Subject Outline

ENVI922
Scientific Basis of Environmental Management

Faculty of Science, Medicine and Health

School of Earth and Environmental Sciences

Spring 2013
Subject Outline

Subject code: ENVI922
Subject name: Scientific Basis of Environmental Management
Credit points: 12
Pre/co-requisites: Must be enrolled in Environmental Science Postgraduate program or MSc (Coastal Planning)
Mode of delivery: On Campus
Delivery location: Wollongong

Version history

<table>
<thead>
<tr>
<th>Edition</th>
<th>Author(s)</th>
<th>Department</th>
<th>Year</th>
</tr>
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<tr>
<td>4th</td>
<td>Samuel Marx, School of SEES, Faculty of SMAH, UOW</td>
<td>2013</td>
<td></td>
</tr>
<tr>
<td>3rd</td>
<td>Samuel Marx, School of SEES, Faculty of Science, UOW</td>
<td>2012</td>
<td></td>
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<tr>
<td>2nd</td>
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The University of Wollongong attempts to ensure that the information contained here is correct at the time of production, however, sections may be amended without notice by the University in response to changing circumstances or for any other reason.
Contacts

Subject Co-ordinator

Name: Dr Samuel Marx

Faculty of Science, Medicine and Health

Location 41.152
Telephone 61 2 4221 3492
Email smah_student_enquiries@uow.edu.au

Consultation mode and times:

<table>
<thead>
<tr>
<th>Lecturers</th>
<th>Office</th>
<th>Phone</th>
<th>Email</th>
<th>Consultation times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samuel Marx</td>
<td>41.G31</td>
<td>(02) 42215318</td>
<td><a href="mailto:smarx@uow.edu.au">smarx@uow.edu.au</a></td>
<td>By appointment</td>
</tr>
<tr>
<td>Tim Cohen</td>
<td>41.G32</td>
<td>(02) 4221 4805</td>
<td><a href="mailto:tcohen@uow.edu.au">tcohen@uow.edu.au</a></td>
<td>By appointment</td>
</tr>
<tr>
<td>Errol Mclean</td>
<td>-</td>
<td>-</td>
<td><a href="mailto:errol@uow.edu.au">errol@uow.edu.au</a></td>
<td>By appointment</td>
</tr>
</tbody>
</table>
Subject Information

Outline

This subject covers topics designed to give students a comprehensive overview of the scientific basis of environmental management. The subject will adopt a multi-disciplinary approach to the scientific understanding of how environmental systems work and show how an appreciation of such knowledge leads to the development of appropriate management strategies for these systems. While there will be some emphasis on the Australian situation, much of the material is applicable in any country. The systems to be covered include rivers, coasts, biological/ecological systems soils and climate/atmospheric science. Case studies from Australia, South-East Asia and the Pacific Islands in addition to other locations will be included. As part of the subject, students will complete projects carried out in team to facilitate the development of interdisciplinary skills and an appreciation of the benefits of teamwork in addressing environmental management issues.

Pre-requisites: Approved entry to MEnvSc degree

Credit Points: 12 cp

Textbooks: None specified. There are numerous books in the Library on material covered in this subject.

School Student Support

School Office (Wendy Weeks, Denise Alsop) Room 41.154 Tel 02 4221 3721
School Manager and OH&S Sandra Chapman Room 41.154B Tel 02 4221 4483
Student Liaison Officer Marina McGlinn Room 41.G29 Tel 02 4221 4396

University support services

Disability Liaison Officer 3rd floor, UniCentre building 02 4221 3445

Library

Telephone 02 4221 3548 http://www.library.uow.edu.au
Learning Outcomes

Through successful completion of this subject students should be able to:

- carry out a scientific investigation of a given environmental management issue individually or in a team context

- carry out an initial assessment of a data set relating to environmental management, e.g., water quality, soil survey, ecological survey, including aspects like data quality and completeness.

- show an understanding of the linkages between an understanding of the major ecological processes in a given area and the development of appropriate management systems.

