Unit Outline
GEOL3005 Regolith Geology and Mineral Exploration
Semester 2, 2016

Unit study package code: GEOL3005
Mode of study: Internal
Tuition pattern summary: Note: For any specific variations to this tuition pattern and for precise information refer to the Learning Activities section.
Lecture: 1 x 2 Hours Weekly
Science Laboratory: 1 x 2 Hours Weekly
This unit does not have a fieldwork component.
Credit Value: 25.0
Pre-requisite units: 7032 (v.0) Geology 102 or any previous version
OR
GEOL1006 (v.0) Fundamentals of Geology 2 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: Dr
Name: Mehrooz Aspandiar
Phone: +618 9266 4373
Email: M.F.Aspandiar@curtin.edu.au
Location: Building: 312 - Room: 317
Teaching Staff:
Name: Mehrooz Aspandiar
Phone: 08 9266 4373
Email: M.F.Aspandiar@curtin.edu.au
Location: Building: 312 - Room: 317
Administrative contact:
Name: Daniela Robers/Pam Kapica
Phone: 08 92669969
Email: wasmteachingsupport@curtin.edu.au
Location: Building: 204 - Room: 226
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

This unit will cover fundamentals of mineral exploration including geological, geochemical and geophysical methods in exploration. Regolith material terminology, geochemistry, mineralogy, genesis and geochemical dispersion are examined with respect to formation of supergene deposits of Au, Ni, U, Al and REE including interpreting surface and subsurface regolith geochemical surveys. In particular, soil, drainage sediment, laterite, groundwater and subsurface regolith and sedimentary material geochemical survey datasets will be viewed and interpreted for target generation. Students will learn about different methods used in mineral exploration such as drilling techniques, analytical and QAQC procedures, data visualisation and interpretation for target generation via GIS and exploration software, all of which will be used to conduct a real world mineral exploration project culminating in a research report.

Introduction

The aim of this unit is to provide students with an understanding of the regolith, the geochemical dispersion of elements from bedrock into regolith during regolith formation, and the application of regolith geochemistry and mineralogy, hydrothermal alteration geochemistry and mineralogy, and geophysics to mineral exploration in weathered and surficial sediment covered areas. You will learn about mineral exploration concepts, exploration focussed sampling and data interpretation of drainage, soil, laterite and saprolite surveys including sampling and logging of drilling materials, drilling methods, QAQC in exploration, types and genesis of supergene deposits and JORC reporting of exploration results. The concepts conveyed apply to both greenfields and brownfields exploration programs. Your main assignment is a real world exploration project where you use drilling data in an area covered by Permian and Cenozoic sediments to make recommendations for future exploration. The unit also introduces you to the use of several software used in exploration such as ArcGIS and Micromine/Surpac.

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 Describe and classify products of rock weathering</td>
<td>✔️ ✔️</td>
</tr>
<tr>
<td>2 Infer dispersion mechanisms responsible for geochemical anomalies and supergene enrichment</td>
<td>✔️ ✔️</td>
</tr>
<tr>
<td>3 Summarise the principles of mineral exploration and assess the practical and geological limitations of techniques such as regolith sampling drilling and assaying</td>
<td>✔️ ✔️</td>
</tr>
<tr>
<td>4 Compile analyse and evaluate mineral exploration data from a range of sources using geochemical plots and GIS software</td>
<td>✔️ ✔️</td>
</tr>
<tr>
<td>5 Synthesise lithological structural and mineralisation data from diamond-drill core and drill chips using standard and spectral logging techniques</td>
<td>✔️ ✔️</td>
</tr>
</tbody>
</table>
Curtin’s Graduate Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apply discipline knowledge</td>
<td>Use analytical skills to solve problems</td>
</tr>
<tr>
<td>Communication skills</td>
<td>Confidence to investigate new ideas</td>
</tr>
<tr>
<td>International perspective</td>
<td>Work independently and as a team</td>
</tr>
<tr>
<td>Thinking skills</td>
<td>Confidence to tackle unfamiliar problems</td>
</tr>
<tr>
<td>Technology skills</td>
<td>Apply principles learnt to new situations</td>
</tr>
<tr>
<td>Cultural understanding</td>
<td>Confidence to investigate new ideas</td>
</tr>
</tbody>
</table>

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

Learning Activities

1. The two-hour lecture each week provides the background information for each topic covered in this unit. Many of the lectures have brief notes with slides.

2. The two-hour practical classes comprise a number of exercises that complement and reinforce material presented in lectures. Some of the lab exercises are based on regolith material/profile identification and interpretation while others are software oriented to conduct analysis and interpretation of 2D and 3D geological, geochemical and geophysical data. It is important to attend and complete the labs as the material covered in the labs will be invaluable for the assignment and application in industry. Furthermore, some lab tasks are assessed.

