IEST7500

FUNDAMENTALS IN ENGINEERING FOR ENVIRONMENTAL MANAGEMENT

SESSION 2, 2013
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# Faculty of Science - Course Outline

## 1. Information about the Course

<table>
<thead>
<tr>
<th>Year of Delivery</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
<td>Course Code</td>
<td>IEST7500</td>
</tr>
<tr>
<td>Course Name</td>
<td>Fundamentals in Engineering for Environmental Management</td>
</tr>
<tr>
<td>Academic Unit</td>
<td>Institute of Environmental Studies</td>
</tr>
<tr>
<td>Level of Course</td>
<td>Postgraduate</td>
</tr>
<tr>
<td>Units of Credit</td>
<td>6UOC</td>
</tr>
<tr>
<td>Session Offered</td>
<td>S2</td>
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<tr>
<td>Assumed Knowledge, Prerequisites or Co-requisites</td>
<td>This course is intended for non-engineering environmental masters programs. Engineering majors are excluded.</td>
</tr>
<tr>
<td>Hours per Week</td>
<td>10 HPW average</td>
</tr>
<tr>
<td>Number of Weeks</td>
<td>12 week</td>
</tr>
<tr>
<td>Commencement Date</td>
<td>31/7/2013</td>
</tr>
</tbody>
</table>

### Summary of Course Structure (for details see 'Course Schedule')

<table>
<thead>
<tr>
<th>Component</th>
<th>HPW</th>
<th>Time</th>
<th>Day</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1 (Week1)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 31/7</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 2 (Week 2)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 7/8</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 3 (Week 3)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 14/8</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 4 (Week 4)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 21/8</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 5 (Week 5)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 28/8</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 6 (Week 6)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 4/9</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 7 (Week 7)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 11/9</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 8 (Week 8)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 18/9</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 9 (Week 9)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 25/9</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Semester Break</td>
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<tr>
<td>Unit 10 (Week10)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 9/10</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 11 (Week11)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 16/10</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>Unit 12 (Week12)</td>
<td>3</td>
<td>6 – 9 pm</td>
<td>Wed 23/10</td>
<td>Vallentine Annexe room 121/122</td>
</tr>
<tr>
<td>TOTAL</td>
<td>36</td>
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</tbody>
</table>

Your learning in this course will be facilitated by the following activities:
- 12 weekly three hour classes comprising lecture, discussion and group work for campus students / online discussions for distance students
- Specific readings for each unit to prepare and revise class content
- Independent research and study in preparing for the assignments.

You will need
- this study guide which includes weekly units of study
- the essential readings (to be downloaded)
- access to relevant publications beyond the set material.

Lecture notes, readings and additional resources will be provided online via Moodle. Distance students will also be required to engage in online discussions using Moodle. See Part 6 of the outline for details on accessing Moodle.

## 2. Staff Involved in the Course

<table>
<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Contact Details</th>
<th>Consultation Times</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Convenor</td>
<td>Dr Alex Baumber</td>
<td>Institute of Environmental Studies&lt;br&gt;Vallentine Annexe, Room 133&lt;br&gt;UNSW Sydney, NSW 2052&lt;br&gt;Tel: +61 2 9385 5730&lt;br&gt;Fax: +61 2 9663 1015&lt;br&gt;Email: <a href="mailto:a.baumber@unsw.edu.au">a.baumber@unsw.edu.au</a></td>
<td>Friday 10am-3pm by appointment. Email enquiries sent during the week will also be handled during these times (i.e. don’t expect a response to an email before Friday).</td>
</tr>
</tbody>
</table>
### Course Description and Course Aims

This fundamental knowledge (FK) course is intended primarily for Masters of Environmental Management students who do not have an engineering background. It introduces general engineering approaches and studies their relation to ecological sustainability. The course analyses this relationship in different socio-economic contexts, including both developed and developing countries and urban and rural environments. Students will address the tension between various forms of technical knowledge, the role of technology in the global economy, the relationship between engineering and sustainable development and the role of engineering in environmental management. Students will be taken through various case studies of real environmental problems and will be encouraged to identify where technological solutions are appropriate and where they are inappropriate or inadequate.