- describe the major processes occurring in the atmosphere, the oceans, lakes, rivers and estuaries

- explain the unique properties of water and their importance in environmental processes

- describe the major features of soils and explain the role of soils as a medium for environmental processes

- list the major types and sources of hazardous wastes and explain the properties of such materials that creates the hazards

- describe the major processes that occur in river catchments and explain how the concept of total catchment management builds on these processes

- describe how coral reefs are formed and explain their importance as ecosystems

- describe the major features of mangrove and other wetland systems and explain their ecological importance

Students will acquire the following statistical, information, computer and academic literacy as a result of explicit teaching / learning activities in this subject:

- Use of Library literature search facilities, e.g., in the preparation of a report on a topic of significance in environmental management

- Critical evaluation of information available from a range of internet and traditional sources

- Articulate, justify, argue and distinguish fact from opinion in environmental science information
• Explore issues within existing knowledge including written and oral analysis
• Formulate clear concise questions based on information needs
• Summarise current understanding, and critically comment on current environmental issues
• Apply problem solving strategies in situations where the problem and desired solution are evident
• Develop the capacity to read and develop a basic understanding in a new discipline relating to environmental science
• Identify the ethical dimensions of an environmental management issue
• Introduction to Endnote as a reference database
• Preparation and Management of Word, Excel and PowerPoint documents

**Graduate Qualities**

Valuable qualities gained by UOW graduates are essential for gaining employment and making an important contribution to society and their chosen field – further information is available at [http://www.uow.edu.au/about/teaching/qualities/](http://www.uow.edu.au/about/teaching/qualities/)

Engagement in this subject will contribute to each student’s development of the following UOW Graduate Qualities:

**Informed**

• Comprehensive knowledge of an area of Science and well-developed skills in using relevant technologies
• Awareness of the international context in which advances in Science are made and applied

**Independent learners**

• Critical thinking skills
• Scientific approach to the acquisition, analysis, and interpretation of data

**Independence in seeking to extend knowledge through ongoing research, enquiry and reflection**

• Problem solvers
• Application of creative, logical and critical thinking to scientific problems
Effective communicators

- Well-developed written, oral & aural communication
- Effective collaboration and teamwork across a range of settings and cultures

Responsible

- Ethical decision making
- Respect for diverse opinions, professions, and cultures

Lecture Times

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>1.30–5:30 pm</td>
<td>1-G04</td>
</tr>
<tr>
<td>Tuesday</td>
<td>2.30–4:30 pm</td>
<td>41-202</td>
</tr>
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</table>

Study Time

Students should note that UOW policy equates 1 credit point with 2 hours of study per week that includes lectures and tutorials. For example, in a 6 credit point subject, a total of 12 hours of study per week is expected.

Recommended Readings

The items listed below are suggested readings; it is neither anticipated nor expected that you will read all of them or even refer to them all. The list is provided to assist you in gathering additional information about topics covered in the course. Some of the materials may not be available in the UOW Library.

General

WATER

OCEANS
Brown, J. *et al* (Open University Oceanography Course Team) 1989. *The Ocean Basins: Their Structure and Evolution*
  *Seawater: Its Composition, Properties and Behaviour*
  *Ocean Circulation*
  *Waves, Tides and Shallow-Water Processes*

ATMOSPHERE

SOILS

FLORA AND FAUNA
ALPINE ECOSYSTEMS

FOREST ECOSYSTEMS
SAVANNA/GRASSLAND ECOSYSTEMS


ARID ENVIRONMENTS


LAKES
   (the final section of this book contains a number of chapters discussing aspects of lake management in Australia).
Limnology and Oceanography - very good international journal with many papers on the science of lake systems

RIVER/CATCHMENT/WATERSHED SYSTEMS


WETLANDS INCLUDING MANGROVES


### ESTUARIES AND COASTAL LAGOONS


**COASTAL SYSTEMS**


**CORAL REEF ECOSYSTEMS**


**e-Learning**

This subject has materials and activities available via eLearning. To access eLearning you must have a UOW user account name and password, and be enrolled in the subject.

eLearning is accessed via SOLS (student online services). Log on to SOLS and then click on the eLearning link in the menu column.

For information regarding the eLearning spaces please use the following links:

