Unit study package number: 311770 and 311774
Mode of study: Internal
Tuition pattern summary:
312 Lecture: 1 x 1 Hours
   Computer Laboratory: 1 x 2 Hours
612 Lecture: 1 x 1 Hours
   Computer Laboratory: 1 x 2 Hours
This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units:
8127 (v.0) Advanced Calculus 201 or any previous version
   OR
8648 (v.0) Mathematical Methods 201 or any previous version
   AND
8128 (v.0) Linear Algebra 202 or any previous version
   OR
7905 (v.0) Mathematical Methods 202 or any previous version
   AND
12454 (v.0) Gravity and Magnetics for Exploration 301 or any previous version
   AND
12455 (v.0) Introduction to Seismic Exploration 303 or any previous version
Co-requisite units: Nil
Anti-requisite units: Nil
Result type: Grade/Mark
Approved incidental fees: Information about approved incidental fees can be obtained from our website. Visit fees.curtin.edu.au/incidental_fees.cfm for details.
Unit coordinator:
   Title: Mr
   Name: Sasha Ziramov
   Phone: +61 8 9266 4973
   Email: Sasha.Ziramov@curtin.edu.au
   Building: 613
   Room: 4H27
Teaching Staff:
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311770 Geophysical Data Processing 312 and 612 (311774)
Semester 2, 2014
Acknowledgement of Country
We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.

Syllabus
Introduce students to advanced techniques and exploration practice in geophysical processing and interpretation; seismic data processing; use of commercial geophysical packages (such as PROMAX, Geosoft, Encom, ER Mapper and/or Intrepid) to process and interpret geophysical data sets. Lectures will take the form of pre-laboratory sessions and cover the necessary theory for the laboratory exercises.

Introduction
Welcome to Geophysics – Data Processing (Petr/Min) 312/612. This unit is designed to introduce students to advanced techniques and exploration practice in petroleum and mineral geophysical processing and interpretation.

Unit Learning Outcomes
All graduates of Curtin University achieve a set of nine graduate attributes during their course of study. These tell an employer that, through your studies, you have acquired discipline knowledge and a range of other skills and attributes which employers say would be useful in a professional setting. Each unit in your course addresses the graduate attributes through a clearly identified set of learning outcomes. They form a vital part in the process referred to as assurance of learning. The learning outcomes tell you what you are expected to know, understand or be able to do in order to be successful in this unit. Each assessment for this unit is carefully designed to test your achievement of one or more of the unit learning outcomes. On successfully completing all of the assessments you will have achieved all of these learning outcomes.

Your course has been designed so that on graduating we can say you will have achieved all of Curtin's Graduate Attributes through the assurance of learning process in each unit.

<table>
<thead>
<tr>
<th>On successful completion of this unit students can:</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Explain the purpose of basic seismic processing algorithms</td>
<td>📊💡</td>
</tr>
<tr>
<td>2 Construct seismic processing flows and choose appropriate parameters</td>
<td>📊💡</td>
</tr>
<tr>
<td>3 Process and interpret ground and airborne data using appropriate techniques</td>
<td>📊💡</td>
</tr>
<tr>
<td>4 Perform image processing of geophysical data</td>
<td>📊💡</td>
</tr>
</tbody>
</table>

Curtin’s Graduate Attributes

💡 Apply discipline knowledge
💡 Thinking skills
(use analytical skills to solve problems)
💡 Information skills
(confidence to investigate new ideas)
💡 Communication skills
💡 Technology skills
💡 Learning how to learn
(apply principles learnt to new situations)
(confidence to tackle unfamiliar problems)
💡 International perspective
(value the perspectives of others)
💡 Cultural understanding
(value the perspectives of others)
💡 Professional Skills
(work independently and as a team)
(plan own work)

Find out more about Curtin’s Graduate attributes at the Office of Teaching & Learning website: ctl.curtin.edu.au
Learning Activities

**Petroleum Section:** Lectures cover a range of topics related to basics of reflection seismic data processing, CDP method. Workshops are aimed to development of practical skills in CDP data processing using ProMAX (one of de-facto standard industrial processing packages). During workshops students will run through the whole basic processing flow for one marine CDP line.