### Student Learning Outcomes

After your study of this course you should be able to:

- describe the interactions between engineering and the environment, and how engineering knowledge and processes can fit into multidisciplinary approaches to environmental problems;
- assess the most common approaches in engineering and how these approaches can help in the development of environmental policy and management;
- discuss the values and beliefs that underlie the engineering approach to addressing environmental issues and assess the strengths and limitations of traditional and alternative engineering paradigms;
- discuss current engineering approaches to addressing environmental issues, including the ability to communicate effectively with those who are using them (in academic and practical settings);
- describe engineering aspects related to sustainable development, “developed and developing” countries, and trade and the global environment;
- propose a feasible role for engineering to help solve environmental problems in practical contexts.

### Major Topics

The course has been split into two main parts. Part A will introduce and explore the key engineering principles operating in a modern industrialised society such as Australia. This will be achieved by following the flows of materials and energy across society, from the extraction of resources, through various conversion processes and uses, to the management of wastes. Part B will explore a range of contexts in which environmental managers may encounter engineering principles, drawing on real-world case studies of engineering in practice. The course structure is as follows:

#### Introduction

- Unit 1 - What is engineering?

#### Part A - Go with the flow: Engineering principles for material and energy flows

- Unit 2 - Harnessing and extracting natural resources
- Unit 3 - Energy
- Unit 4 - Manufacturing, construction and trade
- Unit 5 - Waste management
- Unit 6 - Closing the loop: Sustainability and systems thinking

#### Part B - It’s all about context: Engineering in different environmental contexts

- Unit 7 - Transport and urban engineering
- Unit 8 - Climate change mitigation and adaptation
- Unit 9 - Environmental product design and innovation
- Unit 10 - Natural resource management
- Unit 11 - Engineering and development

#### Course review

- Unit 12 - Course summary and review
| Relationship to Other Courses within the MEM Program | This course is one of the six Fundamental Knowledge courses offered in the Master of Environmental Management program. The Fundamental Knowledge courses aim to help you develop basic ‘environmental literacy’ in key disciplinary areas. The MEM core courses focus on a critical appreciation of different frameworks for environmental management. The wide choice of electives enables you to design the program which best meets your needs.

