



Business and Engineering Asset Management Unit Outline

Engineering Asset Management & Risk

ASST8422

Credit: 6 points

**Trimester 2
2009**

Crawley campus

Dr. Melinda Hodkiewicz

<http://units.handbooks.uwa.edu.au/units/asst/asst8422>

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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.

Unit content

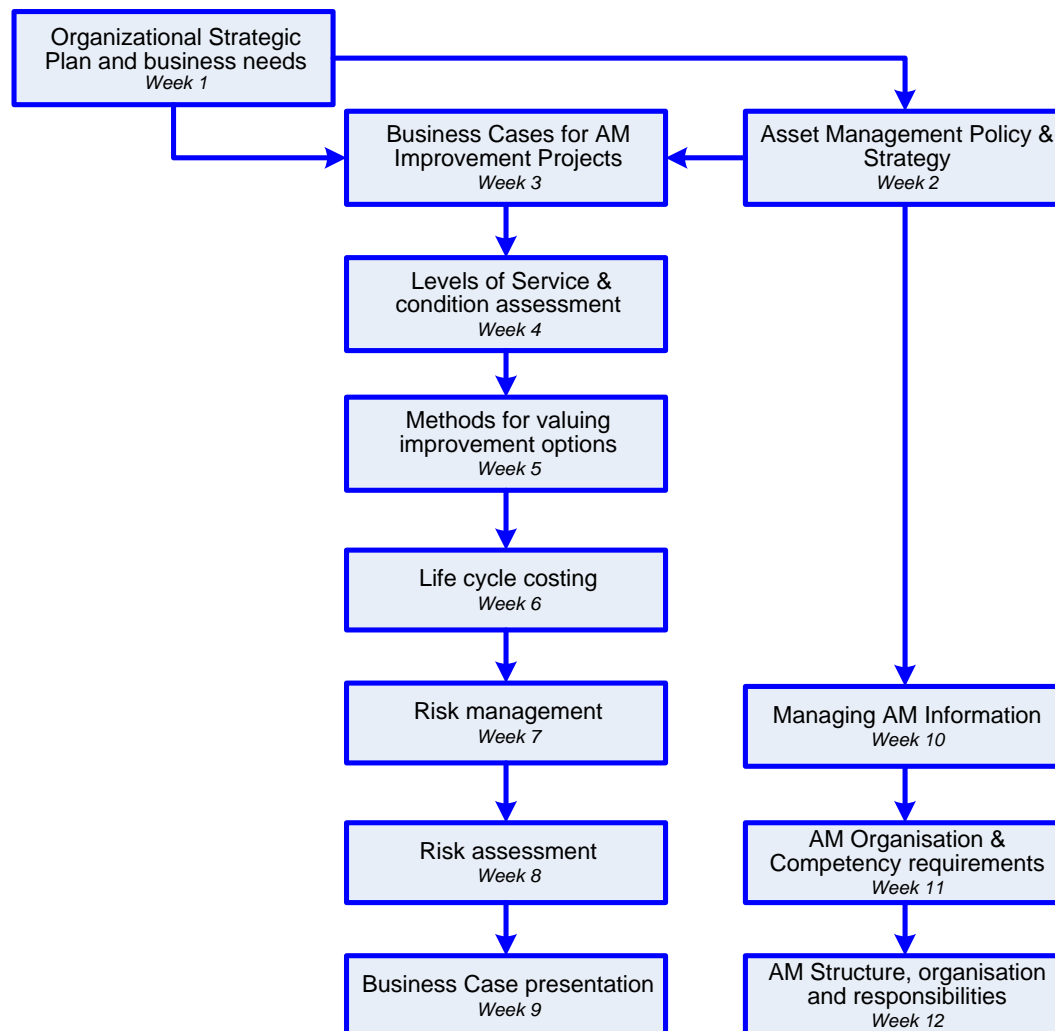


Figure 1: Topic Road Map

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

CONTACT DETAILS

Unit coordinator	Dr. Melinda Hodkiewicz
Email	Melinda.hodkiewicz@uwa.edu.au
Phone	08 6488 7911
Fax	08 6488 1024
Consultation Hours	By appointment
Lecture Times	6-9 pm Monday evenings
Lecture Venue	Room 1.05 1 st floor Mechanical Engineering building
Unit Web Site	Web CT: http://webct6.uwa.edu.au/

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 course. 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
- Pre-recorded lectures by Subject Matter Experts
- Independent study

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 55¹, 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 more than two classes per unit, unless there are exceptional circumstances.

