



Faculty of Engineering

**School of Minerals and Energy Resources Engineering**

Undergraduate Course Outline

PTRL4010

Integrated Oil-Gas Field Evaluation

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## 1. INFORMATION ABOUT THE COURSE

Course Code:	PTRL4010	Term:	T1, 2020	Level:	UG	Units/Credits	6 UOC
Course Name:	<b>Integrated Oil-Gas Field Evaluation</b>						

Course Convenor:	<b>Dr Hamid Roshan</b>						
Contact Details	School of Minerals and Energy Resources Engineering TETB 221	EMAIL:	h.roshan@unsw.edu.au				
		Phone:	+61 2 9385 5535				
Contact times	<b>Lecture and tutorial time schedule</b> Lectures are at K-H6-LG03 - TETB LG03 Wednesday from 15:00-16:00 and tutorials are at Computer lab (TETB LG35) on Wednesday from 16:00-18:00 and Friday from 11:00-13:00. Any changes will be announced on Moodle during the course.						
Course Tutor	<b>Dr Hamid Aghighi (m.a.aghighi@unsw.edu.au)</b>						

### 1.1. Course Description

Field Geology and stratigraphy analysis

Well correlation and Structural modelling

Petro-physical modelling

Geo-statistics, and

PETREL software

### 1.2. Course Completion

Course completion requires submission of all assessment items; failure to submit all assessment items can result in the award of an Unsatisfactory Failure (UF) grade for the Course.

### 1.3. Assumed Knowledge

Prerequisite: PTRL 2010, PTRL 3002, PTRL3003, PTRL 3022, PTRL 3023, PTRL3025

### 1.4. Attendance

To pass this course it is expected that you will attend at least 80% of tutorials and lectures. *If your attendance is below 80% your final report might not be considered.* Attendance will be recorded when applicable. Normally, there is no make-up work for poor attendance. If you have misadventure or ill-health, please contact your course coordinator as soon as possible. The attendance requirement is not meant to be punitive. It is included because participation is an important part of achieving the course outcomes.

## 2. AIMS, LEARNING OUTCOMES AND GRADUATE ATTRIBUTES

### 2.1. Course Aims

The aim of this course is to enable you to construct a structural model, distribute the petro-physical properties in the model and assess the oil/gas in-place of an actual oil/gas field.

### 2.2. Learning Outcomes

One of the main aims of “Thesis” is to give you the opportunity of self-directed learning. That is what you will face in real life where the critical decisions need to be made often with insufficient data. The responsibilities for any decision rest with you and your group where a proper way of researching and communicating is the key to success in these tasks.

This subject will involve the complete evaluation of a field off-shore Australia with the learning outcomes including a) the understanding of Field Geology Investigation, b) Structural modelling, c) Petro-physical modelling, and d) geo-statistics for properties distribution estimation.

## 3. REFERENCE RESOURCES

Geoscience Australia: <http://www.ga.gov.au>

### 3.1. Reference Materials

In addition to the given references, data on the study area will be found on “Moodle” for this subject.

#### Well Completion Reports

Several basic and interpretative Well Completion Reports will be available on Moodle for all wells.

#### Digital Well Logs

Digital well logs (LAS format) for all wells drilled in the field will be available on Moodle.

#### Others

Temperature and geochemical data will be available from open-files databases. Some of these data can also be found through the Petroleum Information Management System (PIMS) and the National Petroleum Wells Database [www.ga.gov.au](http://www.ga.gov.au). Complete SEGY file is also available on Geoscience Australia website.

The lecture note and software training videos as well as initial model can be viewed and downloaded from the UNSW-Moodle <http://moodle.telt.unsw.edu.au/>

### 3.2. Additional Recommended Resources

Recapping previous lecture notes and their recommended books dealing with petrophysics and well-logging, geology, geostatistics and geophysics are recommended.

### 3.3. Other Resources

Students seeking resources can also obtain assistance from the UNSW Library. One starting point for assistance is: <https://www.library.unsw.edu.au/>

### 3.4. Online Resources

Society of Petroleum Engineers:	<a href="http://www.spe.org">http://www.spe.org</a>
Australian Petroleum Production and Exploration Association:	<a href="http://www.appea.com.au">http://www.appea.com.au</a>
American Association of Petroleum Geologists:	<a href="http://www.geobyte.com">http://www.geobyte.com</a>
Petroleum Exploration Society of Australia:	<a href="http://www.pesa.com.au">http://www.pesa.com.au</a>
American Petroleum Institute – For Petroleum Standards	<a href="http://www.api.org">www.api.org</a>
Society of Petrophysicists & Well Log Analysts	<a href="http://www.spwla.org">www.spwla.org</a>
European Association of Geoscientists & Engineers	<a href="http://www.eage.org">www.eage.org</a>
The Society of Exploration Geophysicists	<a href="http://www.seg.org">www.seg.org</a>