An important aspect of the Fundamental Knowledge courses is that each will allow you to critically reflect on the contribution of a particular disciplinary arena – in this case, Engineering. |
## 4. Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Part</th>
<th>Unit</th>
<th>Unit Topic</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1</td>
<td>Introduction</td>
<td>Unit 1. What is Engineering?</td>
<td>By way of introduction, this unit will define engineering, provide the historical background for its emergence as a discipline and highlight the relationships between engineering, science, technology, innovation and management. The unit starts to explore the basic functions of engineering in relation to the environment and human appropriation of finite resources. The unit will introduce the concept of environmental stocks and flows and highlight the areas in which engineering plays a crucial role: resource extraction, energy, manufacturing and waste management.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 2</td>
<td>Part A - Go with the flow: Engineering principles for material and energy flows</td>
<td>Unit 2 - Harnessing and extracting natural resources</td>
<td>This unit will explore the key engineering processes and principles involved in the extraction of raw materials, the harnessing of the water cycle and the appropriation of biological productivity in order to meet human demands.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 3</td>
<td>Unit 3: Energy</td>
<td></td>
<td>This unit will explain the key principles involved in the conversion of energy into useful forms, such as electricity and transport fuels, along with the distribution of energy and maintenance of energy security.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 4</td>
<td>Unit 4 – Manufacturing, construction and trade</td>
<td></td>
<td>This unit will explore the industrial processes involved in the conversion and distribution of materials and energy in order to satisfy human demands. It will focus not only on the engineering processes involved in creating these products and services from basic resources but also the role of engineers in managing the environmental impacts of these processes.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 5</td>
<td>Unit 5 - Waste management</td>
<td></td>
<td>Possible topics (to be confirmed): How to manage landfill waste and material flows into landfill, how to manage landfill emissions, how to deal with regulatory challenges, how to treat food, organics and mixed waste streams, how to design resource recovery options etc.</td>
<td>Dr Stuart Dever</td>
</tr>
<tr>
<td>Week</td>
<td>Part</td>
<td>Unit</td>
<td>Unit Topic</td>
<td>Lecturer</td>
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<tr>
<td>Week 6</td>
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<td>Unit 6 – Closing the loop: Sustainability and systems thinking</td>
<td>This unit will revisit the key engineering principles and processes identified in the preceding four units according to a systems approach that attempts to close the loop between resource extraction and waste disposal. It will explore the role of engineers in pursuing sustainability, including through alternative paradigms such as ecological economics and natural capitalism.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 7</td>
<td>Part B - It's all about context: Engineering in different environmental contexts</td>
<td>Unit 7: Transport and urban engineering</td>
<td>This unit will highlight some of the key engineering challenges associated with the design of transport networks and urban infrastructure. This will include designing and managing transport systems for changing user needs, urban growth and consolidation, and the integration of transport, housing and commerce.</td>
<td>Dr Alex Baumber</td>
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<tr>
<td>Week 8</td>
<td></td>
<td>Unit 8: Climate change mitigation and adaptation</td>
<td>Engineering has an important role to play in the mitigation of human-induced climate change and the adaptation of society to its predicted impacts. This unit will mostly focus on the challenges involved in mitigating climate change through an increase in renewable energy and the adaptation of energy systems to a changed climate.</td>
<td>Dr Jenny Riesz</td>
</tr>
<tr>
<td>Week 9</td>
<td></td>
<td>Unit 9: Environmental product design and innovation</td>
<td>This unit will focus on design and production systems aimed at reducing environmental pressures associated with consumer goods, such as dematerialisation-decarbonisation, life-cycle planning, eco-industrial parks (&quot;industrial symbiosis&quot;) and design for the environment (&quot;eco-design&quot;). It will also expand on concepts introduced in Unit 6 (e.g. cradle-to-cradle design) by exploring specific technological case studies, including group presentations.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 10</td>
<td></td>
<td>Unit 10: Natural resource management</td>
<td>Engineering has played a major role in the conversion of natural environments to landscapes designed to maximise the delivery of human demands for food, water, timber and other outputs. While this has enhanced our ability to meet these growing demands, it has often led to a</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week</td>
<td>Part</td>
<td>Unit</td>
<td>Unit Topic</td>
<td>Lecturer</td>
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<td>loss of resilience and left landscapes susceptible to problems such as erosion, desertification and salinity. However, engineering also has an important role to play in the remediation of these problems.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 11</td>
<td></td>
<td>Unit 11: Engineering and development</td>
<td>This unit has a particular focus on the role of engineering in developing countries for the achievement of social development, poverty alleviation and public health goals. It focuses on the relationships between society and technology, exploring concepts such as technology transfer and appropriate technology through case studies covering energy, water and agriculture.</td>
<td>Dr Alex Baumber</td>
</tr>
<tr>
<td>Week 12</td>
<td>Course review</td>
<td>Unit 12: Course summary and review</td>
<td>We will review the main points from the preceding 11 units. We will discuss the role of engineering in environmental management in the light of the entire course. The aim is to re-evaluate the contribution that engineering can make, and has made, in managing environmental issues.</td>
<td>Dr Alex Baumber</td>
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</tbody>
</table>
### 5. Assessment Tasks and Feedback

