p>
	<p><b>Dr Gilad Bino</b>            I am a conservation ecologist at the Centre for Ecosystem Science. I have dedicated my research career to arresting the biodiversity crises by improving conservation practices through science and education. I am active in freshwater ecology of wetlands and more recently swept into the fascinating world of platypuses.</p>



**Dr Gary Truong**

I completed my PhD in marine ecology with the School of BEES in 2021. My research involved examining how environmental change influences baleen whale migration. I am interested in how marine ecosystems are affected by climate change. I am currently employed by BEES as a technical teaching officer and provide technical support for teaching labs and field trips.

## 4. Course details

<p><b>UNSW virtual handbook</b>  <a href="https://www.handbook.unsw.edu.au/">https://www.handbook.unsw.edu.au/</a></p>	<p>This course is an intensive field-based course which focuses on the threats and management of an entire ecosystem – the Macquarie Marshes. Students will visit the incredibly biodiverse Macquarie Marshes, a wetland on international importance. Students will visit Burrendong Dam which regulates river flows in the Macquarie River, allowing water to be diverted downstream mainly for irrigation upstream of the Macquarie Marshes. Students will then visit a cotton farm to hear the perspective of an irrigator en route to their stay in the Macquarie Marshes, where they will sample the environment's animals and plants. Students will be taught by specialist staff from the UNSW Centre for Ecosystem Science, the Australian Museum and other government and non-government stakeholders. The course focuses on advanced, practical management of ecosystems, species and their habitats. Students will participate in the monitoring of ecosystems and species and gain skills in surveying methods including passive and active monitoring techniques. Practical training will include consideration of the implementation of strategic adaptive management for ecosystems.</p>
<p><b><u>Course Aims</u></b><sup>1</sup></p>	<p>This field based course is designed to provide students with the opportunity to learn about ecosystems and their conservation management alongside academic and industry professionals. This provides a unique serviced learning opportunity to gain insight about conservation strategies currently in place and provide practical experience. Students will employ different techniques involved in ecosystem management and monitoring, and collect data and be able to demonstrate their understanding through the completion of various projects.</p> <p>The aims of BIOS2123 Ecosystem Conservation and Management are:</p> <ol style="list-style-type: none"> <li>1) To provide students with the opportunity to learn about ecosystem conservation and management in Australia, including different stakeholders;</li> <li>2) To gain insight into collection of aquatic indicator data with intensive practical experience where students learn and implement survey techniques;</li> <li>3) To provide students with the chance to develop an adaptive management plan;</li> <li>4) Provide examples of the role of collaborative approaches to ecosystem conservation and management, considering multiple stakeholders and identifies potential partners.</li> </ol>

<sup>1</sup> Learning and Teaching Unit: <http://www.ltu.unsw.edu.au>

<p><b><u>Student Learning Outcomes</u></b><sup>2</sup></p>	<p>By the end of this course, students will have acquired applied skills in ecosystem conservation and management to:</p> <ol style="list-style-type: none"> <li>1 Demonstrate an understanding of ecosystem conservation and management practices</li> <li>2 Demonstrate an understanding of the concept and components of an ecosystem</li> <li>3 Communicate discipline-specific information in a written format with appropriate referencing</li> <li>4 Collaborate with colleagues to collect primary survey data</li> <li>5 Demonstrate an ability to identify species detected in the field</li> <li>6 Demonstrate an ability to identify ecosystem threats and potential mitigation</li> <li>7 Develop skills using technical research equipment</li> <li>8 Develop reflective practices regarding the processes and experiences that occur during this course and where they fit in relation to other experiences or the 'big picture', and demonstrate the capacity to acknowledge and express of how these experiences make you feel: facilitating growth as a reflective practitioner</li> </ol>	
<p><b>Graduate Attributes Developed in this Course</b><sup>3</sup></p>		
<p><b><u>Science Graduate Attributes</u></b><sup>5</sup></p>	<p>0 = NO FOCUS 1 = MINIMAL 2 = MINOR 3 = MAJOR</p>	<p><b>Activities / Assessment</b></p>
<p><b>Research, inquiry and analytical thinking abilities</b></p>	<p>3</p>	<ol style="list-style-type: none"> <li>1. Reading, short-answer questions and short presentation of organisms in the environment (individual)</li> <li>2. Goals, objectives and data requirements for managing organisms in the environment or ecosystem management (Short presentation, group)</li> <li>3. Environmental management (group)</li> <li>4. Field Trip Reflective exercise (individual)</li> </ol>
<p><b>Capability and motivation for intellectual development</b></p>	<p>3</p>	<ol style="list-style-type: none"> <li>1. Reading, short-answer questions and short presentation of organisms in the environment (individual)</li> <li>2. Goals, objectives and data requirements for managing organisms in the environment or ecosystem management (Short presentation, group)</li> <li>3. Environmental management (group)</li> <li>4. Field Trip Reflective exercise (individual)</li> </ol>
<p><b>Ethical, social and professional understanding</b></p>	<p>2</p>	<ol style="list-style-type: none"> <li>1. Reading, short-answer questions and short presentation of organisms in the environment (individual)</li> <li>2. Goals, objectives and data requirements for managing organisms in the environment or ecosystem management (Short presentation, group)</li> <li>3. Environmental management (group)</li> <li>4. Field Trip Reflective exercise (individual)</li> </ol>
<p><b>Communication</b></p>	<p>3</p>	<ol style="list-style-type: none"> <li>1. Reading, short-answer questions and short presentation of organisms in the environment (individual)</li> <li>2. Goals, objectives and data requirements for managing organisms in the environment or ecosystem management (Short presentation, group)</li> <li>3. Environmental management (group)</li> <li>4. Field Trip Reflective exercise (individual)</li> </ol>
<p><b>Teamwork, collaborative and management skills</b></p>	<p>2</p>	<ol style="list-style-type: none"> <li>2. Goals, objectives and data requirements for managing organisms in the environment or ecosystem management (Short presentation, group)</li> <li>3. Environmental management plan (group)</li> </ol>
<p><b>Information literacy</b></p>	<p>3</p>	<ol style="list-style-type: none"> <li>1. Reading, short-answer questions and short presentation of organisms in the environment (individual)</li> <li>4. Environmental management plan (group)</li> <li>5. Field Trip Reflective exercise (individual)</li> </ol>