### 3.5. Report Writing Guide

Use these notes as a general guide to the layout of your reports. In particular –

- a. The main text should be in Calibri 11 point.
- b. The left-hand side header should read "PTRL 4010 – Topic".
- c. The right-hand side header should read "Page X"
- d. You should put a line under the header.
- e. The left-hand side footer should show your group name
- f. The right-hand side footer should show the date (for example, "26 March 2018")
- g. You should put a line above the footer.
- h. Headers and footers should be in Calibri 11 point.

As a guide, the contents of reports should be in this order –

- a. Summary
- b. Introduction (context and aims)
- c. Methodology
- d. Results & Discussion
- e. Conclusions References Appendix

## 4. COURSE CONTENT AND LEARNING ACTIVITIES

### 4.1. Course Content

The students gain hands-on experience of the complete geological modelling and evaluation of a field in off-shore Australia (note that the study field may change e.g. you will be informed in the first lecture of the field under study). Both individual and team works are required to deliver a successful outcome on time. In particular, team work is an important component of this course. This is essential in industry practices where the success of every project heavily relies on communication between team members. Therefore students are required to form the groups of four members at the beginning of the subject. All submissions expect the final submission is group submission (final submission is individual). The assessment is based on both team and individual performance. Therefore, you should be very careful with your team member selection.

The subject will start with the Geology review. You will search through the existing body of the literature to make yourself familiar with the overall geology of the area (Regional geology) and then more focus, Field Geology. In the field geology section, you will need to review the geological information available at the field scale and link it to regional geology through detail analysis of different reports provided.

One of the main steps in geological modelling involves the seismic interpretation especially to pick up horizons and faults. As seismic interpretation is part of Geophysics course, the detail of Seismic interpretation will not be discussed, but videos of interpretation will be provided for students' familiarity with PETREL software. In the next part of geological modelling, the geological structures (zones, layers, etc) are constructed and petrophysical modelling is then performed.

Eventually, you will be given a specific individual task to include in your PETREL model. The final report summarizing all information and model runs must be submitted on Moodle by specified deadline. All other reports are group reports (each group will submit one report). **The maximum of 10-page (excluding references) is allowed for every report.** There will be also an individual assessment on geological model.

The step by step training will also be conducted to get fully familiar with PETREL software throughout the course and exercises are performed at every session.