During the course you will also 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

¹ British Standards Institution. PAS 55-2 Asset Management Part 2: Guidelines for the application of PAS 55-1. 2004. ISBN 0-580-42766-8.

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 course. 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 sit on the Research Committee of the national CRC for Engineering Asset Management (CIEAM), coordinate asset management activities in the facilities program for WA:ERA (Oil & Gas), lead the academic part of the Rio Tinto Asset Management Professional Development Program (mining), 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 course 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:

http://www.teachingandlearning.uwa.edu.au/tl4/for_uwa_staff/policies/teaching,_learning_and_assessment.

Component	Weight*	Due Date
Class participation	10%	Throughout trimester
Assignment 1 – Role of Asset management	15%	Week 4 (8 th June)
Assignment 2 – Business case for asset management improvement plan		
Project brief	5%	Week 5 (15 th June)
Presentation	10%	Week 9 (13 th July)
Written Case	20%	Week 11 (27 th July)
Mini-assignments		
Feedback on Wk3 Business case	5%	Week 5 (15 th June)
NPV/ LCC assignment questions	10%	Week 7 (29 th June)
Crist risk review	5%	Week 8 (6 th July)
AM Competence self assessment	5%	Pre-Week 11 (by cob 12 th July)
Final Exam	15%	Exam week starts 10 Aug

Supplementary exams are not available in this unit.

Assessment details

Assignment 1 - Defining the role of Asset Management

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

- Understand and explain how organizational asset management strategies support business goals.
- Articulate your organisation's business goals.
- Locate and utilize a range of information sources to research asset management issues.
- Deliver an informative, engaging and well-written article that clearly expresses your views to the target audience.

This individual assignment assumes that you have been asked to write an article for your organization's internal magazine or a relevant trade publication. The title of the article is *"What is engineering asset management and why is it important to the organization?"*

Your article should be presented in essay style and include the points listed below. You should refer to relevant, current literature and, wherever possible, use examples cited in course materials and from your reading. Ensure that your opinions and assertions are substantiated with evidence from readings, literature, models, and other forms of literature. The word limit for this article is strictly 1,500 words. This word limit does not include figure captions and the bibliography.

Assignment 2 – 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 1 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.

Mini-assignments – The weekly topics may have associated questions (mini-assignments) involving written work or numerical problems. The written work involves application of concepts and processes discussed in class or available from reading materials to your work situation. Some of these mini-assignments will be for formative assessment. This gives you feedback on your work without involving formal grading. Other parts of the written or presentation mini-assignments will count as summative assessment; these will be assessed using the 'Standard of Assessment' criteria. Grading for numerical problems will involve assessment of appropriate process or calculation method, proficiency in use of the method and assessment of validity of result.

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 or in class on the due date and time. You are expected to observe the due dates for assignments. Remember to keep an electronic copy of any work you submit. 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. Papers of excessive length will also attract a penalty. Assignments with a specified word limit that are more than 10% over length (i.e. 150 words for a 1500 word essay) will be penalised 10% for each 100 words over the word limit. Assignments 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 for major assignments and one week for the mini-assignments.

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. 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:

http://www.teachingandlearning.uwa.edu.au/tl4/for_uwa_staff/policies/teaching_learning_and_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

<http://www.secretariat.uwa.edu.au/home/policies/appeals>

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/NZS 4360 Risk Management*, AS/NZS: 2004a, Standards Australia.
- *HB436 Risk Management Guidelines*, AS/NZS:2004b, Standards Australia.
- *AS 4536 Life cycle costing – an application guide*, AS/NZS:1999, Standards Australia.
- Cameron, I. & Raman, R. 2005, '*Process Systems Risk Management*', Elsevier Academic Press. ISBN 0-12-156932-2.
- Blanchard, B.S. & Fabrycky, W.J. 2006, '*Systems Engineering and Analysis*' Prentice Hall International Series in Industrial and Systems Engineering. ISBN 0-130186977-9.

The Australian Standards are available electronically through the UWA library.