<sup>2</sup> Learning and Teaching Unit – Learning Outcomes:  
[http://www.ltu.unsw.edu.au/content/course\\_prog\\_support/outcomes.cfm?ss=0](http://www.ltu.unsw.edu.au/content/course_prog_support/outcomes.cfm?ss=0)

<sup>3</sup> Access the Science Graduate Attributes and your mapped courses: <http://www2.science.unsw.edu.au/guide/slatig/sciga.html>  
(Mapped courses are available at this site)

<p><b>Major Topics</b></p>	<ol style="list-style-type: none"> <li>(1) Demonstrate an understanding of the current river basin management practices, as large social-ecological systems, role of science and conservation challenges.</li> <li>(2) Demonstrate an ability to identify the relevant stakeholders in river basin management, and an understanding of the impacts that different management strategies may have on stakeholders and ecosystems.</li> <li>(3) Demonstrate an understanding of the importance and challenges of a collaborative approach to river basin conservation and management.</li> <li>(4) Demonstrate proficiency in ecosystem indicator species survey methods via practical assessment.</li> <li>(5) Collaborate with colleagues to collect and interpret primary biophysical data that would allow you to make inferences regarding the health of a river basin ecosystem.</li> <li>(6) Demonstrate an ability to work collaboratively and productively in groups.</li> <li>(7) Demonstrate an understanding of ecosystem functions and identification of key species within.</li> <li>(8) Demonstrate use of reflective practices regarding the processes and experiences that occur during this course and where they fit in relation to other experiences or the 'big picture', and to demonstrate the capacity to acknowledge and express of how these experiences make you feel: facilitating growth as a reflective practitioner.</li> <li>(9) Develop skills using technical research equipment and appropriate methods.</li> </ol>
<p><b>Relationship to Other Courses within the Program</b></p>	<p>This course will facilitate learning of ecosystem conservation and management challenges within Australia alongside industry professionals. Students will acquire a clear understanding of ecosystem science by writing an adaptive management plan, and presenting this at a mock community or stakeholder meeting. Students will also gain practical experience and insight into the constraints placed on current conservation strategies. This course allows students to apply theoretical concepts to actual conservation management strategies and will produce well-rounded, industry-ready graduates.</p> <p>This course is an intensive field-based course intended for 2<sup>nd</sup> year students pursuing a major in biology (or other 2<sup>nd</sup> year students with an interest and adequate background in biology) and interested in learning skills associated with independent research and field work.</p> <p>This course will provide an introduction to ecosystem function and practical skills for ecosystem monitoring and management, providing a useful precursor to BIOS6723 River Basin Ecosystem Management and BIOS3123 Conservation in Practice. In turn it builds on skills and theories learned in BIOS1101 (Evolution &amp; Functional Biology), BIOS1301 (Ecology, Sustainability &amp; Environmental Science), BEES2041 (Data Analysis for Life and Earth Sciences).</p>

## 5. Teaching strategies

Lectures will present and discuss theoretical issues relevant to course content. They will draw on real examples from ecosystem management programmes and will include reference to examples of current research. Lectures will be given before and during the field course with particular focus applied to river basin ecosystem management. We will engage with stakeholders involved in management of rivers and their conservation, including from government and non-government sectors. Practical exercises and formative assessments will require the active use and application of critical thinking skills in a variety of contexts. These activities will be developing skills in research and survey techniques; use of appropriate techniques and variables; management plan writing; understanding of collaboration and teamwork. Written assessments will allow students to demonstrate information research skills and application of their critical and analytical skills and integrative thinking.

This field based course is designed to provide students with the opportunity to learn from academic and industry professionals about the challenges and opportunities presented by conservation management. The course is designed to allow reflection and development of critical and practical thinking in the design and planning of conservation management programmes. It aims to stimulate students to consider a holistic approach, including the importance of identifying and engaging diverse stakeholders. It also aims to provide practical skills in survey techniques and subsequent analyses.

**Lectures** will be delivered during the field course and will discuss theoretical and practical issues relevant to course content. In particular, they will draw on real research examples from various conservation management strategies. Lectures will be given on on-site or with a projector.

**Practical exercises** and formative assessments will require the active use and application of critical thinking skills in a variety of contexts. These activities will be developing skills in research and data collection; use of appropriate survey techniques and variables; scientific report writing and teamwork.

**Written assessments** will allow students to demonstrate information research skills and their application of their critical and analytical skills and integrative thinking to specific ecosystem management problems.

**Presentations** will allow students to demonstrate information research skills and their ability to communicate concepts and findings.

