UNSW Course Outline

PTRL3001 Reservoir Engineering B - 2024

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General Course Information

Course Code : PTRL3001
Year : 2024
Term : Term 2
Teaching Period : T2
Is a multi-term course? : No
Faculty : Faculty of Engineering
Academic Unit : School of Minerals & Energy Resources Engineering
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Undergraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Building upon geology and reservoir engineering knowledge, this course provides working knowledge of tools required to predict oil recovery from subsurface reservoirs. The course describes analytical solutions to two-phase flow in porous media, heterogeneity characterization

of the reservoir rock, solution of drainage problems, and reserves calculations.

Course Aims

The aim of this course is to introduce fluid flow and production mechanisms in petroleum reservoirs.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.
CLO2 : Calculate pseudo-functions to analyse layered reservoirs.
CLO3 : Apply natural water flux models to calculate oil recovery in water drive reservoir.
CLO4 : Analyse well decline rates and their role in field production forecasting and reserves estimation.
CLO5 : Predict oil recovery from immiscible displacement processes through case study analysis.

Course Learning Outcomes	Assessment Item
CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.	• Assignment: Case Study • Quiz • Assignment 2 • Final Exam
CLO2 : Calculate pseudo-functions to analyse layered reservoirs.	• Assignment: Case Study • Assignment 2 • Final Exam
CLO3 : Apply natural water flux models to calculate oil recovery in water drive reservoir.	• Assignment: Case Study • Assignment 2 • Final Exam
CLO4 : Analyse well decline rates and their role in field production forecasting and reserves estimation.	• Assignment: Case Study • Assignment 2 • Final Exam
CLO5 : Predict oil recovery from immiscible displacement processes through case study analysis.	• Quiz • Assignment: Case Study • Final Exam

Learning and Teaching Technologies

Moodle - Learning Management System | Microsoft Teams

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Assignment: Case Study Assessment Format: Individual	15%	Due Date: Week 3: 10 June - 16 June, Week 9: 22 July - 28 July
Quiz Assessment Format: Individual	30%	Due Date: Week 7: 08 July - 14 July
Assignment 2 Assessment Format: Individual	5%	Due Date: Week 9: 22 July - 28 July
Final Exam Assessment Format: Individual	50%	Due Date: Not Applicable

Assessment Details

Assignment: Case Study

Assessment Overview

Performance prediction using frontal advance theory Midterm submission in week3 Final submission in
week-9.

Marking will be done with a rubric. Feedback will be provided online on individual submissions.

Course Learning Outcomes

- CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.
- CLO2 : Calculate pseudo-functions to analyse layered reservoirs.
- CLO3 : Apply natural water flux models to calculate oil recovery in water drive reservoir.
- CLO4 : Analyse well decline rates and their role in field production forecasting and reserves estimation.
- CLO5 : Predict oil recovery from immiscible displacement processes through case study analysis.

Assessment information

First part of the assignment is due in week-3 Friday and feedback will be provided in week-4.

Quiz

Assessment Overview

An online quiz based on material covered until week-5. Marking will be done with a rubric.
Feedback will be provided online on individual tests.

Course Learning Outcomes

- CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.
- CLO5 : Predict oil recovery from immiscible displacement processes through case study analysis.

Assignment 2

Assessment Overview

Coning and petroleum reserves estimation.

Marking will be done with a rubric. Feedback will be provided online on individual submissions.

Course Learning Outcomes

- CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.
- CLO2 : Calculate pseudo-functions to analyse layered reservoirs.
- CLO3 : Apply natural water flux models to calculate oil recovery in water drive reservoir.
- CLO4 : Analyse well decline rates and their role in field production forecasting and reserves estimation.

Final Exam

Assessment Overview

Final Exam based on UNSW timetable

Course Learning Outcomes

- CLO1 : Identify fundamental mechanisms responsible for fluid displacement, drainage, equilibrium or distribution and their measurement techniques.
- CLO2 : Calculate pseudo-functions to analyse layered reservoirs.
- CLO3 : Apply natural water flux models to calculate oil recovery in water drive reservoir.
- CLO4 : Analyse well decline rates and their role in field production forecasting and reserves estimation.
- CLO5 : Predict oil recovery from immiscible displacement processes through case study analysis.

General Assessment Information

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	Interfacial tension, wettability, capillary pressure
Week 2 : 3 June - 9 June	Lecture	Initial sat distribution in a reservoir. Capillary pressure hysteresis and trapping. Mobilization of residual oil.
Week 3 : 10 June - 16 June	Lecture	Two-phase relative permeabilities. Three-phase relative permeabilities. Digital core analysis.
Week 4 : 17 June - 23 June	Lecture	Oil recovery processes. Recovery factors. Mobilization efficiency. Displacement efficiency.
Week 5 : 24 June - 30 June	Lecture	Areal sweep efficiency, Mobility ratio. Water flood patterns and areal sweep efficiency.
Week 6 : 1 July - 7 July	Online Activity	Discussions
Week 7 : 8 July - 14 July	Lecture	Viscous fingering and gravity stable displacements. Crestal and Basal injection Vertical sweep efficiencies and calculation of field recovery factors.
Week 8 : 15 July - 21 July	Lecture	Pseudo-functions Water and gas coning.
Week 9 : 22 July - 28 July	Lecture	Water influx.
Week 10 : 29 July - 4 August	Lecture	Decline curve analysis / CO2 Sequestration

Attendance Requirements

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

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Furqan Le-Hussain		219 TETB	9385 5187	TBC	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 Plagarism

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: www.covid19studyonline.unsw.edu.au

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 Engineering
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