Additional/Suggested/Alternate Text books/ Standards

- British Standards Institution. *PAS 55-1 Asset Management Part 1: Specification for the optimized management of physical infrastructure assets*. 2008. ISBN 978-0-580-50975-9.
- British Standards Institution. *PAS 55-2 Asset Management Part 2: Guidelines for the application of PAS 55-1*. 2008. ISBN 978-0-580-50976-6.
- Institute of Public Works Engineering of Australia. *International Infrastructure Management Manual* Version 2.0 2004 or Version 3.0, 2006. ISBN 0-473-10685-X.
- Standards Australia 2003 'Dependability management Part 3.1: Application guide – Analysis techniques for dependability – Guide on methodology, AS IEC 60300.3.1
- Standards Australia 2005 'Dependability management Part 3.14: Application guide – Maintenance and maintenance support, AS IEC 60300.3.14
- Standards Australia. 60300 Dependability Management Part 3.3 Application Guide – Life Cycle Costing, AS IEC 60300:2005
- Kaplan, RS. & Norton, DP.1996, 'The Balanced Scorecard' Harvard Business School Press.

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/rfms/>

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, be able to use word processing, PowerPoint and Excel software, know how to access recommended reading and other materials on the web and from the University Library system, access WebCT, and have an active email address. There are no specialist software requirements.

Additional resources & reading material

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

UNIT STRUCTURE

Week	Date	Topic
0	9 May	Orientation week for new students
1	18 May	Organisational Strategic Plan & Business needs Learning outcomes <ul style="list-style-type: none"> • Describe the scope and interfaces of AM. • Articulate the role of AM in delivering business outcomes. • Identify stages in the journey towards AM Excellence and describe common challenges and success factors. • Locate resources on AM.
2	25 May	Asset management Policy and Strategy Learning outcomes <ul style="list-style-type: none"> • Understand key stages in AM Strategy development • Develop AM Objectives aligned with AM Policy and the Organisational Strategic Plan. • Identify stakeholders for AM.
3	1 June	Business Cases for AM Improvement projects Learning outcomes: <ul style="list-style-type: none"> • Critically assess a business case and provide constructive feedback • Develop and apply decision criteria and evaluate alternatives using optioneering methods to identify a preferred option. • Select a suitable example for development of a robust, risk-assessed business case
4	8 June	Establish Levels of Service and condition assessment Learning outcomes: <ul style="list-style-type: none"> • Define level of service requirements • Identify and define performance criteria that are relevant and measurable. • Review a levels of service report and identify strengths and opportunities • Identify the how, what, when, why of data collection for condition and performance assessment.
5	15 June	Net Present value Learning outcomes: <ul style="list-style-type: none"> • Calculate NPV, IRR, EAC and payback. • Identify non-cash benefits • Describe the expected value, costs and assumptions of the base case and proposed solution in your Assignment 1 Business case.
6	22 June	Life Cycle Costing Learning outcomes: <ul style="list-style-type: none"> • Competence in calculating asset life cycle costs. • Use life cycle costing methods in decision making • Discuss management of uncertainty in LCC models

7	29 Jun	<p>Risk management process</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> • Understand core risk management concepts as defined in AS 4360:2004. • Establish the context for an asset risk assessment • Utilise the social and technical dimensions of risk as it applies to Asset Management.
8	6 July	<p>Risk assessment</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> • Familiarity with the range of potential tools to identify and assess risks. • Identify, assess and evaluate risks for your Assignment 1 Business Case • Recommend and justify appropriate risk control measures
9	13 July	<p>Business case presentation</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> • Ability to present a business case effectively. • Able to give and receive feedback and communicate effectively.
10	20 July	<p>AM Information System</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> • Describe the attributes of the Information System tools commonly used in organisations to support AM processes. • Explain basic concepts of the asset register • Identify the data and knowledge requirements to support AM Strategy development, implementation and evaluation.
11	27 July	<p>AM Organisation and Competency Development</p> <p>Learning outcome:</p> <ul style="list-style-type: none"> • Develop roles and responsibilities for members of the AM Team. • Identify competency requirements aligned with delivery of AM Team objectives. • Assess competency levels against requirements and create development plans.
12	3 August	<p>AM Structure, responsibilities & governance</p> <p>Learning outcomes:</p> <ul style="list-style-type: none"> • Identify work necessary to develop an AM system • Develop a structure to support the AM system • Discuss governance of the asset management system versus ownership of the assets.