## 6. Rationale for content and teaching approach

<b>Rationale for learning and teaching in this course<sup>4</sup>,</b>	<p>In recent years, there have been too few places available to offer all undergraduate students the experience of longer, more intensive field work situations, under unique and challenging working and learning conditions, which expose them to realities and practicalities of ecosystem management. UNSW has long-term relationships with conservation organisations within Australia, including the Department of Environment and Planning, with strong track records in environmental policy and management. This course fills that gap and proceeds and complements a third-year elective course in particular which include aspects of river ecosystem conservation and management internationally (BIOS6723). The course is supported by the Centre for Ecosystem Science, one of the major centres in the School of Biological, Earth and Environmental Sciences. It has a strong applied ecology and environmental science focus.</p> <p>BIOS2123 will teach applied practical skills required in river basin management, particularly by asking students to apply acquired knowledge to practical challenges in this field. This course allows students to apply academically taught concepts to actual conservation management strategies and will produce well-rounded, industry-ready graduates.</p> <p>BIOS2123 will be held as part of Trimester 3. This course is taught during the intensive field course, with assessment.</p>
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<sup>4</sup> LTU – Teaching Philosophy: [http://www.ltu.unsw.edu.au/content/teaching\\_support/teaching\\_portfolio.cfm?ss=0#putting](http://www.ltu.unsw.edu.au/content/teaching_support/teaching_portfolio.cfm?ss=0#putting)

## 7. Schedule overview

(Please check Moodle regularly for content and instructions)

Day	Date(s)	Activity	Content	Assessment Tasks
		<b>Talk preparation before field course</b>	Notified on Moodle	<b>Prepare 2-minute talks (species allocated prior to course via Moodle). Upload to Moodle before course</b>
1	Sunday 16 <sup>th</sup> October 2022	<p><b>Students arrive at Wellington, NSW.</b></p> <p><b>Students transported to Dubbo via Burrendong dam.</b></p>	<p><u>AM:</u> Travel to Wellington (suggested train arrives ~13:00).</p> <p><u>PM:</u> Met at train station and then travel in minibuses to Burrendong dam. Students set up tents (Westview Caravan Park)</p> <p><u>Lectures:</u> Environmental flows and river regulation (<b>Richard Kingsford</b>, at Burrendong Dam) Water quality – data collection</p> <p>Work Health and Safety overview (<b>Gary Truong</b>) Course overview (<b>Richard Kingsford</b>)</p>	<b>Organisms in the environment (individual) (part of 25%) 2-minute talks (species allocated prior to course)</b>
2	Monday 17 <sup>th</sup> October 2022	<b>Cotton farm field trip, and travel to Macquarie Marshes</b>	<p><u>AM:</u> Pack up at Dubbo camp site and make lunch. Morning trip to Narromine cotton farm (<b>Jon Elder – Cotton Farmer</b>). Lunch (<i>en route</i> to Macquarie Marshes at Narromine). Drive to Macquarie Marshes.</p> <p><u>PM:</u> Work Health and Safety (<b>Gary Truong</b>) Group assignments &amp; assessment overview, Lecture – River regulation in the Macquarie Marshes (<b>Richard Kingsford</b>) Data collection workshop (<b>Gilad Bino</b>)</p>	

3	Tuesday 18 <sup>th</sup> October 2022	<b>Macquarie Marshes</b>	<p>Three different groups established</p> <p><u>AM:</u></p> <ol style="list-style-type: none"> <li>1. Bird survey (<b>Richard Kingsford</b>)</li> <li>2. Fish, turtle and water quality survey (<b>Gilad Bino</b>)</li> <li>3. Reptile and amphibian survey (<b>Jodi Rowley</b>)</li> </ol> <p>Project work</p> <p><u>PM:</u></p> <p>Vegetation surveys (<b>Richard Kingsford, Jodi Rowley, Gilad Bino</b>)</p>	<b>Organisms in the environment (individual) (part of 25%) 2-minute talks (species allocated prior to course)</b>
4	Wednesd ay 19 <sup>th</sup> October 2022	<b>Macquarie Marshes</b>	<p><u>AM:</u></p> <ol style="list-style-type: none"> <li>1. Bird survey (<b>Richard Kingsford/ Sophie Hewitt</b>)</li> <li>2. Fish, turtle and water quality survey (<b>Gilad Bino</b>)</li> <li>3. Reptile and amphibian survey (<b>Jodi Rowley</b>)</li> </ol> <p>Project work</p> <p>Lunch – Wentworth Group of Concerned Scientists (lecture, Dr Celine Steinfeld)</p> <p><u>PM:</u></p> <p>Vegetation surveys (<b>Richard Kingsford, Jodi Rowley, Gilad Bino</b>)</p> <p><u>PM:</u> Lecture - frogs (<b>Jodi Rowley</b>)</p>	

5	Thursday 20 <sup>th</sup> October 2022	<b>Macquarie Marshes</b>	<p><u>AM:</u></p> <ol style="list-style-type: none"> <li>1. Bird survey (<b>Richard Kingsford</b>)</li> <li>2. Fish, turtle and water quality survey (<b>Gilad Bino</b>)</li> <li>3. Reptile and amphibian survey (<b>Jodi Rowley</b>)</li> </ol> <p>Project work</p> <p><u>PM:</u></p> <p>Vegetation surveys (<b>Richard Kingsford, Jodi Rowley, Gilad Bino</b>)</p> <p><u>PM:</u> (Post-BBQ) Landholder talk (<b>Garry &amp; Leanne Hall</b>) Evening BBQ</p>	
6	Friday 21 <sup>st</sup> October 2022	<b>Macquarie Marshes/ Dubbo</b>	<p><u>AM:</u></p> <p>Pack up and drive to Warren Weir for lunch (<b>Richard Kingsford – role of Weirs</b>)</p> <p>Project work</p> <p><u>PM:</u> Return to Dubbo (Westview Camp)</p>	<b>Organisms in the environment (individual) (part of 25%) 2-minute talks (species allocated prior to course)</b>
7	Saturday 22 <sup>nd</sup> October 2022	<b>Dubbo</b>	<p><u>AM:</u></p> <p>Group Project work for presentations in the afternoon</p> <p><u>PM:</u> Group Project presentation</p>	
8	Sunday 23 <sup>rd</sup>	<b>Dubbo/ Sydney</b>	<p><u>AM:</u> Wrap up</p>	