<table>
<thead>
<tr>
<th>Task</th>
<th>Assessment Criteria</th>
<th>% of total</th>
<th>Date of Submission</th>
<th>Feedback</th>
</tr>
</thead>
</table>
| Participation  | **Campus students:**
Campus students will receive participation marks based on the following criteria:
- Attendance at weekly lectures/seminars (Wednesday 6-9pm)
- Intelligent input (quality is more important than quantity here) and questions in class                                                                                                                                                                                                                                                                                                                                 | 10%        | Campus students:    | Mark will be released with the release of final marks.                |
                  | **Distance students:**
Distance students are expected to make a contribution to the online discussion (one post per week at a very minimum). These contributions should extend the discussion by providing opinions on the topic, highlighting key points made in that week’s readings or lecture and drawing on personal experiences or relevant examples that add to the discussion. Discussion posts should not simply restate what someone else has said, although they may usefully rephrase what someone has said to draw out additional points that might otherwise have gone unnoticed. A discussion topic relating to the week’s unit will be posted following the lecture. Your response should draw upon the theoretical analyses developed in the readings and lectures and on your own professional and other experiences. Distance students’ participation marks will be based wholly on these weekly contributions. You will be assessed on:
- The promptness of your contributions (aim for an initial post by the Friday following each lecture)
- Your contribution to building the group discussion by drawing on other students’ posts
- Your ability to draw upon the theories presented in the course to develop your argument
- Your ability to draw upon examples or experiences to emphasise your points                                                                                                                                                                                                                                                                                                                                 |            | Distance students: | Every week from week 2 to week 11                                      |
<table>
<thead>
<tr>
<th>Task</th>
<th>Assessment Criteria</th>
<th>% of total</th>
<th>Date of Submission</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1: Weekly Reviews (individual assignment)</td>
<td>Campus and distance students:</td>
<td>30%</td>
<td>Campus and distance students:</td>
<td>Marked reviews will be returned one week after submission, during the following class (campus students) or sent by email (distance students)</td>
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<td></td>
<td>Length: No more than 500 words (should fit on one A4 page single-spaced with 12-point font). You must submit ten reviews throughout the course. Late summaries will be subject to a penalty of 5% per day. No review will be accepted more than a week late, without prior approval. The reviews will cover the essential reading(s) listed for each unit and available online through Moodle. The reviews must be completed prior to the lecture for that unit to ensure that students are adequately prepared to participate in the discussions around the topic that will take place in class (campus students) or online (distance students). The weekly reviews are designed to ensure that you cover key concepts at a regular pace throughout the course and that you exercise your analytical and synthesis skills. Your review should briefly summarise key arguments (half the page) and make a concise and critical commentary (half the page). Where relevant, you may cite additional material (e.g. additional readings on mooodle, as well as other articles, reports, websites etc.) and highlight links with previous units as we move further into the course.</td>
<td></td>
<td>By 6pm each Wednesday from week 2 to week 11 (i.e. the first one is due Wed 7 August and the last one is due Wed 16 October)</td>
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<td></td>
<td>Assessment criteria:</td>
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<td></td>
<td>• Summary - concise synthesis and explanation of the key concepts from the set readings</td>
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<td>• Critical thinking – analysis and interpretation of readings, highlighting the advantages and limitations of the approaches taken, as well as contrasts and connections between readings</td>
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<td>• Quality of writing – logically organised, clear in thought and argument</td>
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<td>• Compliance with word limit</td>
