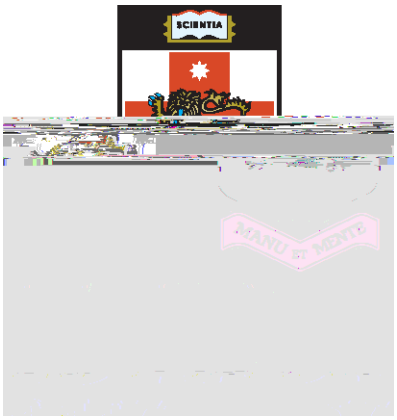

Faculty of Engineering

School of Minerals and Energy Resources Engineering

Undergraduate Course Outline

PTRL4020/PTRL 5010

Natural Gas Engineering

Dr Habib Zughbi

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Course Code:	PTRL4020	Term:	T1 2021	Level:	UG	Units/Credits	6 UOC
Course Name:							

Course Convenor:

Natural gas and hydrogen are becoming an increasingly important part of Australia's and the world's energy supply. Further, natural gas is put forward as a low emission alternative to other fossil fuels, while hydrogen is seen as the ultimate source of fuel to reduce GHG emissions. An extreme surge in research aiming at producing hydrogen at a competitive cost and the development of technologies to allow the development of unconventional gas resources has further added to the likelihood of having H2 commercially as a fuel and also to the expansion in the supply and demand for natural gas. It is important that Petroleum Engineering graduates understand the technical, economic and social issues at play in the development of hydrogen generation and natural gas resources.

The technical aspects of natural gas developments are covered throughout the Petroleum Engineering Program as part of other reservoir engineering, geology, drilling and production courses. This course complements these other courses by aiming to:

1. Combine students existing knowledge of fluid flow with a thorough grounding in the analysis and prediction of the PVT behaviour of hydrogen and natural gases through the application of the thermodynamic concepts and equations of state by applying these concepts to selected unit operations,

2. Introduce students to the types of natural gas resources and the economic and social context of their development and also to the latest in the race to produce and use hydrogen on a commercial level.

At the conclusion of this course, students should be able to:

1. Apply thermodynamic theory to predict & explain the properties and PVT behaviour of hydrogen

- Scholars who are capable of effective communication (GA 1f)
- Leaders who are collaborative team workers (GA 2c)

1. Course introduction; hydrogen generation and natural gas resources; energy, heat & work. Getting gas to market (gas specifications and processing)
2. The first law; state functions & reversible processes; heat effects; heating values; greenhouse gases
3. The second law; entropy; ideal & lost work; material, energy and entropy balances
4. PVT behaviour of ideal and real gases; reversible cycles for processes
5. Real equations of state; residual properties and real processes
6. Onshore transport of natural gas: compressors, turbines and pipelines
7. Vapour-liquid equilibrium and the phase behaviour of natural gases
8. Water vapour in natural gases; dehydration and hydrate inhibition
9. Hydrogen generation technologies and economics and possibly valves, nozzles and chokes in gas operations

Study Period	23 Apr – 28 Apr 2022
Exam Period	29 Apr – 12 May 2022

Other UNSW Key dates: https://student.unsw.edu.au/new-calendar-dates

The assessment criteria provides 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.

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/

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.

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 th3(t)5(h)-4 edorsu3 TET

materials

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