**Minerals Section:** The lectures are designed to support the laboratory program. They will take the form of pre-laboratory sessions and cover the necessary theory for the laboratory exercises. The workshops are designed to acquire skills in solving basic problems in geophysical data processing and interpretation. Use of commercial geophysical packages to process and interpret geophysical data sets including Geosoft, Encom and ER Mapper. The lecture/laboratory schedule is provided at the end of this unit outline.

Learning Resources

**Recommended texts**

You do not have to purchase the following textbooks but you may like to refer to them.


**Online resources**


**Other resources**

Geophysical software manuals as advised.
Assessment

Assessment schedule

<table>
<thead>
<tr>
<th>Task</th>
<th>Value %</th>
<th>Date Due</th>
<th>Unit Learning Outcome(s) Assessed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment of completed Lab Books</td>
<td>50 percent</td>
<td>Week: 14, Day: Friday, Time: 5 pm</td>
<td>1,2,3,4</td>
</tr>
<tr>
<td>Assignment 1 (3 short reports addressing seismic data processing)</td>
<td>25 percent</td>
<td>Week: 6 &amp; 12, Day: Friday, Time: 5 pm</td>
<td>1,2,3,4</td>
</tr>
<tr>
<td>Assignment 2 (3 short reports addressing field and airborne data imaging and processing)</td>
<td>25 percent</td>
<td>Week: 5 &amp; 9, Day: Friday, Time: 5 pm</td>
<td>1,2,3,4</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. **Laboratory Books – Portfolios – Seismic Data Processing**
   Worth: 25%
   Portfolio should contain representation of each seismic data processing step with appropriate screenshots and comments. If any of processing stages require selection of various processing routines parameters student should comment on this (at least – on principal parameters). Size of portfolio is limited by 50 pages including (!) pictures.

2. **Assignment 1 – Short Report No. 1 – Seismic Data Processing.**
   Worth: 10%
   Due: 5 PM Friday Week 6
   The assignment will consist of 2 questions/exercises related to lecture material given in weeks 1-5. Students are expected to produce written report with complete answers, including all intermediate computations and comments. Size of the report is limited by 3 (three) pages.
   Assignment 1 Report 1 Marking Criteria
   Correct answer to each question gives 5%.

3. **Assignment 2 – Short Report No. 2 and 3 – Seismic Data Processing.**
   Worth: 15%
   Due: 5 PM Friday Week 12
   The assignment will consist of 3 questions/exercises related to lecture material given in weeks 6-11. Students are expected to produce written report with complete answers, including all intermediate computations and comments. Size of the report is limited by 4 (four) pages.
   Assignment 1 Report 2 and 3 Marking Criteria
   Correct answer to each question gives 5%.

3. **Assignment 2 – Short Report No. 1 – Minerals Data Processing.**
   Worth: 10%
   Due: 5 PM Friday Week 5
   Airborne radiometrics and image processing
   Assignment 2 Report 1 Marking Criteria
   Marks will be allocated as per the assignment handout

4. **Assignment 2 – Short Report No. 2 and 3 – Minerals Data Processing.**
   Worth: 15%
   Due: 5 PM Friday Week 9
   Interpretation
   Assignment 2 Report 2 adn 3 Marking Criteria
   Marks will be allocated as per the assignment handout
Fair assessment through moderation

Moderation describes a quality assurance process to ensure that assessments are appropriate to the learning outcomes, and that student work is evaluated consistently by assessors. Minimum standards for the moderation of assessment are described in the Assessment Manual, available from policies.curtin.edu.au/policies/teachingandlearning.cfm

Late assessment policy

This ensures that the requirements for submission of assignments and other work to be assessed are fair, transparent, equitable, and that penalties are consistently applied.

1. All assessments which students are required to submit will have a due date and time specified on the Unit Outline.
2. Accepting late submission of assignments or other work will be determined by the unit coordinator or Head of School and will be specified on the Unit Outline.
3. If late submission of assignments or other work is not accepted, students will receive a penalty of 100% after the due date and time i.e. a zero mark for the late assessment.
4. If late submission of assignments or other work is accepted, students will be penalised by ten percent per calendar day for a late assessment submission (e.g., a mark equivalent to 10% of the total allocated for the assessment will be deducted from the marked value for every day that the assessment is late). This means that an assignment worth 20 will have two marks deducted per calendar day late. Hence if it was handed in three calendar days late and marked as 12/20, the student would receive 6/20. An assessment more than seven calendar days overdue will not be marked. Work submitted after this time (due date plus seven days) may result in a Fail - Incomplete (F-IN) grade being awarded for the unit.

