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 & Tutorial  Thursday, 14:00-17:00, Civil Engineering 101 (K-H20-101)
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: Room 311, School of Civil & Environmental Engineering (Bld H20)
Phone: 02 9385 5070

Additional Lecturer  Dr Hazel Rowley
Email: h.rowley@unsw.edu.au

Tutor  None assigned.

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 CVEN4000 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.

HANDBOOK DESCRIPTION

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.


OBJECTIVES

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 must 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 to develop their major project. 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 struggle with the material set in 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, 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>
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</thead>
<tbody>
<tr>
<td>1. Cost assignment (Individual work)</td>
<td>Week 4</td>
<td>15%</td>
<td>Friday 6th April</td>
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<tr>
<td>2. Life Cycle Assessment (Group work)</td>
<td>Week 8</td>
<td>35%</td>
<td>Friday 18th May</td>
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<tr>
<td>3. Final Exam</td>
<td>Exam week</td>
<td>50%</td>
<td>N/A.</td>
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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.
SESSION 1 2012:

<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>1 Mar</td>
<td>Sustainability measures and reporting</td>
<td>Team formation</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>2</td>
<td>8 Mar</td>
<td>Ecological footprint</td>
<td>Ecological footprint</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>3</td>
<td>15 Mar</td>
<td>Sustainable energy management &amp; GHG emissions</td>
<td>GHG emissions accounting</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>4</td>
<td>22 Mar</td>
<td>Costing and pricing of resources</td>
<td>Costing and pricing</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>5</td>
<td>29 Mar</td>
<td>Multicriteria assessment</td>
<td>Multicriteria assessment</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>6</td>
<td>5 Apr</td>
<td>Material flow analysis</td>
<td>Material flow analysis</td>
<td>Stuart Khan</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>7</td>
<td>26 Apr</td>
<td>Life cycle assessment</td>
<td>Life cycle assessment</td>
<td>Stuart Khan</td>
</tr>
<tr>
<td>9</td>
<td>3 May</td>
<td>GaBi as a tool for LCA</td>
<td>*GaBi computer Lab</td>
<td>Stuart Khan</td>
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<tr>
<td>10</td>
<td>10 May</td>
<td>Input-output based LCA</td>
<td>Input-output based LCA</td>
<td>Hazel Rowley</td>
</tr>
<tr>
<td>11</td>
<td>17 May</td>
<td>Risk analysis frameworks</td>
<td>Risk analysis frameworks</td>
<td>Stuart Khan</td>
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<tr>
<td>12</td>
<td>24 May</td>
<td>Risk characterisation</td>
<td>Risk characterisation</td>
<td>Stuart Khan</td>
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<tr>
<td>13</td>
<td>31 May</td>
<td>Risk management</td>
<td>Risk management</td>
<td>Stuart Khan</td>
</tr>
</tbody>
</table>

*Location: Computing laboratories, School of Civil & Environmental Engineering.

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

REVISED COURSE PROGRAM


7. Any additional materials provided on UNSW Blackboard (access through MyUNSW).

**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

**ACADEMIC ADVICE**

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:

http://www.civeng.unsw.edu.au/info-about/our-school/policies-procedures-guidelines/academic-advice