3. Videos/screencasts that reinforce material covered in some labs and demonstrate using required software. Some videos cover special topics related to mineral exploration for specific task (such as assay and QA/QC), technique or commodity.

4. Quizzes on lecture and practical topics will reinforce the main principles.

Learning Resources

Library Reserve

There are resources for this unit in the library Reserve collection. To access these resources, please click on the following link:

http://link.library.curtin.edu.au/primo/course?GEOL3005

Online resources

  
  (http://dx.doi.org/10.1080/08120099.2010.522823)
  
  (ISBN/ISSN: )

Other resources

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>Professional report</td>
<td>40 percent</td>
<td>Week: 12</td>
<td>2,4,5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Day: Friday 21</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>October</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time: 11.59pm</td>
<td></td>
</tr>
<tr>
<td>Final examination</td>
<td>40 percent</td>
<td>Week: 16-17</td>
<td>1,2,3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Day: TBA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time: TBA</td>
<td></td>
</tr>
<tr>
<td>Three Lab exercises</td>
<td>20 percent</td>
<td>TBA</td>
<td>2,3,4</td>
</tr>
</tbody>
</table>

Detailed information on assessment tasks

1. **Professional Report.** The report should be around 2500-3500 words and include figures and sections.
   To be graded highly the report will need to:
   1. Provide an accurate description and interpretation of the regolith, stratigraphy and basement geology observed in the RC chip trays.
   2. Highlight geochemical anomalies and interpret them with consideration to landscape history and QA/QC.
   3. Explain and discuss the geochemical dispersion mechanisms within the area.
   4. Based on the information collected and interpreted, provide an relevant recommendation for future exploration strategy in the area including JORC type reporting.

   **It is compulsory to submit the professional report assessment with a minimum of 50% to pass the unit.**

2. **Final Exam.** The duration of the theory exam is 2 hours, and it comprises four questions. Question 1 is compulsory and carries 16 marks.
   You have to do another two of the remaining three questions and all these carry 12 marks each. You will be assessed on the topics covered in the lectures and practicals. **It is compulsory to complete and achieve a grade of 35% in the theory exam to pass the unit.**

3. **Laboratory Exercises.** Three laboratory exercises will be marked and collectively will carry 20 marks. The lab exercises need to be correctly and clearly answered to score high marks. Laboratory 2 on chip logging and interpretation is the first assessed lab exercise. The other two assessed lab exercises, you will be informed prior to the laboratory. The exercises to be marked should be handed in before submission date. Assessed lab exercises submitted a week after due date will not be marked.

**Pass requirements**

Students must achieve a Final Mark of 50% or greater to pass this unit. In addition, it is a must to obtain a pass mark of 50% for the professional report assignment and 35% in the theory exam to pass the unit. Also, failure to hand in the assignment or sit the final exam or complete two of the assessed labs will result in a F-IN mark.

**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 and Student Progression 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 students are required to submit will have a due date and time specified on this Unit Outline.
2. Students will be penalised by a deduction of 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 assessment worth 20 marks will have two marks deducted per calendar day late. Hence if it was handed in three calendar days late and given a mark of 16/20, the student would receive 10/20. An assessment more than seven calendar days overdue will not be marked and will receive a mark of 0.

Assessment extension

A student unable to complete an assessment task by/on 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 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 prevent 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.

Deferred assessments

If your results show that you have been granted a deferred assessment you should immediately check OASIS for details.

Deferred examinations/tests will be held from 20/02/2017 to 24/02/2017. Notification to students will be made after the Board of Examiners’ meeting via the Official Communications Channel (OCC) in OASIS.

Supplementary assessments

Supplementary assessments, if granted by the Board of Examiners, will have a due date or be held between 20/02/2017 and 24/02/2017. 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 complete the requirements of a supplementary assessment. If your results show that you have been granted a supplementary assessment you should immediately check OASIS for details.

Reasonable adjustments for students with disabilities/health circumstances likely to impact on studies

A Curtin Access Plan (CAP) is a document that outlines the type and level of support required by a student with a disability or health condition to have equitable access to their studies at Curtin. This support can include alternative exam or test arrangements, study materials in accessible formats, access to Curtin’s facilities and services or other support as discussed with an advisor from Disability Services (disability.curtin.edu.au). Documentation is required from your treating Health Professional to confirm your health circumstances.

If you think you may be eligible for a CAP, please contact Disability Services. If you already have a CAP please provide it to the Unit Coordinator at the beginning of each semester.
Referencing style
The referencing style for this unit is APA 6th Ed.
More information can be found on this style from the Library website:

Copyright
© Curtin University. The course material for this unit is provided to you for your own research and study only. It is subject to copyright. It is a copyright infringement to make this material available on third party websites.

Academic Integrity (including plagiarism and cheating)
Any conduct by a student that is dishonest or unfair in connection with any academic work is considered to be academic misconduct. Plagiarism and cheating are serious offences that will be investigated and may result in penalties such as reduced or zero grades, annulled units or even termination from the course.