	October 2022		Pack up camp Depart Dubbo (train departs ~14:00)	
	Trimester 3 (Weeks 7-8)		<u>Papers and documents in Moodle on the Macquarie Marshes</u> Answer 11 Assessment short answer questions on Moodle (part of 25% assessment)	<ol style="list-style-type: none"> <li>1. <b>Course Reading and Assessment (part of 25%).</b></li> <li>2. <b>Short answer exam to be completed on Moodle after the course</b></li> </ol>
	Friday 4 <sup>th</sup> Nov	Post-course assessment tasks due	To be submitted online in Moodle.	<ol style="list-style-type: none"> <li>3. <b>Project report (group) (35%)</b> Group project report submitted on Moodle</li> <li>4. <b>Reflective exercise (individual) (10%)</b></li> </ol>

## 8. Additional resources and support

<b>Text Books</b>	<b>Recommended (non-essential) texts (bookshop and UNSW library):</b> Meffe, G., Nielsen, L., Knight, R. L., & Schenborn, D. (2012). Ecosystem management: adaptive, community-based conservation. Island Press. Kingsford, R. (2006). Ecology of desert rivers. Cambridge University Press.
<b>Course Manual</b>	Available in print and as a pdf file on Moodle
<b>Required and Supplementary Readings</b>	Discussion papers will be available on Moodle: Bino, Gilad, et al. "Developing state and transition models of floodplain vegetation dynamics as a tool for conservation decision-making: a case study of the Macquarie Marshes Ramsar wetland." <i>Journal of Applied Ecology</i> 52.3 (2015): 654-664. Kingsford, R. T., and H. C. Biggs. "Strategic adaptive management guidelines for effective conservation of freshwater ecosystems in and around protected areas of the world." <i>IUCN WCPA Freshwater Taskforce, Australian Wetlands and Rivers Centre, Sydney</i> (2012). Kingsford, Richard T., and Rachael F. Thomas. "The Macquarie Marshes in arid Australia and their waterbirds: a 50-year history of decline." <i>Environmental Management</i> 19.6 (1995): 867-878. Kingsford, Richard T., Harry C. Biggs, and Sharon R. Pollard. "Strategic adaptive management in freshwater protected areas and their rivers." <i>Biological Conservation</i> 144.4 (2011): 1194-1203.
<b>Recommended Internet Sites</b>	Macquarie Marshes - <a href="http://www.nationalparks.nsw.gov.au/visit-a-park/parks/macquarie-marshes-nature-reserve">http://www.nationalparks.nsw.gov.au/visit-a-park/parks/macquarie-marshes-nature-reserve</a>

## 9. Course evaluation and development

Student feedback is gathered periodically by various means. Such feedback is considered carefully with a view to acting on it constructively wherever possible. This course outline conveys how feedback has helped to shape and develop this course.

<b>Mechanisms of Review</b>	<b>Last Review Date</b>	<b>Comments or Changes Resulting from Reviews</b>
<b>Major Course Review</b>	2021	Major revision of the course will occur within two years of running the course.
<b>More/Less/Start</b>	2021	During course term, students can submit anonymous requests for 'more' or 'less' of any content, as well as request a 'start' of content not available.
<b>Other</b>	2021	<p>Student feedback, provided via email or verbally, is always encouraged. Please feel free to provide suggestions on how course content, structure and teaching might be improved. The following questions are intended as a guide:</p> <ol style="list-style-type: none"><li>(1) What topics did you find most interesting?</li><li>(2) What exercises did you find most enjoyable?</li><li>(3) What additional topics would you have liked to see covered?</li><li>(4) What aspects of the course did you find most challenging?</li><li>(5) What aspects of teaching did you find most effective?</li><li>(6) What aspects of teaching did you find least effective?</li><li>(7) Do you have any suggestions on how the course could be improved?</li></ol>

## 10. Logistics

### 10.1 Location:

The course will be at Dubbo and the Macquarie Marshes, NSW. Additional field trips to a cotton-farm and Burrendong dam, will be undertaken within the field course.

### 10.2 Travel overview

**WHERE: Dubbo and Macquarie Marshes NSW.**

**WHEN:** Oct 16<sup>th</sup> 2022

**Meet-up:** Wellington railway station

**Drop off:** Dubbo railway station

#### GETTING THERE:

**Students will need to arrange their own travel to Wellington.** This will involve purchasing a return train ticket on a predetermined train. Transport to and from the rail station will be provided, along with essential transport during the course. If you are not getting the 1:07 pm train let me know (Richard.kingsford@unsw.edu.au)

**Recommended travel options to Wellington (students need to book this themselves):**

#### Trains

Sydney to Dubbo train (alight in Wellington)

**Departs:** Sydney (Central) on 16<sup>th</sup> October (leaving 07:19), 5h46m journey.

**Arrives:** Wellington (arrives 13:07)

Dubbo to Sydney

**Departs:** Dubbo on 23<sup>rd</sup> October (leaving 0900 am and 1415pm), 6h30m journey.

**Arrives:** Sydney (Central) (arrives 16:41 and 20:48)

#### **IF YOU WANT TO DRIVE UP**

If you choose to use a private vehicle, please make sure that you have comprehensive insurance and notify Richard.kingsford@unsw.edu.au that this is what you will be doing.

You can leave your vehicle at Wellington on Saturday afternoon and then pick it up when we come back through Wellington after visiting Burrendong Dam. You can then drive with us in convoy to Dubbo where you can leave your vehicle until we get back from the Macquarie Marshes.

### 10.3 Accommodation Amenities

**Accommodation:** Accommodation has been booked for you. You will need to **bring your own tent and bedding/sleeping bag** to camp at "West View" in Dubbo (<http://www.westviewcaravanpark.com.au/>), and will take your bedding to the Macquarie Marshes where we will be bunk accommodation. All accommodation involves rustic facilities and has flush toilets and showers; limited electricity; drinking water; eating utensils.

