

# MINERALS TERTIARY EDUCATION COUNCIL

## MINERALS GEOSCIENCE HONOURS PROGRAM

**2008**



# **MINERALS TERTIARY EDUCATION COUNCIL MINERALS GEOSCIENCE HONOURS PROGRAM**

*As a student enrolling in Honours in 2008 at one of eight Australian Universities (Adelaide, ANU, Curtin, James Cook, Melbourne, Monash, UTas, UWA) you have the opportunity to participate in the Minerals Tertiary Education Council (MTEC) Minerals Geoscience Honours Program (MGH). This program offers a choice of eight (8) short courses, located across the country, that are specifically designed to provide you with skills and knowledge relevant to future employment in the mining and exploration industry.*

*Participation in the Minerals Geoscience Honours Program involves completing two (2) of the eight (8) courses, which in turn will contribute to the course work component of your honours degree. There are two Hydrogeology courses, but only one can be taken as part of the MGH Program.*

*This document provides you with some information that will help you decide which of these minerals geoscience courses are right for you.*

## **THE MINERALS TERTIARY EDUCATION COUNCIL (MTEC)**

MTEC provides support to its partner universities to produce appropriately skilled graduates in minerals geoscience, mining engineering and metallurgy and to assist the Australian higher education sector to retain the capacity to be a world leader in minerals education.

The MTEC Minerals Geoscience Honours Program offers courses that teach a set of specialist skills that industry has identified graduates entering the minerals industry should possess. The MTEC Minerals Geoscience Honours Program offers courses that teach a set of these specialist skills. By taking any of these courses, delivered by experts in their field, you will learn some invaluable skills for a career in the minerals industry.

The minerals industry, through MTEC, has made a commitment to you by providing travel bursaries so that you can attend courses at other universities. MTEC also provides funding to both your home and host university for running these courses. We hope that you strongly consider a career in the minerals industry and enjoy the MTEC Minerals Geoscience Honours Program.

## **THE MINERALS GEOSCIENCE HONOURS (MGH) PROGRAM**

The MGH courses have been prepared based on the advice of a panel of senior professionals from the mining and exploration industry. Each course is designed to address specific knowledge and skills relevant to your future employment as a minerals industry professional.

The program includes both field- and lecture-based courses with a diverse range of content based on the expertise of staff at the participating universities. Brief course descriptions are included in this document:

<b>Course</b>	<b>University</b>	<b>Dates</b>	<b>Page</b>
Introduction to Hydrogeology <sup>1</sup> <b>OR</b>	University of Melbourne	Feb 4-8	12-13
Advanced Hydrogeology <sup>1</sup>	University of Melbourne	Feb 11-17	14-15
Mining Geology and Resource Evaluation	Curtin University of Technology	Feb 11-15	18-19
Geology from Geophysics	Monash University	Feb 18-22	10-11
Exploration Skills Mapping	University of Tasmania (CODES)	Mar 9-15	8-9
Mineral Exploration Under Cover	University of Adelaide	Mar 16-22	16-17
Ore Textures and Breccias in Mineralised Systems	James Cook University	Mar 31 – April 4	20-21
Applied Structural Geology in Mining and Exploration	University of Western Australia	April 7-11	6-7
Regolith Geoscience and Mineral Exploration	Australian National University	April 14-18	22-23

<sup>1</sup>Refer to course descriptions on pages 12-15 for more information on these mutually exclusive courses  
*As an MTEC student you will be asked to participate in two (2) of the eight (8) courses offered.*

The courses are intended to seamlessly mesh with your home university's Honours program, providing a component of your required course work, whilst offering you the opportunity to study a range of specialised subjects with experts from around the country. The MGH program includes financial support, via a travel bursary, to help with travel and accommodation expenses for one (1) MTEC course being offered outside your home university (details below).

Please discuss your MTEC course participation with your intended Honours supervisor or Honours co-ordinator from your university. Think carefully about the type of course that will most fulfil your needs (including relevance to your proposed Honours project) and take heed of the advice of your supervisor.