Plagiarism occurs when work or property of another person is presented as one’s own, without appropriate acknowledgement or referencing. Submitting work which has been produced by someone else (e.g. allowing or contracting another person to do the work for which you claim authorship) is also plagiarism. Submitted work is subjected to a plagiarism detection process, which may include the use of text matching systems or interviews with students to determine authorship.

Cheating includes (but is not limited to) asking or paying someone to complete an assessment task for you or any use of unauthorised materials or assistance during an examination or test.

From Semester 1, 2016, all incoming coursework students are required to complete Curtin’s Academic Integrity Program (AIP). If a student does not pass the program by the end of their first study period of enrolment at Curtin, their marks will be withheld until they pass. More information about the AIP can be found at:
https://academicintegrity.curtin.edu.au/students/AIP.cfm

Refer to the Academic Integrity tab in Blackboard or academicintegrity.curtin.edu.au for more information, including student guidelines for avoiding plagiarism.

Information and Communications Technology (ICT) Expectations
Curtin students are expected to have reliable internet access in order to connect to OASIS email and learning systems such as Blackboard and Library Services.

You may also require a computer or mobile device for preparing and submitting your work.

Three different types of software programs to visualise and plot geoscientific data will be used as part of laboratory activities in this unit. Therefore, you should be prepared to learn new software for plotting and visualising geoscientific data. Detailed written tutorial and a video tutorial will be provided to accomplish the tasks using industry standard programs. The software used has a medium learning curve, so you should be prepared to learn new software and therefore will need to be patient and practise.

For general ICT assistance, in the first instance please contact OASIS Student Support:
oasisapps.curtin.edu.au/help/general/support.cfm

For specific assistance with any of the items listed below, please contact The Learning Centre:
life.curtin.edu.au/learning-support/learning_centre.htm

- Using Blackboard, the I Drive and Back-Up files
- Introduction to PowerPoint, Word and Excel

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.
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://life.curtin.edu.au/health-and-wellbeing/about_multifaith_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

Students are encouraged to provide unit feedback through eVALUate, Curtin’s online student feedback system. For more information about eVALUate, please refer to evaluate.curtin.edu.au/info/.

To view previous student feedback about this unit, search for the Unit Summary Report at https://evaluate.curtin.edu.au/student/unit_search.cfm. See https://evaluate.curtin.edu.au/info/dates.cfm to find out when you can eVALUate this unit.

Recent changes to this unit include:

Based on feedback from previous year: 1. Software tutorial has been updated. 2. Couple of lectures modified to concentrate on specific topics. 3. A laboratory modified to include geophysical interpretation.
<table>
<thead>
<tr>
<th>Week</th>
<th>Begin Date</th>
<th>Lecture</th>
<th>Lab</th>
<th>Assessment due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>1 August</td>
<td>Introduction or regolith and regolith classification</td>
<td>Regolith materials 1- Hand specimens</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>8 August</td>
<td>Mineral exploration basics. Sampling, QAQC, JORC reporting</td>
<td>Regolith materials &amp; profiles: RC logging of deposits</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>15 August</td>
<td>Geochemical dispersion in the regolith</td>
<td>Interpretation of geochemical mobility</td>
<td>Assessed lab</td>
</tr>
<tr>
<td>4.</td>
<td>22 August</td>
<td>Regolith &amp; alteration mineralogy. Alteration haloes</td>
<td>Regolith/alteration mineralogy interpretation</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>29 August</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>5 Septem</td>
<td>Exploration in different settings</td>
<td>Assignment introduction. GIS introd</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>12 Septem</td>
<td>Stream sediment surveys</td>
<td>Drainage sediment survey interpretation with GIS</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>19 Septem</td>
<td>GEOL3011 Geology Mapping Project Field Trip – no class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>26 Septem</td>
<td>Tuition Free Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>3 October</td>
<td>Soil, calcrete, lag surveys. Surface sampling and analysis</td>
<td>GIS in exploration and geophysical interp</td>
<td>Assessed lab</td>
</tr>
<tr>
<td>11.</td>
<td>10 October</td>
<td>Supergene deposits: Au, Ni, Al</td>
<td>Plotting subsurface data</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>17 October</td>
<td>Other geochemical techniques: groundwater, selective leaches</td>
<td>Plotting subsurface data</td>
<td>Exploration report</td>
</tr>
<tr>
<td>13.</td>
<td>24 October</td>
<td>Geochemical Data Analysis</td>
<td>Geochemical data analysis</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>31 October</td>
<td>Laterite surveys &amp; REE/Lithium</td>
<td></td>
<td>Assessed lab</td>
</tr>
<tr>
<td>15.</td>
<td>7 Novem</td>
<td>Study Week</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>14 Novem</td>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>21 Novem</td>
<td>Examinations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>