## CONTENTS

1. INFORMATION ABOUT THE COURSE ...........................................................................................................2
2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES .........................................................3
3. REFERENCE RESOURCES .........................................................................................................................4
4. COURSE CONTENT AND LEARNING ACTIVITIES ....................................................................................6
5. COURSE ASSESSMENT ..............................................................................................................................7
6. ASSESSMENT CRITERIA .............................................................................................................................7
7. STUDYING A UG COURSE IN MINING ENGINEERING AT UNSW .........................................................8

---

Document Management:
**Filename:** CourseOutline_MINE 4610_S1_2016_V2  
**Date last update:** 4 Mar 2016  
**Changes made by:** P Knights  
**Revision number:** V2
1. INFORMATION ABOUT THE COURSE

<table>
<thead>
<tr>
<th>Course Code:</th>
<th>MINE4610</th>
<th>Semester:</th>
<th>S1, 2016</th>
<th>Level:</th>
<th>UG</th>
<th>Units/Credits</th>
<th>6 UOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Name:</td>
<td>Mine Asset Management and Services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Convenor:</th>
<th>Prof Peter Knights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact Details</td>
<td>School of Engineering University of Queensland</td>
</tr>
<tr>
<td>EMAIL:</td>
<td><a href="mailto:p.knights@uq.edu.au">p.knights@uq.edu.au</a></td>
</tr>
<tr>
<td>Phone:</td>
<td>+61 7 3346 5620</td>
</tr>
<tr>
<td>Contact times</td>
<td>Contact times are scheduled for: Monday 3:00pm – 5:00pm, Quadrangle G45</td>
</tr>
</tbody>
</table>

1.1. Course Description

This course comprises two separate components. Asset management and Mine services. Asset management occupies the first 7 weeks of the course. The remaining 5 weeks covers the area of Mine Services. In 2014 the mining service lectures were completely revised with the assistance of SKM (now part of Jacobs Engineering). It is planned than these lectures will cover the services component of this course.

The anticipated topics covered will be:

- Mine Winders
- Electrical distribution systems
- Pumping
- Belt Conveyors

The assets component of this course covers the principles of maintenance of mining equipment and the design and operation of mine services. It covers the design of maintenance systems, including preventive, predictive, proactive and corrective maintenance methods, as well as basic reliability theory and models for optimising maintenance decisions.

1.2. Course Completion

Course completion requires:

- submission of all assessment items; failure to submit all assessment items will result in the award of an Unsatisfactory Failure (UF) grade for the Course.

1.3. Assumed Knowledge

This course assumes that students have a good understanding of mining terms and descriptions, have been exposed to surface and underground mining methods and are familiar with mining development, operations and production. This course assumes that students have some understanding of fundamentals of project evaluation, physics and material properties. The course also requires completion of the Mining Systems course.
2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

2.1. Course Aims

After successfully completing this course you should be able to:

- (Reliability engineering) Distinguish between functions, functional failures and failure modes. Be familiar with basic reliability analysis, equipment performance indices and improvement methods.
- (Maintenance management) Ability to design and implement maintenance support systems for engineering assets, including specifying preventive, predictive, proactive and corrective tasks within an overall maintenance strategy.
- Mine Services - Be familiar with mine winder, materials handling, electrical distribution fundamentals, and mine dewatering principles.

2.2. Learning Outcomes

After completing this course, it is intended that the students will be able to:

1. appreciate the value of maintenance as a profit driver and not solely as a cost centre
2. identify the life cycle stages of mining equipment and related management processes
3. Identify the role of maintenance planning and scheduling to quantify demand for maintenance resources and allocate these resources
4. Identify the principle maintenance strategies and appreciate the importance of applying proactive strategies.
5. identify the principle condition-based maintenance strategies used in the mining industry and critically evaluate their applicability to mining equipment
6. describe and define key maintenance performance indices, and appreciate the impact these have on mining operations
7. apply basic reliability theory to practical mining examples, including failure rates and how these dictate maintenance tactics
8. assess in-house versus contractor approaches to delivering maintenance services
9. Identify the principles of electrical power distribution, water management, compressed air, hydraulic and communication systems and associated management strategies and hazards.
10. apply the principles of risk management to the maintenance of equipment and services