In order to minimise travel costs you should aim to register for courses and apply for travel bursaries as soon as possible. Early registration will also help us to plan the courses more effectively.

## ASSESSMENT

All of the MGH Program courses are designed to be completed within the one (1) week timetabled for the course. The nature of assessment will vary depending on the nature and content of the course. All students taking courses toward their Honours degree will be assessed in the same way, however, the weighting of the courses (as a proportion of your degree) may vary slightly between universities. All work submitted for assessment will be completed and handed in by the conclusion of the course – there will be no take-home work. Course co-ordinators will endeavour to provide assessments within a week of completion of the course.

## THE TRAVEL BURSARY

As part of its support for the MGH Program, MTEC has provided financial assistance by way of a travel bursary to offset the cost of students participating in courses outside their home university. The bursary is designed to assist you with the costs of travel to, and if relevant, accommodation in the city where the course is being run. *The organisation of this aspect of your travel and accommodation is your responsibility and it is advisable to book early.*

In the case of field-based courses the travel bursary is designed to assist your travel to the *start point* of the course, after which travel and accommodation will be arranged by the course co-ordinator.

As a participating MGH student you can apply for one (1) travel bursary. If you choose to participate in two (2) courses away from your home institution you will have to find an alternate source of funding for the second course. The level of support varies depending on the distance between locations, based on a zone system outlined below.

Zone 1	Local travel Curtin-UWA in Perth Melbourne-Monash in Melbourne	Cost of local public transport
Zone 2	SE Corner: Adelaide-Canberra-Hobart-Melbourne SW Corner: Perth-Kalgoorlie	\$200
Zone 3	Perth to SE Corner Townsville to SE Corner Townsville to Perth	\$700
Zone 4	SE Corner to Kalgoorlie Townsville to Kalgoorlie	\$1200

There is no need to apply separately for a travel bursary. Your course registration will be sufficient for this process.

## REGISTRATION

In order to register for courses offered by Minerals Geoscience Honours Program complete the attached registration form (in consultation with your supervisor) and return via email to: David.Giles@adelaide.edu.au

## INFORMATION

For more information about the MTEC Minerals Geoscience Honours Program please see your local Honours co-ordinator or contact the following people at your institution:

University of Adelaide Prof. David Giles 08 8339 8226 david.giles@adelaide.edu.au	Australian National University Dr. D.C "Bear" McPhail 02 6125 2776 bear@ems.anu.edu.au
Curtin University of Technology Prof. Ian Fitzsimons 08 9266 7968 i.fitzsimons@curtin.edu.au	James Cook University Dr. Pat Williams 07 4781 5223 patrick.williams@jcu.edu.au
University of Melbourne Prof. Janet Hergt 03 8344 9866 head@earthsci.unimelb.edu	Monash University Dr Peter Betts 03 9905 4150 peter.betts@sci.monash.edu.au
University of Tasmania Dr Peter McGoldrick 03 6226 7209 p.mcgoldrick@utas.edu.au	University of Western Australia Cindi Mispagel 08 6488 2669 mispagel@cyllene.uwa.edu.au

For information about specific courses and course content contact the course presenters listed at the bottom of each of the attached course descriptions.

**COURSE TITLE:** Applied Structural Geology in Mining and Exploration

**PROGRAM:** Part of the BSc (Hons) University of UWA and MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** University of Western Australia

