Business and Engineering Asset Management
Unit Outline

Engineering Asset Management & Risk
ASST8422
Credit: 6 points
Trimester 2
2011
Crawley campus

Dr. Melinda Hodkiewicz
http://units.handbooks.uwa.edu.au/units/asst/asst8422
# Contents

## UNIT DESCRIPTION
- Introduction 2
- Learning outcomes 2
- Educational Principles 2

## CONTACT DETAILS & DATES
- 4

## UNIT CONTENT
- 3

## TEACHING AND LEARNING RESPONSIBILITIES
- 4
  - Teaching and learning strategies 4
  - Charter of student rights 6
  - Student Guild contact details 6
  - Use of student feedback 6

## ASSESSMENT MECHANISM
- 6
  - Assessment mechanism summary 6
  - Assessment details 7
  - Assessment practices and procedures policy 9
  - Ethical Scholarship, Academic Literacy and Academic Misconduct 9
  - Appeals Against Academic Assessment 9

## THE UNIVERSITY POLICY ON SPECIAL CONSIDERATION
- 9

## TEXTBOOK(S) & RESOURCES
- 9
  - Unit Website 9
  - Recommended/Required Text(s) 9
  - Additional/Suggested/Alternate Text books/ Standards 10
  - Technical requirements 10
  - Software requirements 10
  - Additional resources & reading material 10
UNIT DESCRIPTION

Introduction

Welcome to the Engineering Asset Management and Risk unit (EAM&R). The emphasis of EAM is on achieving sustainable business outcomes and competitive advantage by applying holistic, systematic and risk-based processes to decisions concerning the physical assets of an organisation. In this unit we will formalize and extend our understanding of the field, learn from peers and industry experts about processes and practices in EAM in a range of industries, and develop the confidence and competence to take on asset management leadership roles in our organizations. The unit coordinator is Dr. Melinda Hodkiewicz, Discipline Group leader for Engineering Asset Management at UWA.

Learning outcomes

On completion of this unit, you should be able to

- Explain how asset management policy and strategy supports your organisation's business goals,
- Deploy the processes and tools that support the asset management function,
- Identify and assess risks to asset function and articulate the consequences of asset functional failure on the business,
- Use appropriate valuation methods to assess asset-oriented projects,
- Develop a business case that clearly presents the costs/ benefits and risks of a proposed solution to improve asset management effectiveness.

Educational Principles

The unit integrates your background and work experience into the teaching programme and assignments to enhance the context and relevance of the material to your work situation. Delivery of material will be achieved using guided readings, topic notes and web-supported lectures. Much of our on-campus time will be spent in workshops on case studies, discussing and applying concepts.

The material in the workshops is adapted from and consistent with the British Standard for Asset Management (PAS55), the International Infrastructure Asset Management Manual (IIMM) and other internationally recognised material. This unit concentrates on developing a clear understanding of the components of an AM program and the ability to value and prioritise projects to improve asset management outcomes. Other engineering units in the EAM postgraduate program http://www.mech.uwa.edu.au/meam/ concentrate on developing and implementing operational and maintenance strategies, disposal/renewal decision making, and reliability-availability-maintainability assessment techniques. Risk management, stakeholder management, asset information location and data management themes are embedded through all of the engineering (ASST) units in the Masters program. Organisational, leadership, financial and management issues are covered in the MBA (MGMT) units.
# UNIT CONTENT

**Workshop 1 of 3**  
June 8 – 10th 2011 (Wk3)

<table>
<thead>
<tr>
<th>DAY 1</th>
<th>DAY 2</th>
<th>DAY 3</th>
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<tbody>
<tr>
<td>AM Theory &amp; Principles</td>
<td>Levels of Service</td>
<td>Life cycle assessment</td>
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<table>
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<tr>
<th>SESSION 1.1</th>
<th>Reflection</th>
<th>Reflection</th>
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<tbody>
<tr>
<td>Welcome to the Program</td>
<td>8.45 – 9.30</td>
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<tr>
<th>SESSION 1.2</th>
<th>SESSION 2.1</th>
<th>SESSION 3.1</th>
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<tbody>
<tr>
<td>Asset Management: The what, the why and the how? Organisational strategic plan &amp; business needs</td>
<td>Levels of service, performance and condition assessment</td>
<td>Net present value and valuing AM improvement projects</td>
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<td>9.30 – 12.00</td>
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**LUNCH 12.00pm**

<table>
<thead>
<tr>
<th>SESSION 1.3</th>
<th>SESSION 2.2</th>
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<tbody>
<tr>
<td>AM Policy and Strategy</td>
<td>Business Cases for AM Improvement projects</td>
<td>Life cycle concepts and costing</td>
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<tr>
<td>12.45-3.45</td>
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<tbody>
<tr>
<td>Work on Assignments</td>
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<tr>
<td>3.45 – 4.30</td>
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**Workshop 2 of 3**  
June 22 – 24th 2011 (Wk5)