2.3. BE (Hons) Program Learning Outcomes

1. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
2. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
3. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
4. Discernment of knowledge development and research directions within the engineering discipline.
5. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
7. Application of established engineering methods to complex engineering problem solving.
8. Fluent application of engineering techniques, tools and resources.
10. Application of systematic approaches to the conduct and management of engineering projects.
11. Ethical conduct and professional accountability.
12. Effective oral and written communication in professional and lay domains.
13. Creative, innovative and pro-active demeanour.
14. Professional use and management of information.
15. Orderly management of self, and professional conduct.
16. Effective team membership and team leadership.

2.4. Graduate Attributes

This course will contribute to the development of the following Graduate Attributes:

- Appropriate technical knowledge
- Having advanced problem solving, analysis and synthesis skills with the ability to tolerate ambiguity
- Ability for engineering design and creativity
- Being able to think and work individually and in teams
- Having Health, Safety, Environment and Community (HSEC) consciousness

3. REFERENCE RESOURCES

3.1. Reference Materials

- MEA Learning Guide – Mine Asset Management & Services – Part B Mine Services

3.2. Reference Materials

3.3. Online Resources

Selected readings as well as other supporting material (e.g. course outline and lecture notes will be made available on LMS.
## 4.1. Learning Activities Summary

<table>
<thead>
<tr>
<th>Activity</th>
<th>Area</th>
<th>Content</th>
<th>Presenter</th>
</tr>
</thead>
</table>
| 1 Lecture | Physical Assets | L1: The purpose of physical assets  
  L2: Performance requirements  
  L3: The life cycle of physical assets  
  L4: Value through asset management | PK |
| 2 Lecture | Asset Management Strategy | L1 Strategy, tactics and resources  
  L2: The maintenance process  
  L3: Determining equipment priority  
  L4: Maintenance maturity model | PK Recorded |
| 3 Lecture | Asset Management Tactics | L1 Functions, functional failures and failure modes  
  L2 Failure intensity functions  
  L3 Maintenance tactics  
  L4 Selecting tactics | PK |
| 4 Lecture | Asset Management Process and Organisation | L1 Key asset management processes  
  L2 Work Order Management  
  L3 Maintenance forecasting, planning & scheduling  
  L4 Organisational structure | PK Recorded |
| 5 Lecture | Asset Management Measurement, Control & Improvement | L1 Performance measurement  
  L2 Continuous improvement  
  L3 Root Cause Analysis  
  L4 Operator Driven Reliability | PK |
| 6 Lecture | Management Spares classification | L1 High rotation spares  
  L2 Low rotation spares  
  L3 Advanced sparing decisions | PK Recorded |
| 7 Lecture | Contracts and Contractor Management | L1 Contract types  
  L2 Work scope  
  L3 Agreed performance measurements  
  L4 Risk sharing | PK |
| 8 Lecture | ISO 55000 Asset Management standards | | PK Recorded |
| 9 Lecture | Conveyors | | PK |
| PK Lecture | Mine dewatering | | TBA |
| 11 Lecture | Quiz and Electrical Distribution Systems | | PK |
| 12 Lecture | Mine Winders | | TBA |

**Notes:**
- The *Course Week* does not always align with the Semester Week.
- The above schedule is a guide only and the indicated dates when each theme and course content is discussed and subject to change without notice.
- Additional guest lectures can be attended to the weekly activities.
- The Weeks mentioned above are planned according to the MEA week calendar.
5. COURSE ASSESSMENT