**DATES:** April 7-11, 2008

**LOCATION:** University of Western Australia, Perth, WA

**DELIVERY:** Classroom based with ca. 50% lecture and case studies, 50% practical exercises.

**ABOUT THE COURSE:** *There is a large step between learning structural geology and effectively applying it to problems facing the mineral industry. This course aims to bridge that gap.* The course is very practical and highly interactive. The main focus is on marrying the understanding of structures, fluid flow and alteration in PRACTICAL geometrical analysis of mineral systems from drill core and outcrop to the regional scale with the intent of improved resource delineation and targeting. Participants will leave with an increased confidence in applying structural geology to their work environment. The course comprises alternating sessions of brief lectures and practical exercises / case studies from world class mineralization systems around the world such as lode gold in the Birimian of West Africa, copper skarn mineralization in the Andes, giant lode gold and intrusive related systems of Australia, deformed Archaean gold and nickel systems, Porphyry Cu/epithermal Au systems in Papua New Guinea, coal in the Sydney Basin, amongst others. Moreover, the course gives participants a snapshot of the future, how advanced process modelling and computer vision are shaping the way structural geology is effectively applied to exploration and mining problems. The course notes are extensive and will serve as an ongoing reference manual for participants.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals industry. Exploration geologists who wish to expand their ability to understand and effectively and rapidly apply structural geology in their work flow.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Recognise the importance and role of structure in the formation and modification of ore deposits
- Understand the tools available and the workflow required to apply structural geology in the mineral exploration industry
- Rapidly apply these structural geology techniques with confidence in your work flow

## **COURSE CONTENT:**

Key themes covered include:

- *Introduction to structural geology applied to mining and mineral exploration*
- *Fluids, Magmas, Structures and Metal - a simple conceptual framework for why mineral deposits are structurally controlled*
- *Tools and approaches for undertaking structural mapping aimed at practical exploration outcomes*
- *Practical fault analysis and integration with fluid flow, alteration and mineralization*
- *Practical fold analysis and mineralisation*
- *Structure and the mine environment - grade control and links to geotechnical engineering*
- *Using structure for reducing risk on target definition and testing*
- *How to build better road maps for mineral exploration through integration of multiple geoscience datasets*
- *Regional Structural and Tectonic Frameworks - the templates for ground selection in project generation and acquisition strategies*
- *Understanding structural and tectonic settings and application in exploration targeting*
- *Understanding deformed mineralization*
- *Seeing through later deformation to determine earlier structural architecture and control on mineral systems*
- *Outcomes from applied process modelling of structures, fluids and mineralisation and their application to mineral exploration*
- *How to undertake advanced structural analysis of mineral systems in the computer environment with modern software packages (Leapfrog, Geomodeller, etc).*

**COURSE PRESENTERS:** Professor T. Campbell McCuaig is the Director for the Centre for Exploration Targeting (CET) at UWA, and has over 20 years experience in applying structural geology in mining and mineral exploration from regional targeting to resource delineation, grade control, geotechnical engineering and project evaluations. Dr. John Miller is a Senior Research Fellow at CET, a structural specialist in mineral deposits.

**ASSESSMENT AND CREDIT:** This course can be taken as a short course only, or taken as part of an honours program at any of the MTEC geoscience honours institutions. For award credit (including future credit) an assessment will be carried out during the course.

**PARTICIPANTS SHOULD BRING:** calculator, notebook.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr John Miller, [jmiller@cyllene.uwa.edu.au](mailto:jmiller@cyllene.uwa.edu.au) , Ph: 08 6488-5803.

**COURSE TITLE:** Exploration Skills Mapping

**PROGRAM:** Part of the BSc (Hons) University of Tasmania and MTEC Minerals Geoscience Honours Program.

**COURSE PROVIDER:** University of Tasmania (CODES)

**DATES:** March 9-15, 2008

**LOCATION:** Field area near Rosebery, western Tasmania

**DELIVERY:** Field course, field mapping and core logging exercises.

**ABOUT THE COURSE:** Geological mapping, core logging and the recognition of ore-related hydrothermal alteration mineral assemblages are essential skills for all mining industry geologists. This field-based course will examine core and surface exposures of a mixed volcano-sedimentary succession in the highly mineralised Cambrian Mount Read Volcanics and Dundas Group of western Tasmania.

**THE COURSE IS FOR:** The course is aimed at Honours-level students interested in either a career in the minerals industry or in sharpening their field skills prior to undertaking mapping- or drill core-based projects.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Field mapping techniques
- Recognition of volcanic textures and their use in field mapping of mineralised sequences
- Recognition of alteration in volcanic sequences
- Structural analysis of slate belt rocks
- Graphic logging of core
- Analysis of structural geology data

**COURSE CONTENT:**

Subjects covered include graphic and structural core logging techniques, basic structural, lithological and alteration mapping, distinguishing primary and hydrothermal alteration-related features in rocks, interpreting geochemical data, working with stereonet and cross-section construction. Staff and students stay in back-packer style accommodation in Queenstown.