Assessment extension

A student wishing to delay the completion or submission of an assessment task after the original published date/time (e.g., examinations, tests) or due date/time (e.g., assignments) must apply for an assessment extension using the Assessment Extension form (available from the Forms page at http://students.curtin.edu.au/administration/) as prescribed by the Academic Registrar. It is the responsibility of the student to demonstrate and provide evidence for exceptional circumstances beyond the student’s control that prevented them from completing/submitting the assessment task.

The student will be expected to lodge the form and supporting documentation with the unit coordinator before the assessment date/time or due date/time. An application may be accepted up to five working days after the date or due date of the assessment task where the student is able to provide an acceptable explanation as to why he or she was not able to submit the application prior to the assessment date. An application for an assessment extension will not be accepted after the date of the Board of Examiners’ meeting.

Additional assessment information

Pass requirements

Mark of more than 50, minimum of 25 in each (Petroleum and Minerals) component.

Referencing style

The referencing style for this unit is Chicago.

More information can be found on this style from the Library web site: library.curtin.edu.au.

Plagiarism

Plagiarism occurs when work or property of another person is presented as one’s own, without appropriate acknowledgement or referencing. Plagiarism is a serious offence. Student guidelines for avoiding plagiarism can be found at: http://academicintegrity.curtin.edu.au/local/docs/StudentPlagiarismGuide.pdf. For more information refer to academicintegrity.curtin.edu.au.

Plagiarism monitoring

Work submitted may be subjected to a plagiarism detection process, which may include the use of systems such as ‘Turnitin’. For further information, see academicintegrity.curtin.edu.au/students/turnitin.cfm.
Additional information

Enrolment

It is your responsibility to ensure that your enrolment is correct - you can check your enrolment through the eStudent option on OASIS, where you can also print an Enrolment Advice.

Supplementary and Deferred Exams

Deferred examinations will be held at a date to be advised (see next section). Supplementary examinations, where applicable and when granted by the Board of Examiners, will be held at a date to be advised (see next section). Notification to students will be made after the Board of Examiners meeting via the Official Communications Channel (OCC) in OASIS.

It is the responsibility of students to be available to attend a supplementary or deferred examination on the date advised and to check their OASIS account on a weekly basis for official Curtin correspondence. If your results show that you have been granted a supplementary or deferred examination you should immediately check your OASIS email for details.

Supplementary and deferred examinations will be held at a date to be advised. Notification to students will be made after the Board of Examiners meeting via the Official Communications Channel (OCC) in OASIS. It is the student’s responsibility to check their OASIS account on a weekly basis for official Curtin correspondence. If your results show that you have been awarded a supplementary or deferred exam you should immediately check your OASIS email for details.

Student Rights and Responsibilities

It is the responsibility of every student to be aware of all relevant legislation, policies and procedures relating to their rights and responsibilities as a student. These include:

- the Student Charter
- the University’s Guiding Ethical Principles
- the University’s policy and statements on plagiarism and academic integrity
- copyright principles and responsibilities
- the University’s policies on appropriate use of software and computer facilities

Information on all these things is available through the University’s "Student Rights and Responsibilities website at: students.curtin.edu.au/rights.

Student Equity

There are a number of factors that might disadvantage some students from participating in their studies or assessments to the best of their ability, under standard conditions. These factors may include a disability or medical condition (e.g. mental illness, chronic illness, physical or sensory disability, learning disability), significant family responsibilities, pregnancy, religious practices, living in a remote location or another reason. If you believe you may be unfairly disadvantaged on these or other grounds please contact Student Equity at eesi@curtin.edu.au or go to http://eesi.curtin.edu.au/student_equity/index.cfm for more information.

You can also contact Counselling and Disability services: http://www.disability.curtin.edu.au or the Multi-faith services: http://unilife.curtin.edu.au/diversity_and_faith/faith_services.htm for further information.