5.1. Assessment Summary

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Release date</th>
<th>Due date</th>
<th>Weight (%)</th>
<th>Learning outcomes assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment #1. Group Work Management –</td>
<td>9 Mar</td>
<td>8 Apr</td>
<td>30</td>
<td>4,5</td>
</tr>
<tr>
<td>Maintenance Strategy Formulation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assignment #2. Individual Case Study</td>
<td>13 April</td>
<td>6 May</td>
<td>30</td>
<td>1,2,3,6,7</td>
</tr>
<tr>
<td>Assignment #3 – Mine Services Tutorial</td>
<td>4 May</td>
<td>27 May</td>
<td>20</td>
<td>8,9</td>
</tr>
<tr>
<td>In Class Quiz – Physical Asset Management</td>
<td>18 May</td>
<td>20</td>
<td></td>
<td>1,2,3,4,6,7,8,10</td>
</tr>
</tbody>
</table>

All the course materials and assignments will be available online through Moodle. Access to the Moodle site is via the Moodle icon on the MyUNSW homepage, or at https://moodle.telt.unsw.edu.au

5.2. Teaching & Learning Methods

- Lectures via Podcast or Articulate and in person
- Tutorials via video-conferencing and/or webcasting
- Assessment via developing solutions to case studies.
- PowerPoint slides and Podcasts/Articulate files
- Course study guide
- Course reading materials
- Assignments (Case study development)

6. ASSESSMENT CRITERIA

The assessment criteria provide a framework or guideline that will be used when assessing the various major assignments in the course. They will be provided along with the assignment. The student is advised to review this framework before undertaking an assignment. The criteria listed for each item of assessment and the descriptions contained therein are not intended to be prescriptive nor is it an exhaustive list. Rather it should be viewed as a framework to guide the student as to the type of information and depth of coverage that is expected to be evident in an assignment; the framework illustrates for example what would distinguish an excellent achievement from a poor achievement.

Hence the student should be cognisant that a range of factors are often being assessed in any one assignment; not just whether the final results are numerically correct or not. Consideration is given to other relevant elements that contribute to the Learning Outcomes of the course as well as the Graduate Attributes of the overall degree program.

The student is cautioned against merely using the assessment criteria as a checklist. When assessing an assignment, elements in the framework will be examined in terms of quality and creativity. Hence ensuring all elements are captured in an assignment is not sufficient and will not automatically lead to full marks being awarded. Other factors such as how the student went about presenting information, structuring an argument and/or supporting a particular recommendation or outcome are also important. Aside from being used as a guideline in preparing an assignment, the framework can also be used to provide feedback to a student on their performance in an assignment. Periodically the criteria are reviewed and updated; consequently, changes are made in order to improve their effectiveness in both of these tasks.
7. STUDYING A UG COURSE IN MINING ENGINEERING AT UNSW

7.1 How We Contact You

At times, the School or your lecturers may need to contact you about your course or your enrolment. Your lecturers will use the email function through Moodle or we will contact you on your @student.unsw.edu.au email address.

We understand that you may have an existing email account and would prefer for your UNSW emails to be redirected to your preferred account. Please see these instructions on how to redirect your UNSW emails: www.it.unsw.edu.au/students/zmail/redirect_external.html

7.2 How You Can Contact Us

We are always ready to assist you with your inquiries. To ensure your question is directed to the correct person, please use the email address below for:

Enrolment or other admin questions regarding your program: mining@unsw.edu.au
Course inquiries: these should be directed to the course convenor.

7.3 Computing Resources and Internet Access Requirements

UNSW Mining Engineering provides blended learning using the on-line Moodle LMS (Learning Management System).

It is essential that you have access to a PC or notebook computer. Mobile devices such as smart phones and tablets may compliment learning, but access to a PC or notebook computer is also required. Note that some specialist engineering software is not available for Mac computers.

You can access the School’s computer laboratory in-line with the School laboratory access guidelines and Class bookings.

It is recommended that you have regular internet access to participate in forum discussion and group work. To run Moodle most effectively, you should have:

- broadband connection (256 Kbit/sec or faster)
- Chrome browser or FireFox
- ability to view streaming video (high or low definition UNSW The Box options)

More information about system requirements is available at www.student.unsw.edu.au/moodle-system-requirements.