<table>
<thead>
<tr>
<th>Week.</th>
<th>Date</th>
<th>Lecture</th>
<th>Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>29-July</td>
<td>1</td>
<td>Course introduction (SM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>Earth’s systems (SM)</td>
</tr>
<tr>
<td>2</td>
<td>5-August</td>
<td>3</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td>3</td>
<td>12-August</td>
<td>5</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td>4</td>
<td>19-August</td>
<td>7</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>Rivers and hydrology (TC)</td>
</tr>
<tr>
<td>5</td>
<td>26-August</td>
<td>9</td>
<td>Student lectures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>Student lectures</td>
</tr>
<tr>
<td>6</td>
<td>2-September</td>
<td>11</td>
<td>Student lectures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>Student lectures</td>
</tr>
<tr>
<td>7</td>
<td>9-September</td>
<td>13</td>
<td>Field trip project preparation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14</td>
<td>Field trip project preparation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>13-15 September: Field trip</td>
</tr>
<tr>
<td>8</td>
<td>16-September</td>
<td>15</td>
<td>Atmosphere and climate (SM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>Atmosphere and climate (SM)</td>
</tr>
<tr>
<td>9</td>
<td>23-September</td>
<td>17</td>
<td>Atmosphere and climate (SM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>Coastal systems (SM)</td>
</tr>
<tr>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>30-4 October: Mid semester recess</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7-October: Labour Day public holiday.</td>
</tr>
<tr>
<td>10</td>
<td>7-October</td>
<td>19</td>
<td>Coastal systems (SM)</td>
</tr>
<tr>
<td>11</td>
<td>14-October</td>
<td>21</td>
<td>Coastal systems (SM)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
<td>Coastal systems (SM)</td>
</tr>
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</table>
Assessment

Minimum attendance requirements

It is expected that students attend all lectures.

Minimum performance requirements

Students need to complete each component at the level specified.

<table>
<thead>
<tr>
<th>Component</th>
<th>Minimum Standard</th>
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</thead>
<tbody>
<tr>
<td>Final examination</td>
<td>900 level 50%</td>
</tr>
</tbody>
</table>

Students who do not meet the minimum performance requirements as set out in the Subject Outline may be given a Fail grade or TF (Technical Fail) grade on their Academic Transcript. See the General Course Rules at [http://www.uow.edu.au/handbook/generalcourserules/index.html](http://www.uow.edu.au/handbook/generalcourserules/index.html)

Summary

<table>
<thead>
<tr>
<th>Task</th>
<th>Title</th>
<th>Weighting</th>
<th>Due Date</th>
</tr>
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<tbody>
<tr>
<td>Assessment 1</td>
<td>Research proposal</td>
<td>10%</td>
<td>12-August</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>Group lectures</td>
<td>15%</td>
<td>26-August</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>Individual report</td>
<td>15%</td>
<td>8-October</td>
</tr>
<tr>
<td>Assessment 4</td>
<td>Group report/presentation</td>
<td>20%</td>
<td>28-October</td>
</tr>
<tr>
<td>Assessment 5</td>
<td>Final exam</td>
<td>40%</td>
<td>TBA</td>
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Performance grades

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<th>Description</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>HD</td>
<td>High Distinction</td>
<td>85–100%</td>
</tr>
<tr>
<td>D</td>
<td>Distinction</td>
<td>75–84%</td>
</tr>
<tr>
<td>C</td>
<td>Credit</td>
<td>65–74%</td>
</tr>
<tr>
<td>P</td>
<td>Pass</td>
<td>50–64%</td>
</tr>
<tr>
<td>F</td>
<td>Fail (unsatisfactory completion)</td>
<td>0–49%</td>
</tr>
<tr>
<td>TF</td>
<td>Technical Fail</td>
<td>No mark recorded</td>
</tr>
</tbody>
</table>
Scaling

Marks awarded for any assessment task (including examinations) may be subject to scaling at the end of the session by the Unit Assessment Committee and/or the Faculty Assessment Committee (FAC). Marks will only be scaled to ensure fairness/parity of marking across groups of students. Scaling will not affect any individual student’s rank order within their cohort. For more information refer to Assessment Guidelines – Scaling [http://www.uow.edu.au/about/policy/UOW058609.html](http://www.uow.edu.au/about/policy/UOW058609.html)

Submission and Return of Assessment Items

**Delivery:** Please submit assignments by 5.00 pm on the due date to the Subject Coordinator or to SMAH Central.

**Post:** Submission by post is permitted provided the assignment arrives on the date due – this will usually mean posting 2 days before due.

**Facsimile:** Submission by fax is not permitted

**Email:** Submission by email is only allowed in exceptional circumstances – please contact Subject Coordinator for permission.

**Assignment covers:** All assignments should be submitted with a front cover page, which will be signed and dated on submission. Cover sheets are available from the SEES Administration Office Office (41.154).

**Collection:** Marked assignments will normally be made available during lectures within two weeks of submission.

Students are advised to keep an electronic or hard copy of all submitted assessment tasks except in circumstances where this is not possible e.g. where the task is submitted at the end of activity in which it was completed.

**Submitting an assignment at SMAH Central**

Assignments submitted at SMAH Central MUST have a SATS (Student Assignment Tracking System) coversheet attached to the front of the assignment. Instructions for generating a coversheet can be found on the SMAH Central web page.

For an assignment to be successfully submitted at SMAH Central please note the following:

- The coversheet must be signed and dated
- The assignment must have the correct coversheet i.e. the correct subject code and tutorial group (if applicable)
- A legible barcode with all numbers and digits below e.g. UOW20121007656
- Assignments must be submitted by 2.30pm on the due date

If an assignment is submitted to SMAH Central without any of the above we will contact you and advise that you need to return to SMAH Central with the correct coversheet. Your
assignment won’t be recorded as being submitted until the correct coversheet is attached. This might mean that the assignment is recorded as being submitted late.

**Late Submission**

All assessment tasks are to be submitted on the due dates as specified in this Subject Outline. Assessment tasks submitted late will be penalised by the deduction of 10% of the maximum possible mark for the assessment task per calendar day or part thereof. Deduction of marks will not result in a negative mark.

Note that assessment tasks submitted to SMAH Central must be submitted by 2:30 pm on the due date to guarantee being recorded in SATS as being submitted on time.

**Academic Consideration including Extensions of Time**

Applications from students for academic consideration should be made only on the grounds of serious or extenuating circumstances. Applications for academic consideration are governed by the University’s Student Academic Consideration Policy at [http://www.uow.edu.au/about/policy/UOW058721.html](http://www.uow.edu.au/about/policy/UOW058721.html)

Do not assume that an application for special consideration will be automatically granted.

**Supplementary Assessments**

Supplementary assessment may be offered to students whose performance in this subject is close to that required to pass the subject, and are otherwise identified as meriting an offer of a supplementary assessment. The precise form of supplementary assessment will be determined at the time the offer of a supplementary is made.

**Referencing**

The Harvard referencing system is used in ENVI922 this is also known as the author-date system due to the order of the information presented. Failure to document adequately and fully is to ignore scholarly rules and run the risk of plagiarism.


**Plagiarism**

Students are responsible for submitting original work for assessment, without plagiarising or cheating, abiding by the University’s policy on plagiarism as set out in the University Handbook under the University’s Policy Directory. Plagiarism has led to expulsion from the University.

The University’s Academic Integrity and Plagiarism Policy, Faculty Handbooks and subject guides clearly set out the University’s expectation that students submit only their own original work for assessment and avoid plagiarising the work of others or cheating. Re-using any of your own work (either in part or in full) which you have submitted previously for assessment is not permitted without appropriate acknowledgement. Plagiarism can be detected and has led to students being expelled from the University.
The use by students of any website that provides access to essays or other assessment items (sometimes promoted as 'resources') is extremely unwise. Students who provide an assessment item (or provide access to an assessment item) to others, either directly or indirectly (for example by uploading an assessment item to a website) are considered by the university to be intentionally or recklessly helping other students to cheat. This is considered academic misconduct and students place themselves at risk of being expelled from the University.

Assessment Tasks

Task 1: Research Proposal

Due Date: 12 August 2013

Weighting: 10%

Details: In week 1 of the course you will be handed a project brief. You are asked to write a proposal outlining how you would address the brief. Your proposal should include a statement about the problem with supporting literature, a description of your methodology and a discussion of its appropriateness, a timeline and a budget.

Your proposal should be no more than 1500 (excluding budget, timeline and title) words and is worth 10% of final grade.

It should include:

1. A project title
2. Introduction and background: A discussion of the problem with reference to supporting literature.
3. Method and approach: how you would address the problem. This could include specific details of for example, how many samples you would analyse, how and where you would analyse them.
4. Benefit and feasibility: A discussion of why you should undertake the work and what the benefit of it will be.
5. Budget: Your expected budget. Note you do not have to include your salary only project costs.
6. Budget justification: A discussion of why the items outlined in the budget are necessary.
7. Timeline.

This assignment should be handed to the Coordinator/Lecturer or to SMAH central on or before 12 August 2013.

Criteria for assessment:

- Introduction and background (20%)
- Method and approach (20%)
- Benefit and feasibility (20%)
- Budget (15%)
- Budget justification (20%)
- Timeline (5%)
Task 2: Student lectures

Due Date: 26 August, 2013

Weighting: 15%

Details: Students will be assigned to groups based on background so that each group is as multidisciplinary as possible. Each group will present a lecture based on a topic which will be given out in week 1. The exact details of this assignment will be discussed in class. The lectures will be presented in weeks 5 and 6 (26 August and 2 of September) and are worth 15% of your final mark. Note electronic powerpoint versions your lecture slides are DUE on 2 September 2013 and are to be handed to the lecturer.