## 4.2. Learning Activities Summary

Week	Lecture period	Workshops	Away work
1	<ul style="list-style-type: none"> <li>Project outline</li> <li>Tasks and deadlines</li> <li>Overview of geological modelling</li> <li>Field Geology and Formations stratigraphy</li> </ul>	<ul style="list-style-type: none"> <li>Group selection</li> <li>Group to assign team leader</li> <li>Discuss the main task allocations</li> <li>PETREL environment</li> <li>PETREL Data import including Well heads, Well deviation survey and Well tops</li> </ul>	<ul style="list-style-type: none"> <li>Identification of issues, tasks, and priorities</li> <li>Allocation of tasks to group members</li> <li>Start reviewing completion/drilling reports provided</li> <li>Practice on PETREL Data importing using videos provided</li> </ul>
2	<ul style="list-style-type: none"> <li>Seismic interpretation</li> <li>Velocity model</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization with Seismic interpretation and visualisation</li> <li>Velocity model selection</li> </ul>	<ul style="list-style-type: none"> <li>Familiarization with regional and field geology</li> <li>Practice on seismic interpretation, visualisation and velocity models</li> </ul>
3	<ul style="list-style-type: none"> <li>Fundamental of well logging and well correlation</li> </ul>	<ul style="list-style-type: none"> <li>Well correlation</li> <li>Well top analysis</li> </ul>	<ul style="list-style-type: none"> <li>Understanding well log requirements</li> <li>Well correlation analysis for the field under investigation</li> </ul>
4	<ul style="list-style-type: none"> <li>Structural modelling and Geo-statistics</li> </ul>	<ul style="list-style-type: none"> <li>Fault modelling</li> <li>Pillar gridding</li> </ul>	<ul style="list-style-type: none"> <li>Fault modelling analysis for the field under investigation</li> <li>Geo-statistics recap</li> </ul>
5	<ul style="list-style-type: none"> <li>Petro-physical modelling and geo-statistics (porosity)</li> </ul>	<ul style="list-style-type: none"> <li>Continue Pillar gridding</li> <li>Make horizons/zones/layers</li> </ul>	<ul style="list-style-type: none"> <li>Pillar gridding for field under investigation</li> <li>Grid generation</li> </ul>
6	<ul style="list-style-type: none"> <li>No lecture</li> </ul>	<ul style="list-style-type: none"> <li>Porosity upscaling</li> <li>Geostatistical analysis including variogram construction and modelling</li> </ul>	<ul style="list-style-type: none"> <li>Porosity upscaling for the field under investigation</li> <li>Variogram construction and modelling</li> </ul>
7	<ul style="list-style-type: none"> <li>DST and permeability</li> </ul>	<ul style="list-style-type: none"> <li>Detail of DST and permeability upscaling</li> <li>PETREL model</li> </ul>	<ul style="list-style-type: none"> <li>Continue PETREL model</li> <li>Working on individual model</li> </ul>
8	<ul style="list-style-type: none"> <li>Water saturation and shaliness</li> </ul>	<ul style="list-style-type: none"> <li>Detail of water saturation and shaliness upscaling</li> <li>Continue PETREL model</li> </ul>	<ul style="list-style-type: none"> <li>Continue PETREL model</li> <li>Working on individual model</li> </ul>
9	<ul style="list-style-type: none"> <li>Mechanical properties</li> </ul>	<ul style="list-style-type: none"> <li>Detail of Mechanical properties upscaling</li> <li>Continue PETREL model</li> </ul>	<ul style="list-style-type: none"> <li>Continue PETREL model</li> <li>Working on individual model</li> </ul>
10	<ul style="list-style-type: none"> <li>PETREL Model debates</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>	<ul style="list-style-type: none"> <li>N/A</li> </ul>

Any changes to lecture/tutorial times will be announced on Moodle during the course.

Other UNSW Key dates: <https://student.unsw.edu.au/calendar>

## 5. COURSE ASSESSMENT

### 5.1. Assessment Summary

Assessment Task	Due date (by 12 am)	Weight (%)
In-class assessment (group assessment)	13 March 2019	10%
Structural and Petro-physical model Report (group assessment)	4 April 2019	20%
PETREL Model Debate (individual assessment)	22 and 24 April 2019	20%
Final Report (individual assessment)	30 April 2019	50%
<b>Total</b>	-	<b>100%</b>

Assignments related details/submission-box will be available online through Moodle. Access to the Moodle site is via the Moodle icon on the MyUNSW homepage.

## 6. ASSESSMENT CRITERIA

The assessment criteria provide a framework for you to assess your own work before formally submitting major assignments to your course convenor. Your course convenor will be using this framework to assess your work and as a way to assess whether you have met the listed learning outcomes and the graduate attributes for your program. We ask that you don't use the assessment criteria guidelines as a checklist, but as a tool to assess the quality of your work. Your course convenor will also be looking at the quality, creativity and the presentation of your written assignment as they review the framework. Rubrics, wherever applicable, will be provided at the time of the assignment release.

## 7. STUDYING AN UG COURSE AT UNSW IN MINERALS AND ENERGY RESOURCES ENGINEERING

### 7.1. How We Contact You

At times, the School or your course convenors may need to contact you about your course or your enrolment. Your course convenors will use the email function within Moodle, or we will contact you on your XXXXXXX@student.unsw.edu.au email address.

We understand that you may have an existing email account and would prefer for your UNSW emails to be redirected to your preferred account. Please see these instructions on how to redirect your UNSW emails: <https://www.it.unsw.edu.au/students/email/index.html>

### 7.2. How You Can Contact Us

We are always ready to assist you with your inquiries. To ensure your question is directed to the correct person, please use the email address below for:

Enrolment or other admin questions regarding your program: Please submit a webform at <https://portal.insight.unsw.edu.au/web-forms/>

Course inquiries: These should be directed to the Course Convenor.



### 7.3. Computing Resources and Internet Access Requirements

UNSW Minerals and Energy Resources Engineering provides blended learning using the online Moodle LMS (Learning Management System).

It is essential that you have access to a PC or notebook computer. Mobile devices such as smart phones and tablets may compliment learning, but access to a PC or notebook computer is also required. Note that some specialist engineering software is not available for Mac computers.