**Other resources:** No or limited internet access (access by personal mobile devices). Phone signal will be patchy and will only be available on the Telstra network at best in some sites, including the Macquarie Marshes.

## 11. Required equipment and training

<p><b>Equipment Required</b></p>	<p><b>These items you must bring/supply your own</b></p> <ul style="list-style-type: none"> <li>• Tent*</li> <li>• Roll mat (for sleeping on)</li> <li>• Sleeping bag, pillow</li> <li>• Strong closed-toe walking boots and warm socks</li> <li>• Long pants and long-sleeved shirts to protect skin from sun and abrasions</li> <li>• Clothing suitable for outdoor wear in very cold and warm weather (beanie, jumpers, woolen layers, water/windproof jacket, thermals). Please be aware that it will be cold at night so bring layers to wear to ensure that you stay warm.</li> <li>• Broad-brimmed hat</li> <li>• Wind Jacket</li> <li>• Water bottle</li> <li>• Personal medication</li> <li>• Towel and toiletries</li> <li>• Sunblock, Insect repellent <i>I will bring a communal supply but it's always best to carry your own.</i></li> <li>• Download the FrogID app on your mobile (<a href="http://www.frogid.net.au">www.frogid.net.au</a>)! To use while frogging 😊</li> <li>• Also download iNaturalist <a href="https://www.inaturalist.org/">https://www.inaturalist.org/</a> beforehand for citizen science contributions</li> <li>• Torch (head torch is better!) and sufficient batteries.</li> </ul> <p>*The School has some extra tents (very limited supply) so let Gary <a href="mailto:g.truong@unsw.edu.au">g.truong@unsw.edu.au</a> <u>by 17<sup>th</sup> Oct, the previous week</u> if you need to borrow one.</p> <p><b>These items are good to bring if you have them</b></p> <ul style="list-style-type: none"> <li>• Sandshoes for water/wet areas <i>so your walking boots stay dry</i></li> <li>• Field notebook</li> <li>• Pencils, clipboard</li> <li>• Laptop and charger for data entry</li> <li>• Binoculars and camera</li> <li>• Mosquito net (optional)</li> </ul>
<p><b>Enabling Skills, Training Required to Complete this Course</b></p>	<p>Understanding of Health &amp; Safety requirements in field environment. All training will be provided on site. Please see Moodle for links to necessary H&amp;S documents.</p>

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## 12. Assessment tasks

Instructions and assessment criteria for assignments are included in this book.

Task	% of Total Mark	Due Date	How to Submit
1. Pre-course reading, short-answer questions and short presentation of organisms in the environment (individual)	25	Pre-course and during course	Moodle and presentation submitted to Moodle
2. Goals, objectives and data requirements for managing organisms for ecosystem management (Short presentation, group), includes engagement in the field	30	During course	Presentation (& submitted to Moodle)
3. Adaptive environmental management plan (group)	35	Within three weeks of end of course	Moodle
4. Field Trip Reflective exercise (individual)	10	Within two weeks of end of course	Moodle

**Late submission will result in a penalty of 10% per day.**

### ***12.1 Short presentation of organisms in the environment (during the course) and post-course reading and short-answer questions (moodle) (individual)***

This assessment is worth 25% in total.

#### ***Task 1***

Produce and present a 2-minute Powerpoint presentation describing an animal or plant that may be encountered on the course from the list below. Species will be assigned prior to the course (to allow you to collect some information on it), and individual students will present their talk following the evening meal different nights (you won't know whether you will be on the first night so be prepared). Bring along a memory stick with your talk so it can be loaded up.

Presentations must include the following headings:

- Where do they live?
- What is their role?
- What are their threats?
- What needs to be done to conserve them?

This is an individual assignment.

### List of species

Silver perch *Bidyanus bidyanus*  
European carp *Cyprinus carpio*  
Gambusia *Gambusia bolbrooki*  
Murray cod *Maccullochella peelii*  
Golden perch *Macquaria ambigua*  
Purple-spotted gudgeon *Mogurnda adspersa*  
Eel-tailed catfish *Tandanus tandanus*

Eastern long-necked turtle *Chelodina longicollis*  
Broad-shelled turtle *Chelodina expansa*  
Murray river turtle *Emydura macquarii*

Perons tree frog *Litoria peronii*  
Painted burrowing frog *Neobatrachus sudelli*  
Crucifix toad *Notaden bennetti*  
Waterholding frog *Cyclorana platycephala*  
Striped burrowing frog *Cyclorana albogutta*  
Salmon-striped frog *Limnodynastes salmini*

River red gum *Eucalyptus camaldulensis*  
Coolibah *Eucalyptus coolabah*  
Black box *Eucalyptus largiflorens*  
River cooba *Acacia stenophylla*  
Lignum *Duma florulenta*  
Lippia *Phyla canescens*  
Common reed *Phragmites australis*  
Water couch *Paspalum distichum*  
Flat Spike-sedge *Eleocharis plana*  
Cumbungi *Typha spp.*  
Duck weed *Azolla filiculoides*

Painted snipe *Rostratula australis*  
Australasian bittern *Botaurus poiciloptilus*  
Straw-necked ibis *Threskiornis spinicollis*  
Glossy ibis *Plegadis falcinellus*  
Pink-eared duck *Malacorhynchus membranaceus*  
Royal spoonbill *Platalea regia*  
Grey teal *Anas gracilis*  
Australian pelican *Pelecanus conspicillatus*

### **Task 2**

You have been provided with the following pre-course reading and some questions in relation to the Macquarie Marshes and the Murray-Darling Basin Plan. Read them, and then log in and answer 10 short-answer questions relating to these issues on Moodle. This assignment should be completed prior to the beginning of the course, and you will be informed of your mark before completion of the field course. This assessment is divided into two sections and is worth 25% of the total mark.

