Unit Outline
314662 Theoretical Geophysics 310
Semester 1, 2013

Unit study package number: 314662
Mode of study: Internal
Tuition pattern summary: Lecture: 1 x 2 Hours Weekly
Science 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.

Unit coordinator:
Name: Maxim Lebedev
Phone: +618 9266 2330
Email: M.Lebedev@exchange.curtin.edu.au
Building: 613
Room: 4H30

Teaching Staff:
Name: Andrej Bona
Phone: +618 9266 7194
Email: A.Bona@curtin.edu.au
Building: 613
Room: 4H27
Name: Mark Lwin
Phone: +618 9266 4970
Email: M.Lwin@curtin.edu.au
Building: 613
Room: 4H27
Name: Robert Galvin
Phone: +618 9266 4973
Email: Robert.Galvin@curtin.edu.au
Building: 613
Room: 4H34

Administrative contact:
Name: Judith Tournay
Phone: 3565
Email: J.Tournay@curtin.edu.au
Building: 613

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
Fourier transformations and sampling of geophysical data; Geophysical applications of correlation and convolution; Filtering of data, interpolation and noise in geophysical data sets; Gradient, curl, divergence and their use in geophysics; partial equations in geophysics.

Introduction
This unit is aimed to introduce students to fundamental principles of geophysical data analysis and provide basic understanding of solving equations in geophysics.

Learning Outcomes
On successful completion of this unit students can:

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Graduate Attributes addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Perform fourier analysis on geophysical signals</td>
<td></td>
</tr>
<tr>
<td>2 Design and use simple methods of geographical data analysis</td>
<td></td>
</tr>
<tr>
<td>3 Apply vector calculus to geophysical data analysis</td>
<td></td>
</tr>
<tr>
<td>4 Understand the role of partial differential equations and their solutions in geophysics</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: otl.curtin.edu.au

Learning Activities
Attending and participating in lectures, workshops and laboratories is the main learning activity. Attendance at the lectures should be considered as absolutely necessary for a suitable understanding of the course material. Independent work on assignments will reinforce the lecture material. Students are encouraged to meet with lecturers for any course material for which they need further explanation.
Learning Resources

Recommended Texts

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

- Harman T.L., Dabney J., Richert N. 1999. ADVANCED ENGINEERING MATHEMATICS WITH MATLAB. Brooks/Cole,

Online Resources


Other Resources

Lecture notes will be provided 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>Laboratory reports</td>
<td>30 percent</td>
<td>TBA</td>
<td>1,4</td>
</tr>
<tr>
<td>Assignments</td>
<td>30 percent</td>
<td>TBA</td>
<td>1,2,3</td>
</tr>
<tr>
<td>Exam</td>
<td>40 percent</td>
<td>TBA</td>
<td>1,3,2</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. Students will be required to submit Laboratory reports after each workshop/laboratory. The first Laboratory report mark will not be counted toward the final mark.
   Laboratory report Marking Criteria:
   - Full completion of the assignment 25%
   - Demonstrated understanding of the subject matter of the assignment 50%
   - Presentation of the material 25%

2. Students will be required to answer questions or do problems related to the lecture material or course content and submit a written report which includes the answers. Assignment details will be provided during the lectures.
   Assignment 2 Marking Criteria:
   - Full completion of the assignment 25%
   - Demonstrated understanding of the subject matter of the assignment 50%
   - Presentation of the material 25%

3. One 2 hour test will be held during week 9. The final 2 hour exam will be during the formal Examination Weeks.

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
All assignments must be accompanied by an Assignment Attachment Form (or cover page) where provided by the Lecturer. Alternatively, assignments need to clearly show the Student's Name, Student ID number, the Title and Number of the Assignment, and the Name of the Lecturer on the first page of their assignment. Unless otherwise advised by the lecturer/s, all assignments MUST be lodged into the respective Lecturers' Locked Assignment Box, located at the Department of Exploration Geophysics Reception Desk. All assignments must be received by 5 pm on the Friday of the week due.

Referencing style
Students should use the Chicago referencing style when preparing assignments. 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. 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:

N/A (new unit)

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

## Program Calendar – Semester 1 2013

<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Lecture/ Seminar</th>
<th>Tutorial/Other</th>
<th>Assessment Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation</td>
<td>25 February</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>4 March</td>
<td>Sampling, aliasing, Fourier series and transform</td>
<td>Sampling, Aliasing</td>
<td>12 March</td>
</tr>
<tr>
<td>2.</td>
<td>11 March</td>
<td>Fourier analysis</td>
<td>Amplitude and Phase, Adding Sines and Cosines</td>
<td>19 March</td>
</tr>
<tr>
<td>3.</td>
<td>18 March</td>
<td>Convolution, correlation</td>
<td>Fourier Analysis, Simple Filtering</td>
<td>26 March</td>
</tr>
<tr>
<td>4.</td>
<td>25 March</td>
<td>Deconvolution, wavelet phase</td>
<td>Convolution, Deconvolution and Correlation</td>
<td>9 April</td>
</tr>
<tr>
<td>5.</td>
<td>1 April</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
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<tr>
<td>6.</td>
<td>8 April</td>
<td>Filters</td>
<td>Filtering</td>
<td>16 April</td>
</tr>
<tr>
<td>7.</td>
<td>15 April</td>
<td>Noise, data processing</td>
<td>Interpolation, Noise</td>
<td>30 April</td>
</tr>
<tr>
<td>8.</td>
<td>22 April</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
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<tr>
<td>9.</td>
<td>29 April</td>
<td>Scalars and vectors. Basis vectors. Vector operations. Einstein's Summation Convention.</td>
<td>TEST</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>13 May</td>
<td>Vector analysis I</td>
<td>Vector analysis</td>
<td>20 May</td>
</tr>
<tr>
<td>12.</td>
<td>20 May</td>
<td>Vector analysis II</td>
<td>Vector field theory: Poisson's equation</td>
<td>27 May</td>
</tr>
<tr>
<td>13.</td>
<td>27 May</td>
<td>Solution of Poisson's equation</td>
<td>Solution of Poisson's equation</td>
<td>3 June</td>
</tr>
<tr>
<td>14.</td>
<td>3 June</td>
<td>Wave equation</td>
<td>Elasticity. Elastic wave equations</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>10 June</td>
<td>Study Week</td>
<td></td>
<td></td>
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<tr>
<td>16.</td>
<td>17 June</td>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>24 June</td>
<td>Examinations</td>
<td></td>
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</tbody>
</table>