It is important to note that the staff of the university may not be able to meet your needs if they are not informed of your individual circumstances so please get in touch with the appropriate service if you require assistance. For general wellbeing concerns or advice please contact Curtin’s Student Wellbeing Advisory Service at: http://life.curtin.edu.au/health-and-wellbeing/student_wellbeing_service.htm

Recent unit changes

We welcome feedback as one way to keep improving this unit. Students are encouraged to provide unit feedback through eVALUate, Curtin’s online student feedback system (see evaluate.curtin.edu.au/info/). Recent changes to this unit include:

N/A

See evaluate.curtin.edu.au to find out when you can eVALUate this unit.
### Program calendar

**Semester 2 2014 Lecture/Laboratory Outline – Petroleum Section** *(BOLD TYPE = Theory; ITALICS = Practicals)*

<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Lecture / Lab topic</th>
<th>Assessment</th>
<th>Assessment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4 Aug</td>
<td><strong>Introduction to Processing</strong> - 1 / Unix basics, ProMAX user interface</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>11 Aug</td>
<td><strong>Introduction to Processing</strong> - 2 / PROMAX structure, Geometry assignment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3.   | 18 Aug     | **Digital filters** - 1 / Interactive data analysis  
Lecture: Fourier, Z-transform, phase, min. phase, ISA |            |                |
| 4.   | 25 Aug     | **Digital filters** – 2 / Pre-processing  
As is + statics |            |                |
| 5.   | 1 Sep      | Tuition Free Week |            |                |
| 6.   | 8 Sep      | **Deconvolution** / Deconvolution  
Inverse filtering, Wiener, predictive decon | Short Report 1 (Petroleum) | Friday, Week 6 |
| 7.   | 15 Sep     | **Velocity analysis** – 1 / Velocity analysis, NMO and stacking – 1 |            |                |
| 8.   | 22 Sep     | **Velocity analysis** – 2 / Velocity analysis, NMO and stacking – 2 |            |                |
| 9.   | 29 Sep     | Tuition Free Week |            |                |
| 10.  | 6 Oct      | **2D Filters** – 1 / Tau-P domain demultiple |            |                |
| 11.  | 13 Oct     | **2D Filters** – 2 / F-K Filtering |            |                |
| 12.  | 20 Oct     | **Introduction to seismic migration** – 1 / Migration - 1 | Short Report 2 & 3 (Petroleum) | Friday, Week 12 |
| 13.  | 27 Oct     | **Introduction to seismic migration** – 2 / Attribute analysis |            |                |
| 14.  | 3 Nov      | Wrap-up and review of the course | Submission of lab books (Petroleum) | Friday, Week 14 |
| 15.  | 10 Nov     | Study Week |            |                |
| 16.  | 17 Nov     | Examinations |            |                |
| 17.  | 24 Nov     | Examinations |            |                |

Assessment of lab component of the unit will be done based on completed laboratory books/portfolios, due on Friday, Week 14.
<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Lecture / Lab topic</th>
<th>Assessment</th>
<th>Assessment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>4 Aug</td>
<td>Radiometrics 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>11 Aug</td>
<td>Radiometrics 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>18 Aug</td>
<td>Image processing 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>25 Aug</td>
<td>Image processing 2</td>
<td>Short Report 1 (Minerals)</td>
<td>Friday, Week 5</td>
</tr>
<tr>
<td>5.</td>
<td>1 Sep</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>8 Sep</td>
<td>Digital elevation models 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>15 Sep</td>
<td>Digital elevation models 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>22 Sep</td>
<td>Gravity and magnetic modelling 1</td>
<td>Short Report 2 &amp; 3 (Minerals)</td>
<td>Friday, Week 9</td>
</tr>
<tr>
<td>9.</td>
<td>29 Sep</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>6 Oct</td>
<td>Gravity and magnetic modelling 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>13 Oct</td>
<td>Interpretation software 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>20 Oct</td>
<td>Interpretation software 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>27 Oct</td>
<td>Processing / Interpretation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>3 Nov</td>
<td>Wrap-up and review of the course</td>
<td>Submission of lab books (Minerals)</td>
<td>Friday, Week 14</td>
</tr>
<tr>
<td>15.</td>
<td>10 Nov</td>
<td>Study Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>17 Nov</td>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>24 Nov</td>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Assessment of lab component of the unit will be done based on completed laboratory books/portfolios, due on Friday, Week 14.