Bino, Gilad, et al. "Developing state and transition models of floodplain vegetation dynamics as a tool for conservation decision-making: a case study of the Macquarie Marshes Ramsar wetland." *Journal of Applied Ecology* 52.3 (2015): 654-664.

Kingsford, R. T., and H. C. Biggs. "Strategic adaptive management guidelines for effective conservation of freshwater ecosystems in and around protected areas of the world." *IUCN WCPA Freshwater Taskforce, Australian Wetlands and Rivers Centre, Sydney* (2012).

Kingsford, Richard T., and Rachael F. Thomas. "The Macquarie Marshes in arid Australia and their waterbirds: a 50-year history of decline." *Environmental Management* 19.6 (1995): 867-878.

Kingsford, Richard T., Harry C. Biggs, and Sharon R. Pollard. "Strategic adaptive management in freshwater protected areas and their rivers." *Biological Conservation* 144.4 (2011): 1194-1203.

Mason, T.J, Honeysett, J., Thomas, R.F., Popovic, G., Hosking, T., Shelly, D.J. and Bowen, S. (2022), Monitoring vital signs: Wetland vegetation responses to hydrological resources in the Macquarie Marshes NSW, Australia. *Austral Ecology* 47, 1296-1314.

These links will also be useful

<https://www.environment.nsw.gov.au/topics/water/wetlands/internationally-significant-wetlands/macquarie-marshes>

<https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-for-the-environment/macquarie-marshes-adaptive-environmental-management-plan-100224.pdf>

<https://www.mdba.gov.au/sites/default/files/archived/proposed/EWR-Macquarie-Marshes.pdf>

<http://www.environment.gov.au/water/topics/wetlands/database/pubs/28-ris.pdf>

<https://www.environment.nsw.gov.au/topics/water/water-for-the-environment/macquarie/annual-environmental-water-priorities>

Learning Objectives:

- improve your ability to communicate discipline-specific information through presentation
- Develop an understanding of current ecosystem conservation and management practices within Australia
- Develop an understanding of the processes and complexities of environmental flow management
- Develop an understanding of the components of an ecosystem
- Acquire an understanding of limitations placed on conservation programmes for managing rivers
- Develop an ability to identify ecosystem threats and potential mitigation

## **12.2 Goals, objectives and data requirements for environmental management or reintroduction plan (Short presentation, group)**

The assessment will be worth 30% of the total mark. In this group assignment, you will be assessed on your participation in the course (e.g. data collection, analysis, engagement) and your group presentation to the rest of the participants at the end of the course. You will also take part in a community consultation and information meeting. In this consultation, you will present your initial plan that builds towards 12.3 below, and will receive input and critique from the rest of the group ("the community", which may include various stakeholders). You should include in your presentation a consideration of the goals, objectives and data requirements for your adaptive environmental management plan, which itself will form assignment 12.3.

Feedback will be given on the course for incorporation into 12.3.

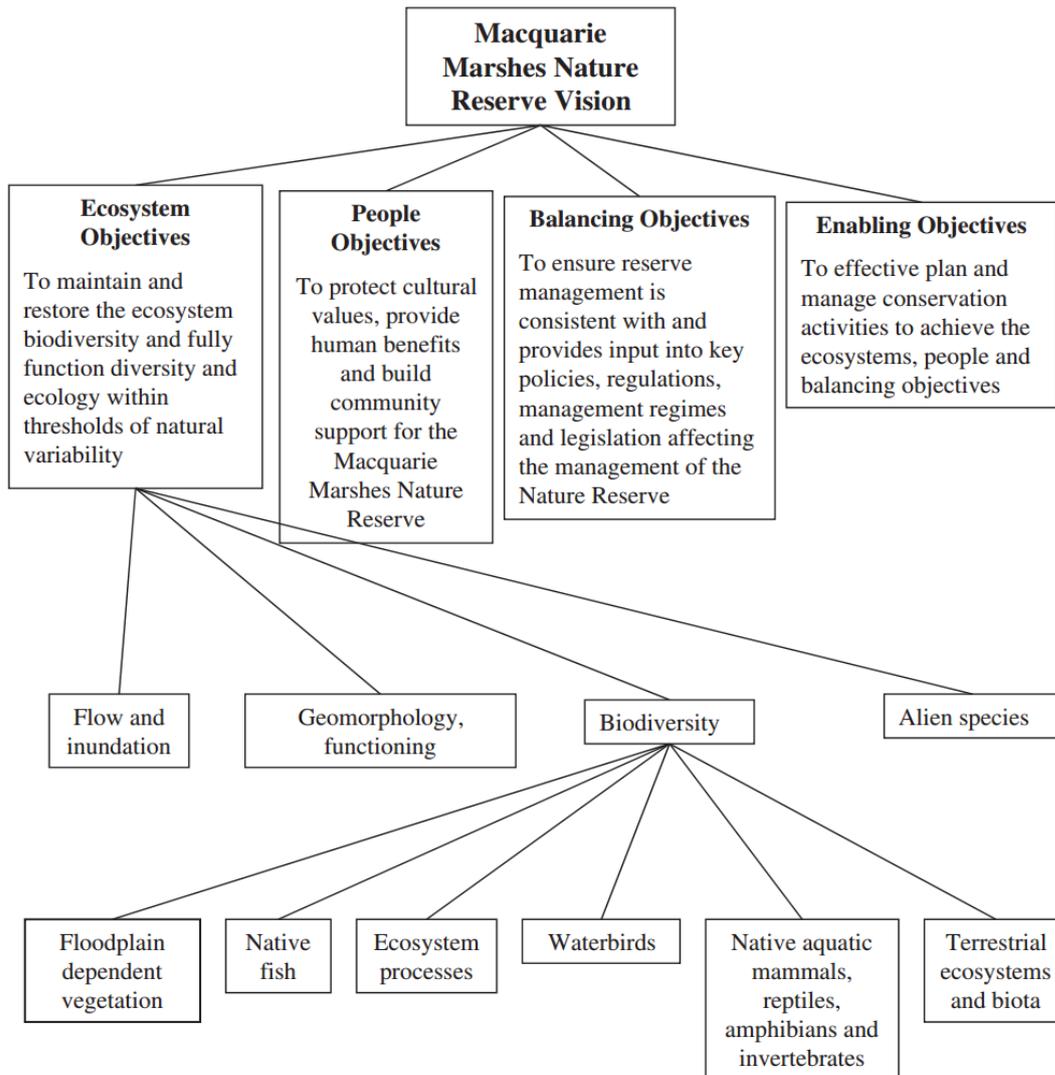
Learning Objectives:

- Improve your ability to communicate discipline-specific information through presentation
- Develop your ability to identify ecosystem threats and potential mitigation
- Develop an understanding of current ecosystem conservation and management practices within Australia
- Develop an understanding of the processes and complexities of reintroduction biology
- Develop an understanding of the components of an ecosystem
- Acquire an understanding of limitations placed on conservation programmes
- Develop an ability to identify ecosystem threats and potential mitigation

### 12.3 Adaptive environmental management plan (group)

This is a group assignment, and you will be assigned to groups at the beginning of the course. You will incorporate the input of this consultation exercise into a written group report, which will be submitted two weeks following the completion of the course. This report will constitute 35% of the course total, and feedback will be given no later than four weeks following submission.

You are required to build on the vision for the restoration of the Macquarie Marshes and you will be allocated a specific organism or group of organisms to work on. Your assignment will consist of five parts. You will use the beginnings of this objectives' hierarchy (Kingsford et al. 2011), supporting a vision for the Macquarie Marshes: "To restore the Macquarie Marshes so that it has its full functional complexity and ecology (native species, communities and processes), built around productive partnerships".



You are the environmental flow manager for the Macquarie Marshes and you will need to do the following.

1. Provide background information on the ecology, threats and life history of your target organism (500 words).
2. Construct detailed objectives which link into the hierarchy of objectives above but only focusing on your organism. Use Kingsford et al. (2011) and references to the Macquarie Marshes to do this. Your finest scale objective needs to be measurable. Provide a short description of how your fine scale objectives were derived (200 words).
3. Detail a monitoring program for your organism which measures an indicator to assess whether you meet your finest level of objectives. You need to think about where you would measure this and how often in relation to an environmental flow regime (500 words).
4. Explain how you would report your results to a manager and advise how to change the management of environmental flow to improve outcomes for your indicator (300 words).
5. Referencing should follow the format of the journal Biological Conservation.

**Kingsford, R.T.,** Biggs, H.C. and Pollard, S.R. (2011). Strategic adaptive management in freshwater protected areas and their rivers. *Biological Conservation* **144**, 1194-1203.

### Using the Web of Science

*Web of Science* is a great resource for finding peer-reviewed scientific papers. Go to the library website <http://info.library.unsw.edu.au/> and click on “databases & e-journals” (under quicklinks). Click “find resource”, and search for “web of science”. Bookmark the Web of Science homepage for future use. To search, put your search terms in the top line. You can use AND, OR, and NOT to combine search terms. It is often necessary to use ‘wildcard’ terms to allow for plural uses of a word or words with alternate suffixes. For example, if you want to look for papers on climate change impact in lizards and snakes, you might search ‘(lizard\* OR snake\* OR squamat\*) AND (climat\*)’. Once you’ve found a relevant article, click on its title to see the abstract. If you want to read the whole paper, click on the SFX button. This gives you links to the full text in pdf format (as long as our library subscribes to the journal in question). A way to find other potentially useful papers is to look at the papers cited in a relevant paper, or the papers that have cited this paper since it’s been published: just click on the blue, underlined numbers next to “times cited” or “references”.

### References

Please use the referencing style of a major journal such as *Ecology* or *Austral Ecology*. References should be cited within the text by name and date when first discussed. If there are two authors, include both names. For three authors, name the first author naming both authors where there are two authors, eg: (Veritas and Aziz 1998), or naming the first author followed by “*et al.*”. An alphabetical Reference List should be included at the end of the research proposal. Web sites and popular science books are not appropriate references.

This assessment is worth 35% of the total mark.

#### Learning Objectives:

- Develop an understanding of the components of an ecosystem
- Improve your ability to communicate discipline-specific information
- Develop your ability to identify ecosystem threats and potential mitigation
- Develop an understanding of current ecosystem conservation and management practices within Australia
- Develop an understanding of the components of an ecosystem
- Acquire an understanding of limitations placed on conservation programmes

## 12.4 Reflective exercise (individual)

The benefits of many skills and experiences you gain from practical experience will not be immediately obvious but will become apparent through reflection of the processes and experiences in which you are engaging during your study. Acknowledgement and expression of how you feel about these experiences and where they fit in relation to other experiences, or the ‘big picture’ facilitates your growth as a reflective practitioner. The aims of this course include to provide practical training and to facilitate experience of current ecosystem conservation and management strategies. This reflective exercise is designed to assess less tangible aspects of your learning and to highlight the importance of reflection to obtain a complete conservation experience.