<table>
<thead>
<tr>
<th>DAY 4</th>
<th>DAY 5</th>
<th>DAY 6</th>
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<tr>
<td>Risk</td>
<td>AM Plans</td>
<td>Developing competency</td>
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<table>
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<th>Reflection</th>
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<th>SESSION 4.1</th>
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<tbody>
<tr>
<td>Risk Management</td>
<td>Asset data management, confidence and use</td>
<td>Individual AM competency development</td>
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<tr>
<td>9.00 – 12.00</td>
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**LUNCH 12.00pm**

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<tr>
<th>SESSION 4.2</th>
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<tbody>
<tr>
<td>Asset risk assessment</td>
<td>Asset management plans</td>
<td>Organisational structures and responsibilities</td>
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<tr>
<td>12.45-3.00</td>
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<th>SESSION 4.3</th>
<th>SESSION 5.3</th>
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<tbody>
<tr>
<td>Presentation for Assignment 3 project brief</td>
<td>Work on Assignments</td>
<td>Discuss Assignments</td>
</tr>
<tr>
<td>3.00-4.30</td>
<td>1.30 – 4.30</td>
<td>3.45-4.30</td>
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CONTACT DETAILS & DATES

Unit coordinator: Dr. Melinda Hodkiewicz  
Email: Melinda.hodkiewicz@uwa.edu.au  
Phone: 08 6488 7911  
Fax: 08 6488 1024  
Consultation Hours: By appointment  
Lecture Dates & Times: 3 Workshops – 8 days total. 8:00 am – 4:00 pm  
Indicative dates, to be confirmed 8-10th June & 22-24th June & 13-15th July.  
Lecture Venue: UWA  

TEACHING AND LEARNING RESPONSIBILITIES

Teaching and learning strategies

Engineering Asset Management is a broad field and our approach will be guided by our individual experiences and the industries we have all worked in. We have much we can learn from each other about the different approaches to asset management, what works and what does not, and why. Open and robust discussion with our peers, the opportunity to formulate and articulate our own views and listen carefully to the views of others is an integral part of this unit. As an aid to class discussion, the topic notes contain ‘questions’ or ‘class discussion’ for you to consider and prepare for before the class. Please give these plenty of thought and time as they provide opportunity for you to consider what the subject means in the context of your business and experience and also to articulate the outcomes to your peers.

This Unit uses a variety of learning strategies including:
- Case studies
- Class discussion & debate
- Lectures
Through these case studies, class discussions and assignments you will have the opportunity to demonstrate dimensions of successful asset management practice as identified in PAS 55\(^1\), in particular we want you to ask yourself "Is what I am proposing for this asset or asset management function holistic, systematic, systemic, risk-based, optimal and sustainable?"

**Holistic**: Does the decision consider all aspects of the asset not just technical issues?
**Systematic**: Have I used a methodical approach providing a clear and justifiable audit trail?
**Systemic**: Have I considered the assets as a system and optimised for the system rather than the individual asset in isolation?
**Risk-based**: Are the priorities appropriate to the identified risks and associated cost/benefits?
**Optimal**: Is the solution the optimum compromise between competing factors such as performance, cost and risk, associated with the asset over its life cycle
**Sustainable**: Have I considered the potential impact to the organization over the short and long term?

Participation in debate is a vital part of the adult learning process. For this reason the Engineering Asset Management unit is not offered in distance-learning mode. It is, therefore, important that you attend classes on campus. More formally, the University regulations state that ‘to complete a course or unit, students shall attend prescribed classes, lectures, seminars and tutorials’. Students should not expect to obtain approval to miss any days of the workshops, unless there are exceptional circumstances.

During the unit you may have the opportunity to hear from and discuss material with a small number of external subject matter experts (SMEs). Some of the activities they may be involved in are: pre-recorded lectures, delivering in-class case studies and lectures, feedback on presentations and group activities. These SMEs are carefully selected based on their experience in the field, educational background and their demonstrated commitment to the development of this and other postgraduate units at UWA. In general the SME’s all hold adjunct or honorary positions in the UWA’s Faculty of Engineering Computing and Mathematics and have formal postgraduate qualifications. SME’s are not involved in the formal assessment processes which are conducted by the academic staff.

The principal academic staff member involved is the author of this outline, Dr. Melinda Hodkiewicz. I am supported by Dr. Kecheng Shen who coordinates the Reliability units that complement this unit. I have a BA(Hons) Metallurgy and Science of Materials, Oxford University; PhD(Mechanical Engineering) UWA; C.Eng Chartered Engineer (UK); CMRP, Certified Maintenance and Reliability Professional; MIMMM, Member of Institute of Materials, Minerals and Mining (UK).

