CVEN9892 SUSTAINABILITY ASSESSMENT AND RISK ANALYSIS IN WATER AND ENERGY SYSTEMS PLANNING

COURSE DETAILS

Units of Credit

6

Contact hours

3 hours per week

Class

Wednesday, 15:00-16:00, Mechanical Eng 203 (K-J17-203)

Tutorial

Wednesday, 16:00-18:00, Mechanical Eng 203 (K-J17-203)

You should assume you need an electronic calculator during every tutorial

Course Coordinator and Lecturer

Dr Stuart Khan
Email: s.khan@unsw.edu.au
Office: UNSW Water Research Centre, Vallentine Annexe
Phone: 02 9385 5082

Additional Lecturers

Mr Matthias Schulz
Email: m.schulz@unsw.edu.au
Ms Hazel Rowley
Email: h.rowley@unsw.edu.au

Tutor

Mr Juan Pablo Alvarez Gaitan
Email: j.alvarezgaitan@student.unsw.edu.au

INFORMATION ABOUT THE COURSE

This course will deepen and apply skills learned in CVEN1701 Environmental Principles and Systems. It also shares and deepens some material in CVEN4727 Environmental Engineering Practice. There are no specific prerequisites for this course but it assumes some familiarity with water supply technologies, will involve computational activities and is aimed at students with an undergraduate degree in engineering.
The design of water and energy systems has advanced from a cost-benefit basis to the incorporation of quantitative assessments of environmental burdens and the human and environmental risks associated with competing options.

This course will equip students with the ability to apply life cycle assessment (LCA) and life cycle costing (LCC) for quantifying environmental and economic performance, and an understanding of the factors that define human health and environmental risks. The latter include the presence of chemicals and pathogenic organisms, and the reliability of engineered systems.


The aim of this course is to introduce sustainability assessment tools – in particular LCA, LCC and risk assessment (RA) - to put them into the context of strategic planning processes with regards to water and energy services and to enable students to make more informed decisions towards increased sustainable outcomes.

In addition, the course aims to foster:

- Capacity for analytical and critical thinking and for creative problem solving
- Ability to engage independent and reflective learning
- Skills for collaborative and multi-disciplinary work
- A respect for ethical practice and social responsibility.

### TEACHING STRATEGIES

**Private Study**
- Review lecture material and additional reading
- Complete all assignments
- Download materials from UNSW Blackboard
- Keep up with notices and find out marks via UNSW Blackboard
- Find out what you must learn

**Lectures**
- Summarise essential course material from lectures and associated reading
- Hear announcements on course changes
- Be guided by discussion questions and additional reading

**Tutorials**
- Participate and attempt all tutorial questions
- Ask questions

**Assessments**
- Enhance your knowledge by undertaking necessary research to complete these tasks
- Demonstrate your knowledge and skills
- Demonstrate higher understanding and problem solving
- Do not copy sections from textbooks or websites, always use appropriate references for sourced material
**EXPECTED LEARNING OUTCOMES**

At the end of this course, students will be able to conduct simple LCAs using professional software. They will be able to describe and contrast different quantitative option evaluation methods including LCC and RA. They will also be able to plan a decision making process, interpret the outcomes from each assessment method, evaluate them by using multicriteria analysis (MCA) and make recommendations towards more sustainable decision making processes. Students will be understand the basic principles of water quality risk assessment be able to undertake risk assessment calculations and formulate reasonable conclusions based on risk assessment activities.

**ASSESSMENT**

The final examination will constitute 50% of the overall course mark. The remaining 50% is comprised from the two assignments as shown in detail below.

Students will need to actively project manage their assignment work in order to gain a good mark in the major assignment. Students should expect to spend a significant amount of time working with their team partner to develop their major project. Students will be assessed throughout the course with assessments linked to a selection of weekly activities. The intent of the earlier assessments will be to check students are gaining basic skills. The major assignment and the exam will test the students’ ability to synthesise the overall course. All material presented during the session, including by guest lecturers, will be examinable in the exam unless otherwise noted.

The formal exam scripts will not be returned. Students who perform poorly in the quizzes and tutorials are recommended to discuss progress with the lecturer during the session. The Course Coordinator reserves the right to adjust the final scores by scaling if agreed with the Head of School. Details of each assessment component, the marks assigned to it, the criteria by which marks will be assigned, and the dates of submission are set out below.