Criteria for assessment:

- 20% of the available marks will be awarded for your individual component of the presentation including:
  - Clarity of expression
  - Depth of understanding demonstrated
  - Use of examples to illustrate points
  - Questions and discussion

- 80% of the available marks will be awarded for the group presentation. This includes:
  - Coverage of topic (25%)
  - Use of appropriate and interesting examples (15%)
  - Lecture slides (25%)
    - Format, style and presentation
    - Graphics & tables, charts format and structure
    - Clarity and information provided
  - Class interaction (5%)
  - Peer review assessment (10%)
Task 3: Individual report

Due Date: 8 October, 2013

Weighting: 25%

Details: Select a topic from the list below. Confirm your choice by signing your name beside the topic of your choice on the list held by the Lecturer/Administrative Assistant. You may not select a topic already signed for by another student.

Write a review paper/report on the topic of your choice (not more than 2000 words). The topics have been selected to require reading and thought in more than one discipline. Evidence of wide reading will be suitably rewarded (worth 25% of final grade).

You are encouraged to use figures and diagrams in your review.

This assignment should be handed to the Coordinator/Lecturer or to SMAH central on or before 8 October 2013.

TOPICS - ENVI 922 ASSIGNMENT NO.3

1. Impacts of land cover change on the climate system
2. The impact of dams on river systems
3. Determining environmental flows in regulated river systems
4. Managing fire regimes in natural ecosystems
5. Reducing water consumption in urban environments
6. Managing fire regimes in populated regions
7. Review the processes and implications of the urban heat island effect
8. Wetlands as a water pollution mitigation system
9. Review the environmental legacy of historical soil erosion in Australia
10. The impact of fire on soil microbial populations
11. Ocean acidification and phytoplankton productivity
12. The behaviour of phosphorus in estuarine systems
13. The role of dust in marine fertilisation
14. The re-establishment of seagrass beds after disturbance
15. Global fertilizer usage, trends and environmental threats.
16. The impacts of agriculture on long term soil health and productivity
17. Bioavailability indices for metals in soils and sediments
18. The use of geochemical tracers to map species movement/behaviour
19. Climate variability in Australia over the Holocene
20. Causes and implications of sea level rise in Australia
21. Fire impacts on nutrient cycling in forest ecosystems
22. Mercury pollution in the environment
23. Treated sewage effluent irrigation utilisation in forest systems
24. Soil erosion as a mechanism for nutrient transport
25. Marine ecosystem impacts of crude oil spills

Criteria for assessment:
- Clarity of expression (20%)
- Depth of understanding demonstrated (30%)
- Use of examples to illustrate points (20%)
- Format, style and presentation (10%)
- Graphics & tables, charts format and structure (10%)
- Conclusions and recommendations (10%)
Task 4: Group report/presentations

Due Date: 28 October, 2013

Weighting: 20%

Details: Students will be assigned to groups based on background so that each group is as multidisciplinary as possible. Each group will be assigned a project to investigate and prepare a written report. The report will be team one and the marks awarded will be given as follows:

75% of assignment mark – based on the group report and applies equally to all team/group members
10% of assignment mark – based on a short summary of individual contribution (maximum length 500 words)
10% of assignment mark – assessment of short seminar presentation given in Week 13 of the subject
5% of assignment mark – based on peer review

Total for Project 20% of final grade.

The group assignment reports and individual reports should be handed to the Subject Coordinator on or before 28 October 2013. The length will vary depending on the project, but in general it is unlikely that more than 5000 words will be required (plus appropriate tables and figures).

Criteria for assessment:

- Clarity of expression (20%)
- Depth of understanding demonstrated (30%)
- Use of examples to illustrate points (20%)
- Format, style and presentation (10%)
- Graphics & tables, charts format and structure (10%)
- Conclusions and recommendations (10%)
Task 5: Final exam

Date: TBA

Weighting: 40%

Details: Details of the final exam will be discussed in lectures

Practical component

A three day field trip will occur on from the 13-15 September as part of the subject.
General Advice

Students should refer to the Faculty of Science, Medicine and Health website for information on policies, learning and support services and other general advice.

Use of Electronic Devices in Timetabled Activities

Ensure that mobile phones are turned off or turned to silent before timetabled activities. Electronic devices including mobile phones and portable MP3 players should not be accessed during timetabled activities unless otherwise advised.