As the Discipline Group Leader I am responsible for the postgraduate program in Business & EAM; this program is a joint initiative between the Faculty of Engineering, Computing and Mathematics and the Business School. I chair the Standards Australia MB19 committee for Asset Management, sit on the Research Committee of the national CRC Mining, lead the academic part of the Rio Tinto Asset Management Professional Development Program (mining) and other executive programs, work with state and

infrastructure organisations and supervise a number of other industry-funded research and education projects.

My responsibilities are:
- To guide you through the unit material by facilitating classroom discussions and activities.
- To coordinate external subject matter experts.
- To provide examples and anecdotes linking text material to real-world situations.
- To create a safe learning environment that encourages participation and interaction.

Your responsibilities are:
- To read the required readings and complete tutorial work before coming to class.
- To actively participate in class discussions.
- To complete all assignments on time.
- To respect all comments from others during class

Charter of student rights

This Charter of Student Rights and Responsibilities upholds the fundamental rights of students who undertake their education at the University of Western Australia.

It recognises that excellence in teaching and learning requires students to be active participants in their educational experience. It upholds the ethos that in addition to the University's role of awarding formal academic qualifications to students, the University must strive to instil in all students independent scholarly learning, critical judgement, academic integrity and ethical sensitivity.

Please refer to the guild website the full charter of student rights, located at http://www.secretariat.uwa.edu.au/home/policies/charter

Student Guild contact details

The University of Western Australia Student Guild
35 Stirling Highway
Crawley WA 6009
Phone: (+61 8) 6488 2295
Facsimile: (+61 8) 6488 1041
E-mail: enquiries@guild.uwa.edu.au
Website: http://www.guild.uwa.edu.au

Use of student feedback

All units are routinely evaluated, through the SPOT and SURF surveys, and feedback from participants is taken into account when I reflect on and update the unit. I welcome your comments and feedback on the content, relevance, presentation and methods of assessment for the unit.

ASSESSMENT MECHANISM

Assessment mechanism summary

There are a number of reasons for having assessable tasks as part of an academic program. The assessable tasks are designed to encourage you to explore and understand the subject more fully. Each assignment has a set of specific learning objectives and a task description against which the work is assessed. Students are encouraged to read the University’s policy on assessment:

Assessment dates will be announced in 2011. In general prospective students should expect an assessment schedule similar to that shown below.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight*</th>
<th>Due Date</th>
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<tbody>
<tr>
<td>Assignment 1 NPV/ LCC</td>
<td>20%</td>
<td>June 19th (End of Wk4)</td>
</tr>
<tr>
<td>Assignment 2 – Organisational AM maturity assessment and strategy development</td>
<td>20%</td>
<td>July 3rd (End of Wk 6th)</td>
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<tr>
<td>Assignment 3 – Business case for asset management improvement plan</td>
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<tr>
<td>Project brief</td>
<td>10%</td>
<td>June 13th (Start of Wk 4)</td>
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<tr>
<td>Presentation</td>
<td>10%</td>
<td>July 15th (Wk 8)</td>
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<tr>
<td>Written Case</td>
<td>20%</td>
<td>August 8th (Wk 12)</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
<td>July 14th (Wk 8)</td>
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Supplementary exams are not available in this unit.

**Assessment details**

**Assignment 1 – LCC and NPV calculations**

The purpose of Assignment 1 is to assess your ability to:

- Perform NPV calculations
- Develop a life cycle cost profile based on parametric and escalated cost approaches
- Determine when to replace assets using EAC approach
- Make recommendations based on LCC data

**Assignment 2 - Defining the role of Asset Management**

The purpose of Assignment 2 is to assess your ability to:

- Assess the current state of asset management maturity in an organisation using a survey tool,
- Identify the main areas that management should concentrate on,
- Develop a strategy statement to achieve specific AM goals, and
- Explain how the proposed asset management strategy supports business goals.

**Assignment 3 – Business Case for an asset management improvement project**

The purpose of this individual assignment is to assess your ability to:

- Identify and evaluate risks for an asset management improvement project evaluation
• Develop and present a business case that comprehensively covers the costs/benefits and risks of proposed solution and demonstrates how this is aligned with the objectives of the organization.

• Identify and critically assess metrics for analysis of both historical data and for project benefit tracking.

• Identify stakeholders, articulate the effects of stakeholders on project and develop appropriate stakeholder management plans

Assignment 3 involves the development and presentation of well researched and clearly articulated business case for an asset management improvement project. Presentation of the business case involves a written report and a verbal presentation to the class.

