



UNSW Course Outline

PTRL6012 Drilling Mud - Formulation, Selection and Maintenance - 2024

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General Course Information

Course Code : PTRL6012

Year : 2024

Term : Term 3

Teaching Period : T3

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Minerals & Energy Resources Engineering

Delivery Mode : Online

Delivery Format : Standard

Delivery Location : Distance Education

Campus : Sydney

Study Level : Postgraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

The course covers both the theory and practical applications of drilling fluids. The combined

lectures, tutorials and laboratory experiments will provide students with a comprehensive understanding of the functions, composition and additives of drilling fluids, clay and polymer chemistry and their applications in drilling fluids, drilling fluid density determination and calculations, drilling fluid filtration and mud caking process, API drilling fluid properties, equipment and testing procedures, drilling fluid system design for control formation damage and wellbore stability under specific formation conditions.

Course Aims

This course will enable students to acquire fundamental knowledge of drilling fluids and to apply the theory to the design, evaluation and optimization of drilling fluid program. The course will reinforce students' understanding of the core aspects of well construction and the inter relationship between wellbore and reservoirs. The practical aspects of the course and the development of professional skills will help students in preparing for their future careers in the industry.

Relationship to Other Courses

A drilling technology course following Well Drilling Equipment and operations

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Design and evaluate drilling fluid program under specific well conditions.
CLO2 : Apply API standards to prepare and test drilling fluids
CLO3 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.

Course Learning Outcomes	Assessment Item
CLO1 : Design and evaluate drilling fluid program under specific well conditions.	<ul style="list-style-type: none"> • Assignments • Design Project • Midterm quiz • Final Exam
CLO2 : Apply API standards to prepare and test drilling fluids	<ul style="list-style-type: none"> • Assignments • Design Project • Midterm quiz • Final Exam
CLO3 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.	<ul style="list-style-type: none"> • Assignments • Design Project • Midterm quiz • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Microsoft Teams | Echo 360

Learning and Teaching in this course

Teaching mode: Distance

Online support via Moodle

Pre-recorded lecture topics will be available in Moodle

Students are expected to apply theories to field case studies

Other Professional Outcomes

<https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>

Additional Course Information

N/A

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignments Assessment Format: Individual	30%	Due Date: Assignments due on Week 3, 6 and 9 respectively.
Design Project Assessment Format: Individual	10%	Due Date: Week 10
Midterm quiz Assessment Format: Individual	10%	Due Date: Week 7: 21 October - 27 October
Final Exam Assessment Format: Individual	50%	Due Date: Exam period

Assessment Details

Assignments

Assessment Overview

Assignments cover lecture topics of previous weeks. Marking will be against specific criteria in a marking guide and Individual written feedback will be provided within ten days of the relevant

submission date through the Learning Management System. Verbal class-wide feedback will be provided in class during assignment reviews.

Course Learning Outcomes

- CL01 : Design and evaluate drilling fluid program under specific well conditions.
- CL02 : Apply API standards to prepare and test drilling fluids
- CL03 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.

Detailed Assessment Description

Assignments contain the following topics:

1. Clay and polymer properties and application in drilling fluids, due on Week 3, feedback before 06/10/2024
2. Mud weight calculations and API properties, due on Week 6
3. Drilling fluids chemical analysis, due on Week 9

Assessment Length

No more than 10 pages

Submission notes

Online Moodle submission

Assessment information

N/A

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

If your Convenor has concerns that your submission contains passages of AI-generated text or media, you may be asked to account for your work. If you are unable to satisfactorily demonstrate your understanding of your submission you may be referred to UNSW Conduct &

Integrity Office for investigation for academic misconduct and possible penalties.

For more information on Generative AI and permitted use please see [here](#).

N/A

Design Project

Assessment Overview

Design mud program for an extended reach development well. In the project, students are required to carry out literature survey, perform wellbore stability analysis, and design mud program through a case study. Final project report is required. Written and verbal feedback will be provided for each student and an individual mark will be issued against specific criteria in a marking guide.

Course Learning Outcomes

- CLO1 : Design and evaluate drilling fluid program under specific well conditions.
- CLO2 : Apply API standards to prepare and test drilling fluids
- CLO3 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.

Detailed Assessment Description

The specification of the project will be released on Week 5. A workshop on the project is scheduled on Week 6.

Assessment Length

No more than 10 pages

Submission notes

Online Moodle submission

Assessment information

N/A

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

Simple Editing Assistance

In completing this assessment, you are permitted to use standard editing and referencing functions in the software you use to complete your assessment. These functions are described

below. You must not use any functions that generate or paraphrase passages of text or other media, whether based on your own work or not.

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For more information on Generative AI and permitted use please see [here](#).

N/A

Midterm quiz

Assessment Overview

The midterm quiz covers lecture topics from W1 to W5. Marking will be against specific criteria in a marking guide and formal feedback will be provided within ten days of the quiz. Verbal class-wide feedback will be given during the quiz review.

Course Learning Outcomes

- CL01 : Design and evaluate drilling fluid program under specific well conditions.
- CL02 : Apply API standards to prepare and test drilling fluids
- CL03 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.

