Unit Outline
314671 Geophysical Reservoir Characterisation 622
Semester 1, 2013

Unit study package number: 314671
Mode of study: Internal
Tuition pattern summary: Lecture: 1 x 2 Hours Weekly
Computer Laboratory: 1 x 3 Hours Weekly
This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units: Nil
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.

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Learning Management System: Blackboard (lms.curtin.edu.au)
Acknowledgement of Country
We respectfully acknowledge the Indigenous Elders, custodians, their descendants and kin of this land past and present.

Syllabus

Introduction
The aim of this unit is to provide the students with the knowledge and practical skills in reservoir characterisation and quantitative interpretation technologies.

Learning Outcomes

<table>
<thead>
<tr>
<th>On successful completion of this unit students can:</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Characterise pore fluid from calculated AVO reconnaissance attributes</td>
<td>📊💡🔍🔍</td>
</tr>
<tr>
<td>2 Estimate elastic anisotropic parameters from seismic data</td>
<td>📊💡🔍🔍</td>
</tr>
<tr>
<td>3 Generate well tie (seismic to log correlation)</td>
<td>🤝💡🔍🔍</td>
</tr>
<tr>
<td>4 Discuss the inversion errors from performed acoustic inversion of seismic data</td>
<td>📊💡🔍🔍</td>
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Curtin's Graduate Attributes

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

Learning Activities
All the class time is organised into lectures and workshops. Lectures will provide essential material for the unit, and will also provide ample opportunities for interactive learning. In addition, some lecture time will be dedicated to in class exercises, which will prepare the students for solving problems. Student's skill in solving these problems will be assessed in the final in class test.

Workshops are designed to develop hands-on skills in quantitative interpretation of seismic data using industry-standard computer software.
Learning Resources

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


Other Resources
Lecture notes, slides and additional references will be available on Blackboard.

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>Mid Semester Presentation</td>
<td>20 percent</td>
<td>Week: 10</td>
<td>1,3,4</td>
</tr>
<tr>
<td>End of semester submission of Portfolio</td>
<td>50 percent</td>
<td>Week: 14</td>
<td>1,3,4</td>
</tr>
<tr>
<td>End of semester test</td>
<td>30 percent</td>
<td>Week: 14</td>
<td>1,2,3</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. You will be required to give a short power-point presentation in front of the class on one of the given topics. The details and the topics will be given in the class.
2. You will need to hand over the portfolio of your lab work. The details will be explained at the workshop.
3. You will be required to sit an in-class test (open book) covering a range of theoretical topics.

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.

Pass requirements

Every student must give the presentation and pass the other two assessments.
Referencing style

Students should use the Chicago referencing style when preparing assignments. More information can be found on this style from the Library website: 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. 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/Deferred Exams:

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.

Disability

Students with a disability or medical condition (e.g. mental health condition, chronic illness, physical or sensory disability, learning disability) are encouraged to seek advice from Disability Services www.disability.curtin.edu.au. A Disability Advisor will work with you and liaise with staff to identify strategies to assist you to meet unit (including fieldwork education) and course requirements, where possible. 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.

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:

This is a new unit.

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

<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Lecture/ Tutorial</th>
<th>Workshop</th>
<th>Assessment Due</th>
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</thead>
<tbody>
<tr>
<td>Orientation</td>
<td></td>
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<tr>
<td>1.</td>
<td>25 February</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td>4 March</td>
<td>Seismic waves in a homogeneous medium. Wave equations for P-SV and SH waves. Boundary conditions. Reflection at a fluid-fluid interface. Reflection at a free surface.</td>
<td>1D model and synthetic seismogram creation (acoustic/elastic)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>18 March</td>
<td>AVO attributes. AVO Classes. Exercises/tutorial</td>
<td>AVO attributes using field gathers</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>25 March</td>
<td>Seismic inversion – basic principles. (1 hour)</td>
<td>Start of inversion workshop: borehole import, deviations, log edit</td>
<td></td>
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<tr>
<td>6.</td>
<td>1 April</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>8 April</td>
<td>Rock Physics, basic principles</td>
<td>Inversion continues (log edit, extract wavelet, start of correlation)</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>15 April</td>
<td>Rock physics, continues (Gassmann theory, computing moduli)</td>
<td>Inversion continues (finish correlation, build 2D model)</td>
<td></td>
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<tr>
<td>9.</td>
<td>22 April</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>29 April</td>
<td>Project presentations</td>
<td>2D inversion, error analysis</td>
<td>Presentation</td>
</tr>
<tr>
<td>11.</td>
<td>6 May</td>
<td>Seismic anisotropy I. Symmetry classes. Waves in anisotropic media. Slowness surfaces. Anisotropy parameters.</td>
<td>3D inversion (hidden borehole error analysis)</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>13 May</td>
<td>Seismic anisotropy II. NMO, velocity analysis and AVO in VTI media</td>
<td>Fluid substitution exercise with field data</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>20 May</td>
<td>Special topic Plane and spherical waves. Homogeneous and evanescent plane waves. Forward modelling</td>
<td>AVO inversion (super gathers, angle gathers, recon)</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>27 May</td>
<td>Tutorial</td>
<td>AVO inversion (elastic impedance, Lambda-rho)</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>3 June</td>
<td>Review</td>
<td>Final test</td>
<td>Portfolio</td>
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