7.4 Accessing Course Materials through Moodle

Course outlines and support materials are uploaded on a Learning Management System (LMS) - Moodle. All enrolled students are automatically included on the Moodle for each course. To access these documents, please visit: www.moodle.telt.unsw.edu.au

7.5 Assignment Submissions

The School has developed a guideline to help you when submitting a course assignment. Please take a closer look at all these details on our website: www.engineering.unsw.edu.au/mining-engineering/assignment-submission-policy

We encourage you to retain a copy of every assignment submitted for assessment for your own record either in hardcopy or electronic form. On a rare occasion, assignments may be mislaid and we may contact you to re-submit your assignment.
7.6 Late Submission of an Assignment

Full marks for an assignment are only possible when an assignment is received by the due date. In fairness to those students who do meet the assignment due date and time, deductions will apply to submissions made after this time. Details on deductions that are automatically applied to late submissions are available on our webpage: http://www.engineering.unsw.edu.au/mining-engineering/late-submissions

We understand that at times you may not be able to submit an assignment on time, and the School will accommodate any fair and reasonable extension. We would recommend you review the UNSW Special Consideration guidelines as soon as possible: https://student.unsw.edu.au/special-consideration

7.7 Unsatisfactory and/ or Non-completion of course

A student who has not satisfactorily completed all the requirements of MINE4250 will not have met the prerequisite requirements and therefore will not be eligible to undertake MINE 4260.

7.8 Course Results

For details on UNSW assessment policy, please visit: https://student.unsw.edu.au/assessment

In some instances, your final course result may be withheld and not released on the UNSW planned date. This is indicated by a course grade result of either:

- WD – which usually indicates you have not completed one or more items of assessment or there is an issue with one or more assignment; or
- WC – which indicates you have applied for Special Consideration due to illness or misadventure and the course results have not been finalised.

In either event it would be your responsibility to contact the Course Convener as soon as practicable but no later than five (5) days after release of the course result. If you don’t contact the convener on time, you may be required to re-submit an assignment or re-sit the final exam and may result in you failing the course. You would also have a NC (course not completed) mark on your transcript and would need to re-enroll in the course.

7.9 Special Consideration

You can apply for special consideration through UNSW Student Central when illness or other circumstances interfere with your assessment performance. Sickness, misadventure or other circumstances beyond your control may:

- Prevent you from completing a course requirement,
- Keep you from attending an assessable activity,
- Stop you submitting assessable work for a course,
- Significantly affect your performance in assessable work, be it a formal end-of-semester examination, a class test, a laboratory test, a seminar presentation or any other form of assessment.

We ask that you please contact the Course Convenor immediately once you have completed the special consideration application, no later than one week from submission.

More details on special consideration can be found at: https://www.student.unsw.edu.au/special-consideration

7.10 Students Needing Additional Support

The Student Equity and Disabilities Unit (SEADU) aims to provide all students with support and professional advice when circumstances may prevent students from achieving a successful university education. Take a look at their webpage: http://www.studentequity.unsw.edu.au/
7.11 Academic Honesty and Plagiarism

Your lecturer and the University will expect your submitted assignments are truly your own work. UNSW has very clear guidelines on what plagiarism is and how to avoid it. Plagiarism is using the words or ideas of others and presenting them as your own. Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. The University has adopted an educative approach to plagiarism and has developed a range of resources to support students. All the details on plagiarism, including some useful resources, can be found at https://www.student.unsw.edu.au/plagiarism.

All Mining Engineering students are required to complete a student declaration for academic integrity which is outlined in the assignment cover sheets. By signing this declaration, you agree that your work is your own original work.

If you need some additional support with your writing skills, please contact the Learning Centre or view some of the resources on their website: http://www.lc.unsw.edu.au/. The Learning Centre is designed to help you improve your academic writing and communication skills. Some students use the Centre services because they are finding their assignments a challenge, others because they want to improve an already successful academic performance.

7.12 Report Writing Guide for Mining Engineers


7.13 Continual Course Improvement

At the end of each course, all students will have the opportunity to complete a course evaluation form. These anonymous surveys help us understand your views of the course, your lecturers and the course materials. We are continuously improving our courses based on student feedback, and your perspective is valuable.

We also encourage all students to share any feedback they have any time during the course – if you have a concern, please contact us immediately.