You should complete the following tasks:

1. in maximum of three paragraphs, describe your impressions of the current state of river ecosystem and conservation management in Australia and how you feel it should be approached.
2. briefly describe three important things you learnt about the constraints placed on conservation management strategies of large rivers (and the organisations that implement them). Please rank these (with no.1 being the most important). Provide a brief justification why you ranked them in this order;
3. write one or two sentences each day describing the most outstanding thing you learnt that day;
4. write a maximum of two paragraphs describing your practical experience during this field trip (e.g. collection of field data, leadership) and what you learned about working in a group;

5. describe three important things you learnt during the field component of the course. Please rank these (with no. 1 being the most important to either your personal or professional development). Provide a brief justification on why you ranked them in this order.

This assignment should be short (no more than four pages using size12 font and standard margins).

Feedback will be given individually on each report, given no later than four weeks after submission. This assignment is worth 10% of the total mark.

Learning Objectives:

- Develop reflective practices regarding the processes and experiences that occur during this course and where they fit in relation to other experiences or the 'big picture'.
- Develop the capacity to acknowledge and express how these experiences make you feel: facilitating growth as a reflective practitioner

### 13. UNSW academic honesty and plagiarism policy

#### PLEASE READ CAREFULLY

#### What is Plagiarism?

**Plagiarism is the presentation of the thoughts or work of another as one's own. \*Examples include:**

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
  - paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
  - piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via: [www.lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism)

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

\* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle

† Adapted with kind permission from the University of Melbourne.

## **14. BEES academic honesty and plagiarism policy**

In addition to the UNSW Policy on Academic Honesty and Plagiarism, the School of Biological, Earth and Environmental Sciences (BEES) also considers any work submitted that has been produced outside of a given course in a given year to be plagiarism i.e:

- Work produced for a third party e.g. your place of employment, is considered intellectual property of the third party, and, as such, if such work is submitted in place of a required course work, it is deemed plagiarism.
- All work submitted for assessment must be created specifically for the given assessment task in the given year. Work produced in previous years or for other assessments is not acceptable.

## 15. Administration

<b>Expectations of Students</b>	Students are expected to attend the field trip and to submit all assessments on time.		
<b>Assignment Submissions</b>	<p>Unless otherwise advised, assessment tasks are submitted online using Moodle. Keep a file copy of your work. It is recommended you do not wait until the last moment to submit an assessment task as there could be a delay if many students are trying to use the system at once. Submit a trial document in advance so you are familiar with how to upload files to the system, only the last document submitted will be assessed.</p> <p>Turnitin performs plagiarism checks on the submitted assessment tasks and may be used. Students must submit all assignments by the set deadlines. Late work submitted after deadlines will be penalised at the rate of 10% per day unless a medical certificate or other documentation is attached. After 7 days the assignment will automatically be deemed a fail if sufficient documentation is not produced.</p>		
<b>Health and Safety<sup>5</sup></b>	Information on relevant Health and Safety policies and expectations at UNSW can be accessed online <a href="http://www.safety.unsw.edu.au/staff-student-resources/students">http://www.safety.unsw.edu.au/staff-student-resources/students</a>		
<b>Assessment Procedures</b>	If illness or misadventure intervenes to prevent a student meeting an assessment deadline or class meeting then he/she should contact the lecturer in charge of the assessment. The conditions for special consideration are given at <a href="https://student.unsw.edu.au/special-consideration">https://student.unsw.edu.au/special-consideration</a> .		
<b>Equity and Diversity</b>	<p>Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with staff prior to, or at the commencement of, their course, and with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or <a href="http://www.studentequity.unsw.edu.au/">http://www.studentequity.unsw.edu.au/</a>).</p> <p>Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.</p>		
<b>Student Complaint Procedure<sup>6</sup></b>	In all cases you should first try to resolve any issues with the course convenor.		
	If this is unsatisfactory, you should contact the School Student Ethics Officer (Prof Stephen Bonser, <a href="mailto:s.bonser@unsw.edu.au">s.bonser@unsw.edu.au</a> ) or the Deputy Head of School (A/Prof Scott Mooney <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> ) who is the School's Grievance Officer and Designated Officer under the UNSW Plagiarism Procedure.		
	UNSW has formal policies about the resolution of complaints that are available online for review (see <a href="https://student.unsw.edu.au/complaints">https://student.unsw.edu.au/complaints</a> ).		
	<b>School Contact</b>	<b>Faculty Contact</b>	<b>University Contact</b>
	Dr S Mooney Deputy Head of School (Undergraduate Programs) <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> Tel: 9385 8063	Dr Chris Tisdell, Acting Associate Dean (Education) <a href="mailto:cct@unsw.edu.au">cct@unsw.edu.au</a> Tel: 9385 6792 or Dr S Mooney Associate Dean (Undergraduate Programs) <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> Tel: 9385 8063	Student Administration in the Office of the Pro-Vice Chancellor (Students). <a href="mailto:clare.jones@unsw.edu.au">clare.jones@unsw.edu.au</a> Tel: 9385 3087  University Counselling and Psychological Services <sup>7</sup> Tel: 9385 5418 <a href="mailto:counselling@unsw.edu.au">counselling@unsw.edu.au</a>

<sup>5</sup> UNSW Health and Safety: <https://safety.unsw.edu.au>

<sup>6</sup> UNSW Complaints Procedure: <https://student.unsw.edu.au/complaints>

<sup>7</sup> University Counselling and Psychological Services <https://student.unsw.edu.au/counselling>

## 16. Additional support for students

- The *Current Students* Gateway: [student.unsw.edu.au](http://student.unsw.edu.au)
- Academic Skills and Support: [student.unsw.edu.au/skills](http://student.unsw.edu.au/skills)
- Student Wellbeing, Health and Safety: [student.unsw.edu.au/wellbeing](http://student.unsw.edu.au/wellbeing)
- Disability Support Services: [student.unsw.edu.au/disability](http://student.unsw.edu.au/disability)
- UNSW IT Service Centre: [www.it.unsw.edu.au/students](http://www.it.unsw.edu.au/students)