School of Minerals & Energy Resources Engineering // UNSW Engineering

PTRL3015

Well Drilling Equipment and Operations

Term One // 2021

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Zhixi Chen	zhixic@unsw.edu.au	Office hours	Office 211, Level 2, TETB	+61 2 9385 5182

Lecturers

Name	Email	Availability	Location	Phone
Sheik Rahman	sheik.rahman@unsw.edu.au	Office hours	Office 212, Level 2, TETB	0418418892

School Contact Information

School of Minerals and Energy Resources
Old Main Building, Level 1, 159 (K15)
UNSW SYDNEY NSW 2052 AUSTRALIA

Engineering Student Services

Course Details

Credit Points 6

Summary of the Course

The course comprises of 3 units of Lecture and Tutorial and 3 units of Laboratory work.

The lecture includes: Introduction to physical processes involved in drilling oil and gas wells. Rotary drilling rigs for both land and offshore operation. Drilling equipment including rig powering and transmission, hoisting, rotary systems, BOP equipment and hookup, drill pipes and collars. Drilling fluid circulating systems including pumps, mud tanks, mud mixtures and mud cleaners. Elements of rock mechanics and its application in drilling. Selection of drill bits and penetration rate optimisation. Rig sizing and selection. Special marine equipment for offshore drilling.

The laboratory work involves: formulation of a basic drilling fluid and cement flurry and determine physical and chemical properties. Physical and chemical properties include density, viscosity, filtration, alkalinity, acidity, solid contents, and presence of oil, water, and gases in drilling fluids.

Course Aims

This course is taught from a practical view with the aim that students will learn how to streamline and optimize rig operations and gain the technical skills to provide cost- effective solutions to common rig problems associated with day to day operations. Students enrolled in this course will be given an in-depth view of the physical processes involved in drilling oil and gas wells, both on-shore and off-shore.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Learn the functions and roles of key drilling equipment and apparatus;	PE1.1, PE1.2, PE1.5, PE2.1, PE2.2, PE2.3, PE3.4
2. Be given an in-depth view of the physical processes involved in drilling oil and gas wells, both on-shore and off-shore;	PE1.1, PE1.3, PE1.2, PE2.1, PE2.3, PE3.4, PE2.4
3. Learn to select appropriate drilling rig components & equipment as to optimize costs for a given drilling operation (onshore or offshore).	PE1.3, PE2.1, PE2.3, PE2.4, PE3.4, PE3.6, PE2.2

Teaching Strategies

1. Weekly lectures are designed to provide students fundamental understanding through a series of topics on drilling equipment and operations.
2.

Assessment

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Home work	25%	Assignments 1,2,3,4 due at the end of Weeks 3,5,7,9.	1, 2, 3
Final Assessment	40%	Exam period	1, 2, 3
Hands On	20%	Lab report due within 2 weeks after each lab session	1, 2, 3
Midterm Assessment	15%	Tuesday, Week 7	1, 2, 3

Assessment Details

Assessment 1: Home work

Start date: Not Applicable

Details:

4 individual assignments due at the end of Weeks 3,5,7,9 respectively; Tutorial exercises due weekly.

Additional details:

Ass1 covers Power System and Circulation System; Ass2 covers Hoisting System; Ass3 covers Drillstring; Ass4 covers Rotary Drill Bits.

The specifications and marking rubrics will be provided at the time of the assignment release.

Submission notes: Online Moodle Submission

Turnitin setting: This is not a Turnitin assignment

Assessment 2: Final Assessment

Length: 2 hrs

Details:

A 2 hours final exam during exam period covers topics from Weeks 1 to 10.

Additional details:

Guidelines for helping the preparation for the final exam will be released prior to the exam.

Submission notes: Online Moodle submission

Turnitin setting: This is not a Turnitin assignment

Assessment 3: Hands On

Start date: Not Applicable

Details:

Activity involves preparation of drilling fluids and cement slurry and measurement of their properties in the laboratory. Individual lab report due after each lab session.

Additional details:

Laboratory guidlines will be provided on Moodle prior to Lab sessions.

Submission notes: Online Moodle submission

Turnitin setting: This assignment is submitted through Turnitin and students can see Turnitin similarity reports.

Assessment 4: Midterm Assessment

Details:

One hour quiz in Week 7 covers topics from Weeks 1 to 5

Additional details:

Guidelines for helping the preparation for the quiz will be released on Moodle prior to the quiz.

Submission notes: Online Moodle submission

Turnitin setting: This is not a Turnitin assignment

Resources

Prescribed Resources

Support material for this course including, whenever available, copies of lecture notes, lecture slides, recommended readings, etc. can be found on Moodle.

The lecture notes/slides may be viewed and downloaded from the UNSW-Moodle: http://moodle.telt.unsw.edu.au/

Recommended Resources

Followings are the recommended books for this course:

- Applied Drilling Engineering AT Bourgoyne Jr, ME Chenevert, KK Millheim and FS Young Jr. SPE Textbook Series, Vol. 2, 2nd Edition (1991)
- Oil Well Drilling Engineering, Principles and Practice H. Rabia. Graham and Trotman Ltd (1985)

Course Evaluation and Development

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 https://student.unsw.edu.au/myExperience and you will be notified when this is available for you to complete.

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.

Laboratory Workshop Information

Laboratory activities will be conducted in LG29 and LG31, TETB.

Please prepare yourself before attending the lab session by reading through Lab notes, Safe Working Procedures, Risk management form and Safety Data Sheet and watching pre-recorded video clips.

[redacted] mission of Assessment Tasks

School has developed a guideline to help you when submitting a course assignment.

ncourage you to retain a copy of every assignment submitted for assessment for your own record in hardcopy or electronic form.

sessments must have an assessment cover sheet attached.

rse completion

se completion requires submission of all assessment items. Failure to submit all assessment items esult in the award of an Unsatisfactory Failure (UF) grade for the Course unless special deration has been submitted and approved. Please note, a competency hurdle of 50% is applied to al assessment.

Submission of an Assignment

arks for an assignment are only possible when an assignment is received by the due date.

nderstand that at times you may not be able to submit an assignment on time, and the School will mmodate any fair and reasonable extension. We would recommend you review the UNSW Special ideration guidelines – see section below.

submission will not be accepted and will be considered as no submission.

cial Consideration

an apply for special consideration through The Nucleus Student Hub when illness or other nstances interfere with your assessment performance. Sickness, misadventure or other nstances beyond your control may:

- Prevent you from completing a course requirement
- [redacted] from attending an assessable activity
- mitting assessable work for a course
- fect your performance in assessable work, be it a formal end-of-semester class test, a laboratory test, a seminar presentation or any other form of

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

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

- UNSW Learning Centre - www.lc.unsw.edu.au
- Counselling support - www.counselling.unsw.edu.au

Equitable Learning Services aims to provide all students with a free and confidential service that provides practical support to ensure that your health condition doesn't adversely affect your studies. https://student.unsw.edu.au/els

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 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 Centre services because they are finding their assignments a challenge, others because they want to improve an already successful academic performance.

- 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 at www.student.unsw.edu.au/moodle-system-requirements

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	