Detailed Assessment Description

Content up to Week 5. Guidelines for helping the preparation for the online quiz will be released prior to the quiz.

Assessment Length

1.5 hrs

Submission notes

Online Moodle Quiz

Assessment information

N/A

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

This assessment is designed for you to complete without the use of any generative AI. You are not permitted to use any generative AI tools, software or service to search for or generate information or answers.

For more information on Generative AI and permitted use please see [here](#).

N/A

Final Exam

Assessment Overview

Final exam covers all topics. Marking will be done with a rubric. Individual mark will be issued.

Course Learning Outcomes

- CLO1 : Design and evaluate drilling fluid program under specific well conditions.
- CLO2 : Apply API standards to prepare and test drilling fluids
- CLO3 : Describe the interactions of drilling fluids with formations and the related wellbore stability and formation damage mechanisms.

Detailed Assessment Description

A two hours online quiz will be hold within the exam period. Guidelines for helping the preparation for the final exam will be released prior to the exam.

Assessment Length

2hrs

Submission notes

Moodle Quiz

Assessment information

N/A

Assignment submission Turnitin type

Not Applicable

Generative AI Permission Level

No Assistance

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For more information on Generative AI and permitted use please see [here](#).

N/A

General Assessment Information

The assessment contains assignments, project, midterm exam and final exam.

Grading Basis

Standard

Requirements to pass course

Students need to achieve 50 marks to pass the course.

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 0 : 2 September - 8 September	Reading	Course outline and Introduction
Week 1 : 9 September - 15 September	Topic	Ch-1 Introduction; Ch-2 Clay Chemistry
Week 2 : 16 September - 22 September	Topic	Ch-2 Clay Chemistry
Week 3 : 23 September - 29 September	Topic	Ch-3 Polymer Chemistry
Week 4 : 30 September - 6 October	Topic	Ch-4 Mud Program
Week 5 : 7 October - 13 October	Topic	Ch-5 Drilling Fluid Filtration
Week 6 : 14 October - 20 October	Topic	Ch-5 Drilling Fluid Filtration
Week 7 : 21 October - 27 October	Topic	Ch-6 API properties
	Assessment	Midterm exam
Week 8 : 28 October - 3 November	Topic	Ch-6 API properties
Week 9 : 4 November - 10 November	Topic	Ch-7 Mud Systems & Treatments for Specific Hole Conditions.
Week 10 : 11 November - 17 November	Topic	Ch-8 Oil based mud

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

Content topics in Week 1-10

Mid-term quiz in Week 7

Final exam in the Exam Period

Course 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:

Ryen Caenn, HCH Darley, George R. Gray: Composition and Properties of Drilling and Completion Fluids, 7th edition, Gulf Professional Publishing, Elsevier, 2016.

Bourgoyne A.T. Jr., Millheim K.K., Chenevert M.E. and Young F.S. Jr.: Applied Drilling Engineering, SPE Textbook Series, Vol. 2, Richardson, TX, USA, 1991.

Additional Costs

N/A

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.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Zhixi Chen		Office 211, Level 2, TETB	0402 962 708	Office hours	Yes	Yes

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

II. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable

Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle or your primary learning management system (LMS) should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off 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. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures

can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Submission of Assessment Tasks

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For some assessment items, a late penalty may not be appropriate. These will be clearly indicated in the course outline, and such assessments will receive a mark of zero if not completed by the specified date. Examples include:

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries e.g. admissions, fees, programs, credit transfer

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

School-specific Information

Course completion

Course completion requires submission of all assessment items. Failure to submit all assessment items may result in the award of an Unsatisfactory Failure (UF) grade for the course unless special consideration has been submitted and approved.

Submission of Assessment Tasks

We encourage you to retain a copy of every assignment submitted for your own record, either in hardcopy or electronic form. All assessments must have an assessment cover sheet attached (if required).

Student Resources

The School has [student resources](#) section, containing useful advice and information to ensure you're able to focus on your studies.

Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the online Moodle LMS (Learning Management System). Also see - Transitioning to Online Learning: <https://www.student.unsw.edu.au/transitioning-online-learning>

Note that some specialist engineering software is not available for Mac computers.

- Mining Engineering Students: OMB G48
- Petroleum Engineering Students: TETB LG34 & LG35

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

Accessing Course Materials Through Moodle

Course outlines, support materials are uploaded to Moodle, the university standard Learning Management System (LMS). In addition, on-line assignment submissions are made using the assignment dropbox facility provided in Moodle. All enrolled students are automatically included in Moodle for each course. To access these documents and other course resources, please visit: www.moodle.telt.unsw.edu.au

School Contact Information

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

For current students, all enquiries and assistance relating to enrolment, class registration, progression checks and other administrative matters, please see [The Nucleus: Student Hub](#).

Web & Important Links:

[School of Minerals and Energy Resources](#)

[The Nucleus Student Hub](#)

[Moodle](#)

[UNSW Handbook](#)

[UNSW Timetable](#)

[Student Wellbeing](#)

[Urgent Mental Health & Support](#)

[Equitable Learning Services](#)