**Final exam** - The purpose of the test is to evaluate your understanding of the knowledge you have acquired during the EAM&R unit and your ability to apply that knowledge. It will be an open book exam. The test is of 3 hours duration.

**Submission of Assignments** - Assignments should be submitted by e-mail by 9:00 pm on the nominated date. You are expected to observe the due dates for assignments. Extensions will only be given in extenuating circumstances. Please note that the pressure of work commitments is not generally considered to be extenuating circumstances. Late assignments will attract a penalty of 5% per day. This penalty will be waived by the lecturer only in exceptional circumstances. No marks will be awarded to assignments submitted after other students in the class have had their assignments returned.

Assignment feedback will be returned by one of the following methods (1) in class (2) by e-mail. It is the intention that the marked assignments will be returned within two weeks of submission.

**Guidelines for Assignments**

Learning outcomes: Note the learning outcomes for the assignment. Take care to demonstrate achievement of these learning outcomes in your report/article as this influences the overall assessment grade.

References: It is important to demonstrate evidence of wide reading and research in your assignments. An excellent paper/report will be based on reference to relevant materials. It will draw on both the academic and practitioner literature to substantiate the discussion. The in-text references and list should be in accordance with the Harvard Style and include only those references referred to in the body of the essay. References that you have read during the course of your research but do not cite in your report/presentation should not be included. Sources of diagrams and direct quotes should be page referenced and cited accordingly.

Writing Style: You are expected to adopt a writing style that is appropriate to technical academic writing and professional communication. Avoid long sections of text. Please note that the emphasis is on using your own words rather than the extensive use of quotes in written essays. Direct quotes should be used sparingly and only in certain circumstances such as when defining key constructs/terms, conveying a difficult concept that might be misinterpreted if the author’s original words are not used, or for literary effect. Edit your work carefully for errors in grammar, spelling and punctuation and be precise in your choice of words and expression of ideas. All tables and figures should have a number and title.
Assessment practices and procedures policy

Students are encouraged to read the University’s policy on assessment:

Ethical Scholarship, Academic Literacy and Academic Misconduct

Refer to the Ethical Scholarship, Academic Literacy and Academic Misconduct and individual Faculty policies. For further information on the rules and procedures in respect of appropriate academic conduct you should visit:
http://www.teachingandlearning.uwa.edu.au/tl4/for_uwa_staff/policies/student_related_policies/academic_conduct

Appeals Against Academic Assessment

The University regulations relating to appeals and the form on which the appeal should be lodged can be found at

THE UNIVERSITY POLICY ON SPECIAL CONSIDERATION

The university policy on special consideration has been altered so that from now on applications for consideration, deferral of tests or exams or extensions of time for assignments on medical, personal or other grounds must be lodged with the faculty office no later than three working days after the due date for the assessment in question. This rule will apply to all students, except in exceptional circumstances (‘exceptional’ does mean ‘exceptional’, not ‘just didn’t have time to get around to it’).

Communicated by the Associate Dean (Students), Faculty of Engineering, Computing and Mathematics, on February 16, 2009.

TEXTBOOK(S) & RESOURCES

Unit Website

There is a unit web site on Web CT http://webct6.uwa.edu.au/
Course Material on-line: please visit UWA’s library

Recommended/Required Text(s)

- AS IEC 60812-2008 Analysis techniques for system reliability – Procedure for failure mode and effects analysis, AS IEC 60812, Standards Australia
The Australian Standards are available electronically through the UWA library.

**Additional/Suggested/Alternate Text books/ Standards**

- Standards Australia 2003 ‘Dependability management Part 3.1: Application guide – Analysis techniques for dependability – Guide on methodology, AS IEC 60300.3.1

Many relevant books and journal or conference papers are available on-line through the Library and the Super Search facility. Papers identified in the topic notes should be available through the Course Materials web page accessed at [http://cmo.library.uwa.edu.au/rmls/](http://cmo.library.uwa.edu.au/rmls/)

**Technical requirements**

The University only permits the use of calculators in examinations when the calculator has an approved sticker. If the student does not have an approved sticker on their calculator, they will not be permitted to use the calculator. Since this is a University wide policy it is not possible for unit coordinator to grant on the spot exemptions.

**Software requirements**

You will need access to a web-linked PC and know how to access recommended reading and other materials on the web and from the University Library system, be able to access WebCT, and have an active email address.

You must be competent in the use of word processing packages such as Word, and PowerPoint. We use Excel a lot and you must be a competent user of this software for data analysis, graphing and simple modelling. You must There are no specialist software requirements.

**Additional resources & reading material**

There are many journal and conference papers that are relevant to this unit. The list is extensive so is not provided here. Please refer to the Course Materials Online web site.