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<td></td>
<td>Submission:</td>
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<td></td>
<td>• Campus students: Hard copy to be handed in at the start of each lecture.</td>
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<td></td>
<td>• Distance students: Each review should be pasted into an email and sent to <a href="mailto:a.baumber@unsw.edu.au">a.baumber@unsw.edu.au</a>. NO ATTACHMENTS. The subject line should be “Family Name_Unit X_IEST7500” (with X being the relevant unit number)</td>
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<tr>
<td>Task</td>
<td>Assessment Criteria</td>
<td>% of total</td>
<td>Date of Submission</td>
<td>Feedback</td>
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<tr>
<td>Assignment 2: Group Assignment (seminar or online discussion facilitation)</td>
<td>Campus students: Group seminar&lt;br&gt;For this assignment you’ll be working in threes or fours (no more, no less). Your group will lead a seminar during one of the classes in weeks 7-11, on a case study related to the unit for that week. Your seminar should consist of a 20 minute presentation followed by another 20 minutes for a group discussion, role playing exercise, debate or other activity of your choosing. The overall time limit of 40 minutes must be strictly adhered to. Below are a number of potential case study topics for each unit. You may select your own topic, but you need to confirm it with Alex beforehand:&lt;br&gt;&lt;ul&gt;&lt;li&gt;Unit 7: Transport and urban engineering&lt;br&gt;  - Transit-oriented development&lt;br&gt;  - Personal rapid transit&lt;br&gt;  - Energy efficiency and generation in urban developments (e.g. tri-generation)&lt;/li&gt;&lt;li&gt;Unit 8: Climate change mitigation and adaptation&lt;br&gt;  - Deployment of a particular renewable energy option (e.g. solar PV, biofuels, wind)&lt;br&gt;  - Carbon capture and storage (geosequestration of CO$_2$ from coal-fired power plants)&lt;br&gt;  - Coastal protection versus “planned retreat” as adaptation strategies&lt;/li&gt;&lt;li&gt;Unit 9: Environmental product design and innovation&lt;br&gt;  - Nanotechnology&lt;br&gt;  - Genetic engineering&lt;br&gt;  - Robotics or biomechatronics (i.e. robotic extensions linked to the human nervous system)&lt;/li&gt;&lt;li&gt;Unit 10: Natural resource management&lt;br&gt;  - Rehabilitation or bioremediation (e.g. minesites, contaminated land, oil spills etc)&lt;br&gt;  - Water desalination&lt;br&gt;  - Coal seam gas&lt;/li&gt;&lt;li&gt;Unit 11: Engineering and development&lt;br&gt;  - Large dams in developing countries&lt;br&gt;  - Distributed energy solutions (e.g. solar PV, micro-hydro, biofuel generators)&lt;br&gt;  - Community-based clean drinking water solutions&lt;/li&gt;&lt;/ul&gt;&lt;br&gt;Your presentation should explain the basic functioning of your chosen technology/process, the relevant engineering principles and the problems it has been designed to solve. You may highlight examples of the technology in practice (or proposed applications). You are then expected to generate and facilitate a discussion on the potential opportunities that can emerge, the environmental and/or social impacts and uncertainties, the values and beliefs underlying the engineering approach, and the particular role for engineering and technology. Where possible, link your findings back to the content of the readings and previous lectures (you are not expected to cite the lecture given on the same night as your seminar).&lt;br&gt;&lt;br&gt;Each member of the group must participate, either in presenting or in facilitating the activities that will help establish the key points. Each group member will generally be given the same mark unless there are</td>
<td>30%</td>
<td>Campus students: During weeks 7-11 (groups and seminar dates will be finalised by week 5)</td>
<td>Marks and comments provided via email within one week of group seminar</td>
</tr>
<tr>
<td>Task</td>
<td>Assessment Criteria</td>
<td>% of total</td>
<td>Date of Submission</td>
<td>Feedback</td>
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| clear differences in presentation skills, level of preparation or depth of understanding. You are encouraged to be creative in the way in which you organise the group seminar, with class engagement and interaction to be a key focus. Powerpoint is a useful tool, but should be used only to aid the presentation, not as the primary focus of your seminar. Powerpoint slides and other visual aids used in these presentations will be posted online for the benefit of distance students. Assessment Criteria:  
• Understanding of the environmental concern to be addressed.  
• Identification of engineering approach and technologies involved.  
• Analysis of these in the broader environmental and social context.  
• Demonstrated teamwork.  
• Facilitation of discussion.  
| 30% | Distance students: During weeks 3-11 (groups and allocated weeks will be finalised by week 2) | Marks and comments provided via email within one week of completion of online facilitation task |