**ASSIGNMENTS**

<table>
<thead>
<tr>
<th>Assessment details</th>
<th>Issue in</th>
<th>Marks</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Major project (Group work)</td>
<td>Week 1</td>
<td>35%</td>
<td>Friday 3rd June</td>
</tr>
<tr>
<td>2. Cost assignment (Individual work)</td>
<td>Week 3</td>
<td>15%</td>
<td>Friday 1st April</td>
</tr>
</tbody>
</table>

All assignments and reports are to be submitted electronically via UNSW Blackboard. No hard copies will be accepted. No emailed copies will be accepted. Assignments and reports are due before midnight on the due date. Late assignments will receive a 10% penalty per week or part thereof.

**Marking criteria:**

All assignments will be marked on the basis of whether the student demonstrates an understanding of the material. Where numerical errors can be identified as simple slips, penalties will not be as large as when errors appear to be a result of a conceptual misunderstanding, or the source of the error is difficult to determine from the working. The major assignment will be additionally assessed with respect to the depth of the analysis, the breadth of its consideration of the question at hand and the clarity of the way in which
the answer is presented. The use of tables and diagrams is encouraged. **Please make sure you do not exceed the imposed word limits.**

### COURSE PROGRAM

#### SESSION 1 2011 (28 February – 3 June)

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Tutorial</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>March 2</td>
<td>Practical Sustainability Frameworks</td>
<td>Team formation</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>2</td>
<td>March 9</td>
<td>The role of quantification in social debates</td>
<td>Examples from the media</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>3</td>
<td>March 16</td>
<td>Costing and pricing resources</td>
<td>Levelised costing</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>4</td>
<td>March 23</td>
<td>Life cycle inventory analysis - LCI</td>
<td>LCI examples</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>5</td>
<td>March 30</td>
<td>Input-output based LCA</td>
<td>Application of IOA</td>
<td>Hazel Rowley</td>
</tr>
<tr>
<td>6</td>
<td>April 6</td>
<td>Life cycle impact assessment - LCIA</td>
<td>GaBi software explained</td>
<td>Matthias Schulz</td>
</tr>
<tr>
<td>7</td>
<td>April 13</td>
<td>Approaches to MCA</td>
<td>GaBi software laboratory</td>
<td>Matthias Schulz</td>
</tr>
<tr>
<td>8</td>
<td>April 20</td>
<td>NO CLASS</td>
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**MID SEMESTER BREAK**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lecture Topic</th>
<th>Tutorial</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>May 4</td>
<td>Risk assessment frameworks</td>
<td>Risk assessment frameworks</td>
<td>Stuart Khan</td>
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<tr>
<td>10</td>
<td>May 11</td>
<td>Hazard identification</td>
<td>Hazard identification</td>
<td>Stuart Khan</td>
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<tr>
<td>11</td>
<td>May 18</td>
<td>Dose-response Assessment</td>
<td>Dose-response Assessment</td>
<td>Stuart Khan</td>
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<tr>
<td>12</td>
<td>May 25</td>
<td>Risk Characterisation</td>
<td>Risk Characterisation</td>
<td>Stuart Khan</td>
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<tr>
<td>13</td>
<td>June 1</td>
<td>Risk Management</td>
<td>Risk Management</td>
<td>Stuart Khan</td>
</tr>
</tbody>
</table>

### RELEVANT RESOURCES

**LCA Resources**


12. Lane, J., de Haas, D., Lant, P. (2010) Life cycle impacts of the Gold Coast urban water system. Ozwater’10, Brisbane, 8-10 March 2010. (S Khan can provide a copy of this paper).

**Risk Assessment resources**


7. Any additional materials provided on UNSW Blackboard: http://lms-blackboard.telt.unsw.edu.au/

**DATES TO NOTE**

Refer to MyUNSW for Important Dates available at:

https://my.unsw.edu.au/student/resources/KeyDates.html

**PLAGIARISM**

Beware! An assignment that includes plagiarised material will receive a 0% Fail, and students who plagiarise may fail the course. Students who plagiarise are also liable to disciplinary action, including exclusion from enrolment.
Plagiarism is the use of another person’s work or ideas as if they were your own. When it is necessary or desirable to use other people’s material you should adequately acknowledge whose words or ideas they are and where you found them (giving the complete reference details, including page number(s)). The Learning Centre provides further information on what constitutes Plagiarism at:

http://www.lc.unsw.edu.au/onlib/plag.html

**COMMON SCHOOL INFORMATION**

For information about:

- Notes on assessments and plagiarism,
- School policy on Supplementary exams,
- Special Considerations,
- Solutions to Problems,
- Year Managers and Grievance Officer of Teaching and Learning Committee, and
- CEVSOC.

Refer to Common School Information on the School website available at: