



Faculty of Engineering

School of Minerals and Energy Resources Engineering

Postgraduate Course Outline

PTRL6009

Well Drilling Equipment and Operations

Prof Sheik Rahman

1.

2.2. Learning Outcomes

By the end of this course students will:

1. learn the functions and roles of key drilling equipment and apparatus.
2. be given an in-depth view of the physical processes involved in drilling oil and gas wells, both on-shore and offshore.
3. learn to select appropriate drilling rig components & equipment as to optimize costs for a given drilling operation (onshore or offshore).

Student please view the link to the [UNSW Graduate Attributes](#)

3.4. Online Resources

There are numerous articles / information sources on reservoir engineering on the web. Many of them are sound, but many are either very lightweight or contain errors. Be very careful in your choice of web sources. Remember, UNSW librarians are usually happy to help you locate articles or make suggestions regarding possible material to help you in your academic work. You can also access basic online help at <http://www.library.unsw.edu.au/>

3.5.

4.2. Learning Activities Summary

UNSW Wk	Activity	Content
1	Lecture	<ul style="list-style-type: none"> • Course introduction and expectations • Power System <ul style="list-style-type: none"> ○ Describe the power requirements for different equipment on a typical land or offshore drilling rig. ○ Identify the modes of power generation. ○ Understand the different means of power transmission. ○ Plan & select an optimum (diesel) engine generator system for a specific drilling operation.
2	Lecture	<ul style="list-style-type: none"> • Circulation System <ul style="list-style-type: none"> ○ Identify & explain the principal components of a typical mud circulation system: mixing equipment, pits, pumps, mud cleaners etc. ○ Estimate the volume of mud required for a specific drilling operation. ○ Determine the power requirements for the circulation of mud. ○ Understand the different mud cleaning equipment & their operating principles.
3	Lecture	<ul style="list-style-type: none"> • Hoisting System <ul style="list-style-type: none"> ○ Identify the different equipment that makes up the hoisting system. ○ Identify the different components of a block & tackle system & understand their functions. ○ Estimate horsepower required for trip & trip-out of different tubulars. ○ Estimate the working life of drilling line (tonne) & select appropriate drilling lines for a given drilling condition.
4	Lecture	<ul style="list-style-type: none"> • Supporting Structure <ul style="list-style-type: none"> ○ Understand the purpose of derricks & the factors that affect the design of the derrick. ○ Calculate the load carrying capacity for a given type of drilling derrick & supporting structure. ○ Design an appropriate drilling derrick & supporting structure for a given drilling operation.
5	Lecture	<ul style="list-style-type: none"> • Rotary System <ul style="list-style-type: none"> ○ Understand the operating principles of Kelly & top-drive systems. ○ Understand the different equipment & operating principles involved in these two systems. ○ Estimate horsepower requirements to drive these individual systems. ○ Select appropriate rotary system components for a given drilling operation.
6	Lecture	<ul style="list-style-type: none"> • Drill String and its Components <ul style="list-style-type: none"> ○ Specify the components of a drillstring & describe their functions: drill pipe, tool joints, heavyweights, drill collar & stabilisers. ○ Estimate the different forces on the drill string. ○ Given a drilling operation, select appropriate specifications for the components of a drillstring.

UNSW Wk	Activity	Content
7	Lecture	<ul style="list-style-type: none"> Rotary Drilling Bits <ul style="list-style-type: none"> Identify different types of bits & their classifications: roller cutter, diamond & poly crystalline diamond compacts (PDC) bits. Understand the different components of bits & their functions: cone, bearings, teeth & nozzle for rock bits; geometry of cone surface, compacts etc for diamond bits. Estimate the penetration rate, bit life & drilling costs based on tooth wear & bearing wear for different drilling situations.
8	Lecture	<ul style="list-style-type: none"> Well control & Blow out prevention <ul style="list-style-type: none"> Identify different sources of abnormal pressures. Identify the causes of kicks. Learn the different types of BOPS & their components. Understand BOP stack design for given different drilling conditions. Design mudweight for different drilling depth ranges.
9	Lecture	<ul style="list-style-type: none"> Offshore Drilling System <ul style="list-style-type: none"> Understand the drilling practices for topside & subsea well completions. Describe the equipment & systems required to drill offshore: marine risers, subsea templates & wellhead BOP systems, mooring for mobile drilling rigs etc. Learn the drilling & operational capabilities for different drilling rigs (fixed & mobile drilling rigs).
10	Revision	<ul style="list-style-type: none"> Course Review

Study Period 17 Feb– 28 Apr 2020
Exam Period 2 May– 15 May 2020

Other UNSW Key dates <https://student.unsw.edu.au/newcalendar/dates>

5. COURSE ASSESSMENT

5.1. Assessment Summary

Assessment task	Due date/ week	Weight	Assessment	Learning outcomes assessed
1	End of Week 3 End of Week 5 End of Week 7 End of Week 9	30% (7.5% x 4)	Assignments	1, 2, 3
2	Week 8	10%	Midterm Quiz (Online)	1, 2, 3
3	End of Week 11	10%	Project	1, 2, 3
4		50%	Final Exam	1, 2, 3

Assignments related details/submissions [46.ill b Tf 11 | mMC 1ct](#)

6. ASSESSMENT CRITERIA

The assessment criteria provide a framework for you to assess your own work before formally submitting it.

7.3. Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the on-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.

Mining Engineering Students: OMB G48/49

Petroleum Engineering Students: TETB

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)
- ability to view streaming video (high or low definition UNSW TV options)

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

7.4. Accessing Course Materials Through Moodle

Course outlines, support materials are uploaded to Moodle, the university standard Learning Management System.

For example if a student submitted the assignment five days after the due date and the unadjusted mark was 68% then the final adjustment mark for the assignment would be 43%; that is the raw mark of 68% less 25 percentile points (5 days @ 5 percentile points per day).

7.7. Special Consideration

You can apply for special consideration through [UNSW Student Centre](#) 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 semester examination, a class test, a laboratory test, a seminar presentation or any other form of assessment.

We ask that you please contact the Convenor immediately once you have completed the

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 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: www.lc.unsw.edu.au. The Learning Centre is designed to help you improve your academic writing and communication skills. Some students use the services because they are finding their assignments a challenge, others because they want to improve an already successful academic performance.

7.11. 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.

Feedback is given via

8. SCHOOL ASSESSMENT COVER SHEET

Course Convenor: _____
Course Code: _____ Course Title: _____
Assignment: _____
Due Date: _____
Student Name: _____ Student ID: _____

ACADEMIC REQUIREMENTS

Before submitting this assignment, the student is advised to review:

- the assessment requirements contained in the briefing document for the assignment;
- the various matters related to assessment in the relevant Course Outline; and
- the Plagiarism and Academic Integrity website at < <http://www.lc.unsw.edu.au/plagiarism/pint.html> > to ensure they are familiar with the requirements to provide appropriate acknowledgement of source materials.

If after reviewing this material there is any doubt about assessment requirements, then in the first instance the student should consult with the Course Convenor and then if necessary with the Director of Undergraduate Studies.

While students are generally encouraged to work with other students to enhance learning, all assignments submitted for assessment must be their entire own work and