



UNSW Course Outline

PTRL4012 Enhanced Oil and Gas Recovery - 2024

Published on the 07 Feb 2024

General Course Information

Course Code : PTRL4012

Year : 2024

Term : Term 1

Teaching Period : T1

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

This comprehensive course provides an in-depth exploration of Enhanced Oil Recovery (EOR), Enhanced Gas Recovery (EGR), and Enhanced Coalbed Methane Recovery (ECBM) techniques. Participants will gain a thorough understanding of the fundamental concepts, methodologies,

and practical applications of these advanced reservoir engineering methods. Topics covered include the following.

- 1. Enhanced Oil Recovery (EOR), Enhanced Gas Recovery (EGR), and Enhanced Coalbed Methane Recovery (ECBM)**
- 2. Reasons for Implementing EOR/EGR/ECBM**
- 3. Screening of Reservoirs for Selection of EOR/EGR/ECBM Methods**
- 4. Sweep and Displacement Efficiency**
- 5. Estimating Trapped Oil Saturation**
- 6. Decreasing Residual Oil Saturation by Gas Injection Processes**
- 7. Controlling Mobility at the Field Scale**
- 8. Increasing Oil Mobility by Thermal Methods**
- 9. Miscible Displacement of CH₄ by CO₂ in Depleted Gas Reservoirs**
- 10. Displacing CH₄ in Coal Seams by N₂ and CO₂**
- 11. Co-Optimization of EOR/EGR/ECBM and CO₂**
- 12. Understanding the Role of Commercial Reservoir Simulators**

This course provides a comprehensive knowledge base and practical skills to address the challenges and opportunities in enhanced oil recovery, enhanced gas recovery, and enhanced coalbed methane recovery. Participants will gain the expertise needed to contribute to the efficient and sustainable utilisation of energy resources in the modern energy landscape.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Display the knowledge and skills needed to solve reservoir engineering problems by means of numerical techniques
CLO2 : Apply integrated knowledge of math and basic sciences including geosciences to the solution of problems related to EOR/EGR performance predictions
CLO3 : Evaluate the function of commercial reservoir simulators for improving oil and natural gas recovery from conventional and unconventional hydrocarbon reservoirs
CLO4 : Apply the basic physics behind EOR/EGR processes to explain improved recovery

Course Learning Outcomes	Assessment Item
CLO1 : Display the knowledge and skills needed to solve reservoir engineering problems by means of numerical techniques	<ul style="list-style-type: none">• Homework Problems• Quiz 1
CLO2 : Apply integrated knowledge of math and basic sciences including geosciences to the solution of problems related to EOR/EGR performance predictions	<ul style="list-style-type: none">• Homework Problems• Quiz 1
CLO3 : Evaluate the function of commercial reservoir simulators for improving oil and natural gas recovery from conventional and unconventional hydrocarbon reservoirs	<ul style="list-style-type: none">• Final Exam• Homework Problems
CLO4 : Apply the basic physics behind EOR/EGR processes to explain improved recovery	<ul style="list-style-type: none">• Presentation Summary• Final Exam• Homework Problems

Learning and Teaching Technologies

Moodle - Learning Management System

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Homework Problems Assessment Format: Individual	16%	
Quiz 1 Assessment Format: Individual	24%	
Presentation Summary Assessment Format: Individual	10%	
Final Exam Assessment Format: Individual	50%	

Assessment Details

Homework Problems

Assessment Overview

Engineering problems related to EOR and reservoir engineering skills. Each week there is one problem related to the materials covered in class.

HW1: 2 questions per week for weeks 1-5 (Total 6% of marks)

HW2: 2 questions per week for weeks 6-10 (Total 10% of marks)

Course Learning Outcomes

- CL01 : Display the knowledge and skills needed to solve reservoir engineering problems by means of numerical techniques
- CL02 : Apply integrated knowledge of math and basic sciences including geosciences to the solution of problems related to EOR/EGR performance predictions
- CL03 : Evaluate the function of commercial reservoir simulators for improving oil and natural gas recovery from conventional and unconventional hydrocarbon reservoirs
- CL04 : Apply the basic physics behind EOR/EGR processes to explain improved recovery

Quiz 1

Assessment Overview

One in-class quiz will be conducted during Week 7.

Course Learning Outcomes

- CL01 : Display the knowledge and skills needed to solve reservoir engineering problems by means of numerical techniques
- CL02 : Apply integrated knowledge of math and basic sciences including geosciences to the

solution of problems related to EOR/EGR performance predictions

Presentation Summary

Assessment Overview

Under-graduate students (PTRL 4012 only) are expected to attend all of the post-graduate presentations. Each student will need to select a given presentation and provide a one-page summary. The summary is expected to outline the topic covered during the presentation and highlight how the given technology facilitates the recovery of additional hydrocarbon.

Course Learning Outcomes

- CL04 : Apply the basic physics behind EOR/EGR processes to explain improved recovery

Final Exam

Assessment Overview

The final exam will be administered by the UNSW exam unit. The exam will cover all materials from the course with a focus on materials from Weeks 8 through 10.

Course Learning Outcomes

- CL03 : Evaluate the function of commercial reservoir simulators for improving oil and natural gas recovery from conventional and unconventional hydrocarbon reservoirs
- CL04 : Apply the basic physics behind EOR/EGR processes to explain improved recovery

General Assessment Information

Specific assessment information will be provided on Moodle

Grading Basis

Standard

Course Schedule

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
	Ryan Armstrong					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 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 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. 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.

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
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](#)