Mining Engineering Students: OMB G48/49

Petroleum Engineering Students: TETB

It is recommended that you have regular internet access to participate in forum discussion and group work. To run Moodle most effectively, you should have:

- 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](http://www.student.unsw.edu.au/moodle-system-requirements)

### 7.4. 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 drop-box 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)

### 7.5. Assignment Submissions

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

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

All assessments must have an assessment cover sheet attached.

### 7.6. Late Submission of an Assignment

Each project task should be completed within a specified time period and by the due date. There will be no extension for the submissions and the late submission will attract a penalty up to 10% of the assessment task value per day. The submission due dates and instructions are given in appropriate section of this document.

### 7.7. Special Consideration

You can apply for special consideration through [UNSW Student Central](#) when illness or other circumstances interfere with your assessment performance. Sickness, misadventure or other circumstances beyond your control may:

- Prevent you from completing a course requirement,
- Keep you from attending an assessable activity,

- Stop you submitting assessable work for a course,
- Significantly affect your performance in assessable work, be it a formal end-of-semester examination, a class test, a laboratory test, a seminar presentation or any other form of assessment.

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

More details on special consideration can be found at: [www.student.unsw.edu.au/special-consideration](http://www.student.unsw.edu.au/special-consideration)

## 7.8. Course Results

For details on UNSW assessment policy, please visit: [www.student.unsw.edu.au/assessment](http://www.student.unsw.edu.au/assessment)

In some instances your final course result may be withheld and not released on the UNSW planned date. This is indicated by a course grade result of either:

- WD – which usually indicates you have not completed one or more items of assessment or there is an issue with one or more assignment; or
- WC – which indicates you have applied for Special Consideration due to illness or misadventure and the course results have not been finalised.

In either event it would be your responsibility to contact the Course Convener as soon as practicable but no later than five (5) days after release of the course result. If you don't contact the convener on time, you may be required to re-submit an assignment or re-sit the final exam and may result in you failing the course. You would also have a NC (course not completed) mark on your transcript and would need to re-enroll in the course.

## 7.9. Students Needing Additional Support

The Student Equity and Disabilities Unit (SEADU) aims to provide all students with support and professional advice when circumstances may prevent students from achieving a successful university education. Take a look at their webpage: [www.studentequity.unsw.edu.au/](http://www.studentequity.unsw.edu.au/)

## 7.10. 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](http://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/](http://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.

### **7.11. Continual Course Improvement**

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.



# School of Minerals and Energy Resources Engineering Assessment Cover Sheet

Course Convenor: \_\_\_\_\_  
Course Code: \_\_\_\_\_ Course Title: \_\_\_\_\_  
Assignment: \_\_\_\_\_  
Due Date: \_\_\_\_\_  
Student Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

## ACADEMIC REQUIREMENTS

Before submitting this assignment, the student is advised to review:

- the assessment requirements contained in the briefing document for the assignment;
- the various matters related to assessment in the relevant Course Outline; and
- the *Plagiarism and Academic Integrity* website at <https://student.unsw.edu.au/plagiarism> to ensure they are familiar with the requirements to provide appropriate acknowledgement of source materials.

If after reviewing this material there is any doubt about assessment requirements, then in the first instance the student should consult with the Course Convenor and then if necessary with the Director – Undergraduate Studies.

While students are generally encouraged to work with other students to enhance learning, all assignments submitted for assessment must be their entire own work and duly acknowledge the use of other person's work or material. The student may be required to explain any or all parts of the assignment to the Course Convenor or other authorised persons. *Plagiarism* is using the work of others in whole or part without appropriate acknowledgement within the assignment in the required form. *Collusion* is where another person(s) assists in the preparation of a student's assignment without the consent or knowledge of the Course Convenor.

*Plagiarism* and *Collusion* are considered as Academic Misconduct and will be dealt with according to University Policy.

## STUDENT DECLARATION OF ACADEMIC INTEGRITY

I declare that:

- This assessment item is entirely my own original work, except where I have acknowledged use of source material [such as books, journal articles, other published material, the Internet, and the work of other student/s or any other person/s].
- This assessment item has not been submitted for assessment for academic credit in this, or any other course, at UNSW or elsewhere.

I understand that:

- The assessor of this assessment item may, for the purpose of assessing this item, reproduce this assessment item and provide a copy to another member of the University.
- The assessor may communicate a copy of this assessment item to a plagiarism checking service (which may then retain a copy of the assessment item on its database for the purpose of future plagiarism checking).

Student Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Students are advised to retain a copy of this assessment for their records and submission should be made in accordance to the assessment details available on the course Moodle site.**