



## UNSW Course Outline

# PTRL5102 Digital Core Analysis - 2024

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## General Course Information

**Course Code :** PTRL5102

**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 :** In Person

**Delivery Format :** Standard

**Delivery Location :** Kensington

**Campus :** Sydney

**Study Level :** Postgraduate

**Units of Credit :** 6

### Useful Links

[Handbook Class Timetable](#)

## Course Details & Outcomes

### Course Description

This course introduces concepts of digital core analysis and provides resources engineers with the knowledge to define the objectives of and execute a digital core analysis acquisition program. The course covers topics from sample preparation and 3D tomographic image

acquisition to image processing, rock-typing and physical property calculations including pore-scale modeling.

## Course Aims

This course aims to (1) introduce the student to the background knowledge in digital core analysis and (2) guide the student in the application of digital core analysis to practical problems.

The learning outcomes are for the student to (1) demonstrate knowledge and skills needed to employ digital core analysis in the industry, (2) understand assumptions and limitations inherent to this technology, and (3) design and/or apply digital core analysis in the context of resources engineering applications.

## Course Learning Outcomes

| Course Learning Outcomes  |
|---|
| CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering. |
| CLO2 : Identify future innovative pathways for resources engineering problems   |
| CLO3 : Demonstrate effective group work and communication skills for professional practice  |

| Course Learning Outcomes  | Assessment Item  |
|---|--|
| CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering. | <ul style="list-style-type: none"><li>• Group project phase 1</li><li>• Quizzes</li><li>• Group project phase 2</li><li>• Group Presentation</li></ul> |
| CLO2 : Identify future innovative pathways for resources engineering problems   | <ul style="list-style-type: none"><li>• Group project phase 1</li><li>• Quizzes</li><li>• Group project phase 2</li><li>• Group Presentation</li></ul> |
| CLO3 : Demonstrate effective group work and communication skills for professional practice  | <ul style="list-style-type: none"><li>• Group project phase 1</li><li>• Group project phase 2</li><li>• Group Presentation</li></ul>                   |

## Learning and Teaching Technologies

Moodle - Learning Management System

# Learning and Teaching in this course

Students will utilize the image processing workstations in TETB LG24 and/or Matlab or python scripting approaches for image processing (to be agreed within the group). In the first 5 weeks we will have more lectures and during that time the groups will make the decision as to what project they will implement (objectives/samples/physical properties). The rest of the course is (guided) implementation through a practical approach.

# Assessments

## Assessment Structure

| Assessment Item  | Weight | Relevant Dates  |
|--|--------|---|
| Group project phase 1<br>Assessment Format: Individual | 40%    | Start Date: Not Applicable<br>Due Date: Week 6: 14 October - 20 October                                     |
| Quizzes<br>Assessment Format: Individual               | 10%    | Start Date: Regular weekly quizzes (multiple).<br>Due Date: Each quiz is due within a week of opening.      |
| Group project phase 2<br>Assessment Format: Group      | 30%    | Start Date: Not Applicable<br>Due Date: Week 10: 11 November - 17 November                                  |
| Group Presentation<br>Assessment Format: Group         | 20%    | Start Date: Not Applicable<br>Due Date: Week 6: 14 October - 20 October, Week 10: 11 November - 17 November |

## Assessment Details

### Group project phase 1

#### Assessment Overview

As part of the group project implementing a digital core analysis workflow, individual students will carry out image processing tasks and physical property calculations on a selected sample (can be provided by the student) and write a corresponding report.

Marking will be based on specific assessment criteria and students will receive feedback after the marking is finalised.

#### Course Learning Outcomes

- CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering.
- CLO2 : Identify future innovative pathways for resources engineering problems
- CLO3 : Demonstrate effective group work and communication skills for professional practice

### Detailed Assessment Description

A more detailed assessment will be agreed upon discussion with the group(s) formed, as they are able to bring their own samples and/or select an area of interest.

### Assessment Length

< 10 pages

### Assessment information

The assignment forms the basis for the group project and should detail the objectives of the group project - e.g., since many different objectives are possible in digital core analysis, the group will decide on a combination and submit a plan for completion of the project and the responsibilities assigned to individual team members.

### Assignment submission Turnitin type

Not Applicable

### Generative AI Permission Level

#### Assistance with Attribution

This assessment requires you to write/create a first iteration of your submission yourself. You are then permitted to use generative AI tools, software or services to improve your submission in the ways set out below.

Any output of generative AI tools, software or services that is used within your assessment must be attributed with full referencing.

If outputs of generative AI tools, software or services form part of your submission and are not appropriately attributed, your Convenor will determine whether the omission is significant. If so, you may be asked to explain your submission. 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](#).

### Quizzes

#### Assessment Overview

Self-assessment of learned concepts uploaded after each lecture (weeks 1-5). Unlimited number of attempts.

Marking will be based on specific assessment criteria and students will receive feedback after

the marking is finalised.

### Course Learning Outcomes

- CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering.
- CLO2 : Identify future innovative pathways for resources engineering problems

### Detailed Assessment Description

These are regular quizzes for the first weeks of the course, ensuring that no students fall behind in the base material.

### Submission notes

Quizzes can be repeated indefinitely, but must be passed.

### 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](#).

## Group project phase 2

### Assessment Overview

As part of the group project implementing a digital core analysis workflow, the students in the group will collate and discuss their findings from the individual section, generating a bigger picture of the topic.

Marking will be based on specific assessment criteria for both individual and group components. Students will receive feedback after the marking is finalised.

### Course Learning Outcomes

- CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering.
- CLO2 : Identify future innovative pathways for resources engineering problems
- CLO3 : Demonstrate effective group work and communication skills for professional practice

## Detailed Assessment Description

This group assessment consists of a final report, but also includes the assessment of the regular contribution of students as experienced in the weekly workshop/tutorial meetings. Note that in the second half of the course there are no lectures - it is wholly practical learning supervised by the lecturer/convenor. It is expected that students show initiative and contributions throughout. While the report is done by the group, individual contributions of students are noted as well through this process.

## Assessment Length

<= 20 pages in total. Additional information (if required) can be attached as appendix.

## Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

## Generative AI Permission Level

### **Assistance with Attribution**

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For more information on Generative AI and permitted use please see [here](#).

## **Group Presentation**

### Assessment Overview

Each group gives a 10 minute presentation on their proposed workflow at the beginning of the group project and a 20 minute presentation about the final results at the end of the term.

Marking will be based on specific assessment criteria for both individual and group components. Students will receive feedback after the marking is finalised.

## Course Learning Outcomes

- CLO1 : Develop knowledge of image acquisition, image processing and pore scale modeling and its application in resources engineering.
- CLO2 : Identify future innovative pathways for resources engineering problems
- CLO3 : Demonstrate effective group work and communication skills for professional practice

## Detailed Assessment Description

All students in the group will present their contribution to the group project (~5m/student in the final presentation). In addition the original objective and final workflow of the digital core analysis project should be detailed. All students within the group should be able to explain any part of the group project. Note that the presentation has two phases (week 6 and week 10).

## Assignment submission Turnitin type

Not Applicable

## Generative AI Permission Level

### **Assistance with Attribution**

This assessment requires you to write/create a first iteration of your submission yourself. You are then permitted to use generative AI tools, software or services to improve your submission in the ways set out below.

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For more information on Generative AI and permitted use please see [here](#).

## **General Assessment Information**

### Grading Basis

Standard

### Requirements to pass course

To pass the course, students need to achieve an overall pass mark. Students who do not contribute to the group project - e.g., visible through peer assessment or through the fact that the lecturer also covers the tutorials (attendance and contribution), will fail the course.

# Course Schedule

## Attendance Requirements

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

## General Schedule Information

Further information on course schedule will be provided on Moodle.

# Course Resources

## Prescribed Resources

- Matlab (online server)
- Aviso (through TETB LG24)
- Supercomputing resources will be utilized if required (depending on tasks chosen). In those cases I will provide direct assistance as needed.

## Course Evaluation and Development

In the past students have been very happy regarding the course (6/6 my experience). This is possibly attributed to the hands-on approach, which seems to work very well. For now we do not have a reason to change the teaching approach. However, there will be a flexible approach to the emergence of AI and I would be very happy to hear feedback to that regard.

# Staff Details

| Position | Name            | Email | Location | Phone      | Availability | Equitable Learning Services Contact | Primary Contact |
|----------|-----------------|-------|----------|------------|--------------|-------------------------------------|-----------------|
| Convenor | Christoph Arn s |       | TETB 220 |            |              | No                                  | Yes             |
| Lecturer | Christoph Arn s |       | TETB 220 | 0434797239 |              | No                                  | No              |

# 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](https://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](https://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](#)