**COURSE PRESENTER:** Dr T Webster, Dr Andrew McNeill

**ASSESSMENT AND CREDIT:**

Assessment is based on field maps, core logs and cross-sections and a short written report (4 page max.) to be handed in at the completion of the camp.

10 % Performance and aptitude in the field (i.e. assessment based on attitude and approach to mapping, basic field skills (e.g. structural measurements, rock and mineral identification, representation of data on maps, etc), level of independence, approach to problem solving, response to questions, etc).

**PARTICIPANTS SHOULD BRING:**

Students are expected to supply all field gear, but compasses and mapping boards can be provided by prior arrangement. Weather conditions on the west coast of Tasmania can be extreme and unpredictable at any time of the year. Students should come prepared for both hot and sunny, and cold and wet weather. Much of the mapping is conducted along a Hydro canal and gumboots, wet-boots or waders are recommended.

Participants will be provided with a checklist of recommended items prior to the course. Please pay particular attention to the recommended footwear and clothing.

**Students supply own meals.**

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Tony Webster, [awebster@utas.edu.au](mailto:awebster@utas.edu.au), Ph: 03 6226 1942

**COURSE TITLE:** Geology from Geophysics

**PROGRAM:** Part of the BSc (Hons) Monash University and MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** Monash University, School of Geosciences

**DATES:** Feb 18-24, 2008

**LOCATION:** Monash University, School of Geosciences

**DELIVERY:** 5 day, computer-based course involving processing and interpreting regional geophysical data.

**ABOUT THE COURSE:** The course is designed to provide practical experience in the processing of regional geophysical datasets or the purpose of undertaking geological interpretation. The course is designed to allow the student to go through step-by-step methodologies of processing data, interpretation techniques, and modelling of geophysical data.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals industry. Exploration geologists who wish to expand their ability to interpret geophysical data.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Processing of regional geophysical datasets.
- Develop strategies to interpret geology from regional aeromagnetic and gravity data.
- Integrate geological data into the geophysical interpretation
- Practical experience in geophysical interpretation.
- Develop skills in modelling geophysical data.

**COURSE CONTENT:**

- Gridding of geophysical datasets.
- Processing of geophysical datasets
- Image enhancement techniques
- Interpretation strategies
- Practical interpretation
- Forward modelling of geophysical data
- Understanding the third dimension

**COURSE PRESENTER:** Dr Peter Betts (Senior Lecturer and coordinator) has 15 years experience in regional interpretation and processing of geophysical data for the purposes of geological interpretation. Dr Laurent Ailleres (Senior Research Fellow) has 15 years experience in geophysical processing, and is Australia's foremost authority in 3D modelling. Both Dr Betts and Dr Ailleres are structural geologists and have developed techniques to integrate geophysics and geology to solve tectonic problems and three dimensional analysis.

**ASSESSMENT AND CREDIT:** This course can be taken as a short course only.  
**PARTICIPANTS SHOULD BRING:** Themselves and their thinking cap.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr Peter Betts, [Peter.Betts@sci.monash.edu.au](mailto:Peter.Betts@sci.monash.edu.au) , Ph: 03 9905 4150

**COURSE TITLE:** Introduction to Hydrogeology

**PROGRAM:** Part of the BSc (Hons) University of Melbourne and MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** University of Melbourne, School of Earth Sciences