**Distance students: Online discussion facilitation in groups**

This assignment will generally be undertaken in pairs (singles or threes may be required depending on enrolments). The discussion leader(s) for a given week will be responsible for leading, encouraging and moderating a group discussion over the seven days following each lecture. As a discussion leader, you will be required to make the first posting by the Thursday of your allocated week (i.e. the day after the lecture for that unit). You will then need to lead the discussion over the following week, comment on the contributions of other distance students, and give some concluding remarks before the next lecture (i.e. discussion must be concluded by 6pm on the following Wednesday). All other distance students are required to make at least one posting each week at a very minimum (see participation mark above). Discussion leaders will generally have had little time to digest the lecture content for the unit at the time they commence their facilitation task. As such, the discussion should focus on the set readings for the week, along with additional material that the discussion leaders have chosen to explore. Later in the week’s discussion, the leaders should relate the issues being discussed back to the lecture material. The discussion leaders will need to decide how to divide up the facilitation responsibilities (e.g. dividing up the readings, dividing up the key issues or having one student take the lead in introducing the topic and the other in concluding it). Prior to commencing your discussion, you will need to provide Alex with a brief plan (1-page) detailing the division of responsibilities and the issues you plan to raise. Feedback can be provided on plans if they are received by the Friday prior to the start of the discussion. Assessment criteria  
• Organised approach to planning and executing the facilitation task (including submission of plan).  
• Sophisticated understanding of the issues, going beyond the weekly summaries.  
• Clear and concise introductory piece, summarising key issues and posing discussion questions.  
• Timely, appropriate and responsive comments that build on the points made by other students.  
• Succinct concluding remarks, including summary of the discussion over the week. |
<table>
<thead>
<tr>
<th>Task</th>
<th>Assessment Criteria</th>
<th>% of total</th>
<th>Date of Submission</th>
<th>Feedback</th>
</tr>
</thead>
</table>
| Assignment 3: Technology Assessment Report (individual assignment) | Campus and distance students:  
Length: 2,500-3000 words (no more, no less, excluding references)  
Submission: Pdf or word document e-mailed before or on the day to a.baumber@unsw.edu.au  
Technology Assessment (TA) was developed when it became clear that new technologies had a number of undesirable social, occupational, environmental, cultural, technical and economic side effects. In an attempt to avoid these consequences, technology users are now encouraged to systematically consider and weigh up the positive and negative effects of a new technology (or of a new application of an existing technology). Some resources on conducting a TA are provided in part 6 of this course outline, as well as on Moodle. In your report, you will need to address the following:  
• Choose a technology, product or infrastructure type. You may select one presented in the lectures or the readings, but you are expected to look, think and research well beyond the details provided. A TA is future-oriented and so there needs to be an aspect of novelty, either in the technology itself, or in its application/deployment. Campus students: you cannot choose the same technology that you covered in your group seminars.  
• Describe the technology, product or infrastructure type. Identify the goals it intends to satisfy. Characterise its operation and development. Be critical; don’t “sell” the technology.  
• Identify raw materials, land, energy, labour and capital required for the operation of the technology, as well as the wastes and any hazardous products generated during production, use and disposal. Assess information gaps and uncertainties.  
• Discuss known and potential social impacts or conflicts that emerge during production, use and disposal. Emphasise whether any of these impacts are unintended, indirect or delayed. Assess information gaps and uncertainties. Explore the risks into the future. Relate these issues back to the content of the lectures and the readings.  
• Consider alternatives that may achieve similar or even improved goals, but with lower environmental and/or social impacts. Describe possible social, economic, cultural and political influences on the process of technology selection and the engineering process. Assessment criteria  
• Demonstration of thorough and thoughtful research, with attention to referencing.  
• Comprehension of research materials and of issues, conflicts and the range of solutions, their strengths and weaknesses.  
• Comparative and critical analysis, with care to addressing essay topic.  
• Organisation of material so as to produce a clear, logical and sophisticated argument.  
• Clear, succinct and effective writing, good grammar and correct spelling. | 30% | Campus and distance students:  
Friday 1 November 2013 before 17:00 | Mark will be released with the release of final marks. Additional feedback will be sent through email. |
6. Additional Resources and Support

You will be required to read/download the essential readings for each of the units from Moodle. This will require a browser such as Firefox (15 and above), Safari (6 and above), Internet Explorer (9.0 and above) or Chrome (22 and above).

