



**UNSW**

## UNSW Course Outline

# PTRL6028 Practical Aspects of Well Planning and Drilling Cost Estimates - 2024

Published on the 29 Aug 2024

## General Course Information

**Course Code :** PTRL6028

**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

Students will learn a technical and analytic approach to cost-effective well planning from site

selection to casing landing and cementing with an emphasis on trajectory analysis based on borehole stability, torque and drag of tubulars, and hole cleaning. This course binds together key concepts from mud design, cementing and casing design, and directional and ERD well design. Students will learn how to use these concepts to plan and optimize well trajectories in a systematic and practical manner. The course learning outcomes are reinforced by practical examples and case studies.

Course covers: data acquisition, pore pressure prediction, fracture gradient prediction, in-situ stress determination, stress analysis, trajectory analysis and optimization, wellbore stability analysis, mud weight selection and optimization, casing program design, BHA selection and design, torque and drag analysis, determination of cuttings transport efficiency.

## **Course Aims**

This course will enable students to acquire fundamental knowledge on formation pressure, insitu stresses, wellbore stability, drilling hydraulics, torque and drag and to apply the theory to the design, evaluation and optimization of well trajectory, casing program, and drilling program. The course will reinforce students' understanding of the core aspects of well construction and the inter relationship between wellbore and reservoirs. The development of practical and professional skills through series of real-world case studies will help students in preparing for their future careers in the industry.

## **Relationship to Other Courses**

An advanced drilling technology course following Well Drilling Equipment and Operations, Drilling Fluids, Casing Design and Cementing and Directional Drilling.

# Course Learning Outcomes

Course Learning Outcomes
CLO1 : Investigate formation pore pressure and in-situ stresses
CLO2 : Analyse wellbore stability and choose safe mud weight
CLO3 : Design and evaluate casing program, drilling hydraulics, drill string and bottom hole assembly

Course Learning Outcomes	Assessment Item
CLO1 : Investigate formation pore pressure and in-situ stresses	<ul style="list-style-type: none"><li>• Midterm Quiz</li><li>• Assignments</li><li>• Project</li><li>• Final Exam</li></ul>
CLO2 : Analyse wellbore stability and choose safe mud weight	<ul style="list-style-type: none"><li>• Midterm Quiz</li><li>• Assignments</li><li>• Project</li><li>• Final Exam</li></ul>
CLO3 : Design and evaluate casing program, drilling hydraulics, drill string and bottom hole assembly	<ul style="list-style-type: none"><li>• Assignments</li><li>• Project</li><li>• Final Exam</li></ul>

## Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Microsoft Teams

## 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
Midterm Quiz Assessment Format: Individual	10%	Due Date: Week 7
Assignments Assessment Format: Individual	30%	Due Date: Assignments due on Week 3, 7 and 9 respectively.
Project Assessment Format: Individual	10%	Due Date: Week 10
Final Exam Assessment Format: Individual	50%	Due Date: Exam period

## Assessment Details

### 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

- CLO1 : Investigate formation pore pressure and in-situ stresses
- CLO2 : Analyse wellbore stability and choose safe mud weight

#### Detailed Assessment Description

The midterm quiz covers lecture topics from W1 to W5. Guidelines for helping the preparation for the midterm quiz will be released on Moodle prior to the quiz.

#### Assessment Length

1.5hrs

#### 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

## Assignments

### Assessment Overview

Assignments are related to characterization of formation pore pressure and in-situ stresses, wellbore stability analysis, drilling fluid hydraulics, cuttings transportation, drag and torque analysis. 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

- CLO1 : Investigate formation pore pressure and in-situ stresses
- CLO2 : Analyse wellbore stability and choose safe mud weight
- CLO3 : Design and evaluate casing program, drilling hydraulics, drill string and bottom hole assembly

### Detailed Assessment Description

Assignments contain the following topics:

1. Formation pore pressure and in-situ stresses, due on Week 3, feedback before 6/10/2024
2. Wellbore stability and drilling hydraulics, due on Week 7
3. Torque, drag and drill string, due on Week 9

### Assessment Length

No more than 10 pages

### Submission notes

Online 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

## Project

### Assessment Overview

The project focuses on wellbore stability analysis of 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 : Investigate formation pore pressure and in-situ stresses
- CLO2 : Analyse wellbore stability and choose safe mud weight
- CLO3 : Design and evaluate casing program, drilling hydraulics, drill string and bottom hole assembly

### Detailed Assessment Description

The specification of the project will be released on Week 5.

### Assessment Length

No more than 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

## **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 : Investigate formation pore pressure and in-situ stresses
- CLO2 : Analyse wellbore stability and choose safe mud weight
- CLO3 : Design and evaluate casing program, drilling hydraulics, drill string and bottom hole assembly

### Detailed Assessment Description

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

**Assessment Length**

2 hrs

**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

## **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/Introduction
Week 1 : 9 September - 15 September	Topic	Ch-1 Introduction to Well Planning; Ch-2 Prediction of Formation Pressure
Week 2 : 16 September - 22 September	Topic	Ch-2 Prediction of Formation Pressure; Ch-3 Determination of In-Situ Stresses
Week 3 : 23 September - 29 September	Topic	Ch-3 Determination of In-Situ Stresses
Week 4 : 30 September - 6 October	Topic	Ch-4 Wellbore Stability Analysis
Week 5 : 7 October - 13 October	Topic	Ch-4 Wellbore Stability Analysis
Week 6 : 14 October - 20 October	Online Activity	Project consultancy
Week 7 : 21 October - 27 October	Topic	Ch-5 Hydraulic of Drilling Fluid Circulating System
	Assessment	Online quiz
Week 8 : 28 October - 3 November	Topic	Ch-5 Hydraulic of Drilling Fluid Circulating System
Week 9 : 4 November - 10 November	Topic	Ch-6 Torque & Drag Analysis
Week 10 : 11 November - 17 November	Topic	Ch-6 Torque & Drag Analysis; Ch-7 Drill string Considerations

## Attendance Requirements

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

## General Schedule Information

Lecture topics in Weeks 1 - 10

Midterm exam 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, video clips, lecture recordings, recommended readings, etc. can be found on Moodle.

The lecture note 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:

- [Bernt S. Aadnoy](#): Modern Well Design, 2nd Edition, Taylor & Francis, 2010.

- Bourgoyn 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	No	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 polices. 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 convener 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](http://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](http://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](http://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](http://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](#)