**DATES:** February 4-8, 2008

**LOCATION:** The University of Melbourne, School of Earth Sciences

**DELIVERY:** Lectures and practical exercises in 'workshop-style' intensive mode.

**ABOUT THE COURSE:** The course comprises five days of lectures and practical exercises that cover a diverse range of topics. It provides a basic introduction to hydrogeology for students with little or no hydrogeology background. This unit is not available for students who have taken hydrogeology at Third Year at either Melbourne or Monash.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses relevant to the minerals industry. Those holding a BSc (or equivalent) with a major in Geology wishing to extend their knowledge.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Understand the occurrence and movement of groundwater
- Identify processes operating in natural aqueous systems using natural chemical tracers
- Describe ways in which contamination can occur and be detected
- Apply the knowledge obtained in the course to new problems impacting on groundwater

**COURSE CONTENT:**

- Principles of Hydrogeology (Day 1) Material covered: hydraulic conductivity, porosity, Darcy's Law, steady state groundwater flow.
- Physical hydrogeology (Day 2) – covers groundwater occurrence, groundwater flow systems, aquifers & aquitards.
- Groundwater Chemistry (Day 3) – introduces processes controlling groundwater chemistry in natural systems as a way of tracing water-rock interaction, groundwater mixing, groundwater-surface water interaction, salinisation.
- Isotopes in Groundwater Systems (Days 4) - introduces the use of stable and radiogenic isotopes in evaluating groundwater flow systems in terms of mixing, groundwater residence time, and water-rock interaction.
- Interaction of physical and chemical hydrogeology (Day 5) - Groundwater / surface water interaction, salinization. Case study.

**COURSE PRESENTER:** Dr Charles Lawrence, Senior Lecturer

**ASSESSMENT AND CREDIT:** This course can be taken as a short course, or taken for 6.25 points credit towards a Masters award qualification offered by the University of Melbourne. For award credit (including future credit) an assessment is required. This will require submission of practical exercises for marking, and completion of a written examination.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr Charles Lawrence, [crl@unimelb.edu.au](mailto:crl@unimelb.edu.au) , Ph: 03 8344 7963

**NOTE: Students can take only one of “Introduction to Hydrogeology” OR “Advanced Hydrogeology”. Please discuss your attendance on either of these courses with your Honours coordinator or Honours supervisor before enrolling.**

**COURSE TITLE:** Advanced Hydrogeology

**PROGRAM:** Part of the BSc (Hons) University of Melbourne and MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** University of Melbourne, School of Earth Sciences

**DATES:** February 11-17, 2008

**LOCATION:** The University of Melbourne, School of Earth Sciences

**DELIVERY:** Lectures and practical exercises in 'workshop-style' intensive mode, followed by a 3-day field component.

**ABOUT THE COURSE:** The course comprises four days of lectures and practical exercises and a three-day field excursion that together cover topics in hydrogeology at an advanced level. It is suitable for students who have taken HYG (Introduction to Hydrogeology) or have completed introductory hydrogeology units in their BSc.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses relevant to the minerals industry. Those holding a BSc (or equivalent) with a major in Geology wishing to extend their knowledge.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Determine the movement of groundwater using conventional and emerging technologies
- Evaluate groundwater flow, storage, recharge by applying appropriate tests
- Describe ways in which preferential flow paths impact on groundwater systems
- Apply the knowledge obtained in the course to address problems of importance to the minerals industry (e.g., such as those involving tailings dams).

**COURSE CONTENT:**

- Recharge & Discharge (Day 1) – Cartwright. This unit will cover determining rates of recharge and discharge using physical hydrogeology, radiometric dating, and chemical mass balance.
- Physical Hydrogeology (Day 2) – Lawrence This unit addresses: derivation of the groundwater flow equation, storage characteristics, principles of groundwater recharge, and methods for evaluating aquifer systems including pumping tests and single-well recovery tests.
- Groundwater Flow in Fractured Rocks and Dual Porosity Media (Day 3) – Cartwright. This unit addresses groundwater flow through preferential flow paths such as fractures and interaction with unfractured matrix blocks.
- Case Studies (Day 4) – Lawrence & Cartwright. This unit will draw many of the principles of hydrogeology together and look at examples of aquifer-aquitard interaction.
- Field Component (Days 5-7) – Lawrence Field trip to western Victoria, including tailings dams, primary and secondary salinity, groundwater-surface water interaction.