To login, go to: https://moodle.telt.unsw.edu.au

If you have trouble logging into Moodle, or you cannot see the course once you log in, please contact the IT Service Centre for assistance. If you have difficulty using the Moodle environment or tools, please visit http://teaching.unsw.edu.au/moodle-students or contact the IT Service Centre:

- Email: itservicecentre@unsw.edu.au
- Phone: +61 2 9385 1333

You will also need your z number and z pass to access a number of the readings via the UNSW library website.

**Unit 1. What is Engineering?**


**Unit 2. Harnessing and extracting natural resources**


**Unit 3: Energy**


**Unit 4 – Manufacturing, construction and trade**


**Unit 5: Waste management**

To be confirmed (check Moodle as the lecture date approaches)

**Unit 6 – Closing the loop: Sustainability and systems thinking**


### Unit 7: Transport and urban engineering


Leduc, Wouter R.W.A., Van Kann, Ferry M.G. Spatial planning based on urban energy harvesting toward productive urban regions. *Journal of Cleaner Production*, 2013, Vol.39, pp.180-190

### Unit 8: Climate change mitigation and adaptation


### Unit 9: Environmental Product Design and Innovation


### Unit 10 - Natural resource management


### Unit 11: Engineering and development


### Optional Readings

AEMO (2013). 100 per cent renewable study – Draft modelling outcomes. 


<table>
<thead>
<tr>
<th>Resources on how to conduct a Technology Assessment</th>
<th>There are different forms of TA that you may wish to draw on for Assignment 3, including:</th>
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<td>- Classical TA, which tends to be expert-driven;</td>
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<td>- Participatory TA, which seeks to engage a range of stakeholders; and</td>
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<td>- Discursive or Argumentative TA, which seeks to deepen the debate about technology</td>
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<td>and society.</td>
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For a basic overview of these different types of TA, see the following:

For the basic steps involved in undertaking a TA, see:


### 7. Administration Matters

| Expectations of Students | IEST7500 requires an average of 10 hours per week of study.  
There are three assignments:  
- 10 individual weekly reviews  
- An individual essay  
- A group seminar/online facilitation  
- Participation in class, or participation in online discussions for distance mode  
There is an attendance requirement of 80% of classes. Distance students must also make contributions to 80% of discussion posts in Moodle or they will be given a fail for that component. |
| Assignment Submissions | PLEASE NOTE:  
All work must be submitted by the due date.  
Late submissions will be penalised by loss of marks (5% per day). No weekly review will be accepted more than a week late, without prior approval.  
All extensions require a reasonable excuse (e.g. medical) and must be supported by documentation.  
On-line participation must be posted within one week after the lecture.  
Assignments must have on the title page a statement confirming that the work is that of the enrolled student and that any other sources of information used have been acknowledged. |
| Occupational Health and Safety¹ | Students should be aware of relevant UNSW Occupational Health and Safety policies [http://www.ohs.unsw.edu.au/](http://www.ohs.unsw.edu.au/) |
| Assessment Procedures | Assignments should be submitted by the due date. In the event of illness or misadventure causing late submission, students must produce a medical certificate or provide evidence of misadventure, or face penalty. Failure to submit by the due date will attract a penalty of 5% per day late. |
| Equity and Diversity | Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or [http://www.studentequity.unsw.edu.au/](http://www.studentequity.unsw.edu.au/)).  
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. |
| Student Complaint Procedure³ | Dr Daniel Robinson  
MEM Coordinator  
IES  
d.robinson@unsw.edu.au  
Tel: 9385 9809  
A/Prof Julian Cox  
Associate Dean (Education)  
julian.cox@unsw.edu.au  
Tel: 9385 8574  
or  
Dr Gavin Edwards  
Associate Dean (Undergraduate Programs)  
g.edwards@unsw.edu.au  
Tel: 9385 4652  
Student Conduct and Appeals Officer (SCAO) within the Office of the Pro-Vice-Chancellor (Students) and Registrar.  
studentcomplaints@unsw.edu.au  
Telephone 02 9385 8515  
University Counselling and Psychological Services⁴  
Tel: 9385 5418 |

¹UNSW OHS Home page  
²UNSW Assessment Policy  
³UNSW Student Complaint Procedure  
⁴University Counselling and Psychological Services
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

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