**COURSE PRESENTER:** Dr Charles Lawrence, Senior Lecturer

**ASSESSMENT AND CREDIT:** This course can be taken as a short course, or taken for 6.25 points credit towards a Masters award qualification offered by the University of Melbourne. For award credit (including future credit) an assessment is required. This will require submission of practical exercises for marking, and completion of a written examination.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr Charles Lawrence, [crl@unimelb.edu.au](mailto:crl@unimelb.edu.au) , Ph: 03 8344 7963

**NOTE: Students can take only one of “Introduction to Hydrogeology” OR “Advanced Hydrogeology”. Please discuss your attendance on either of these courses with your Honours Coordinator or Honours Supervisor before enrolling.**

**COURSE TITLE:** Mineral Exploration Under Cover

**PROGRAM:** Part of the BSc (Hons) in Geology at the University of Adelaide and a component of the MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** University of Adelaide, Discipline of Geology and Geophysics

**DATES:** 16-22 March 2008

**LOCATION:** Arkaroola, SA

**DELIVERY:** Predominantly field based with related exercises and lecture material delivered in the evenings

**ABOUT THE COURSE:** As exposed mineral deposits are being depleted mineral exploration is increasingly being driven under cover. This course is designed to arm students and active professionals with the practical tools required for mineral exploration in areas where prospective rocks are buried by younger cover sequences. The course will focus on uranium systems in the northern Flinders Ranges however the techniques presented have relevance to a range of deposit styles and settings.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals industry. Professional exploration geologists, geophysicists and geochemists who wish to expand their ability to interpret geological, geophysical and geochemical data in the field.

**LEARNING OUTCOMES:**

This course will develop skills to:

- Synthesise geological, geophysical and geochemical data to remotely map buried basement rocks
- Establish a regolith and landscape evolution framework
- Assess and implement appropriate exploration tools (geochemical, biochemical, geophysical) within the context of the basement and cover geology and the nature of the target
- Interpret exploration datasets in an active exploration environment

**COURSE CONTENT:**

The course will be located at Arkaroola in the northern Flinders Ranges. This area is ideal because it features known uranium mineralisation of a number of deposit types (within basement and cover rocks) and is prospective for a range of other commodities. The distribution of uranium in the region is a complex function of 1600 million years of geology including primary U-enrichment within early Mesoproterozoic basement and multiple periods of reworking and redistribution up to the present day. Sandstone-hosted uranium deposits within Tertiary sediments of the Frome Embayment are active mineralising systems within an environment characterised by Neotectonic faulting, sedimentation and fluid flow. As such the northern Flinders Ranges offers the opportunity to study the relationships between basement geology (exposed and buried), landscape evolution (uplift, faulting, denudation, sedimentation), hydrogeology and biological systems with respect to a range of mineralisation types. The course will cover techniques (geological, geophysical and geochemical) appropriate for mapping

basement geology from exposed to covered areas, determining the landscape evolution framework and targeting mineralisation beneath and within the cover. This will include recent advances in EM and shallow seismic techniques, geochemistry and biogeochemistry, tertiary to neo-tectonics. A unifying theme will be the importance of increasing the effective target size of buried deposits by recognising the cryptic signatures of mineral systems at a scale greater than the deposit itself.

**COURSE PRESENTERS:** Dr Steve Hill, Dr David Giles

**ASSESSMENT AND CREDIT:** This course can be taken as a short course only, or taken for credit towards an honours qualification in any participating MTEC university. For award credit (including future credit) an assessment is required. Assessment will be based on a short written report, due 1 week after completion of the field course.

**ADDITIONAL INFORMATION:** Students will travel via car or bus from Adelaide University to Arkaroola leaving at 8am on 16<sup>th</sup> March. Interstate students will be required to arrive in Adelaide on 15<sup>th</sup> March

**PARTICIPANTS SHOULD BRING:**

Boots and field clothing suitable for *intense summer heat*, sleeping bag and mattress or swag. A checklist of recommended gear will be provided to participants prior to the course.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr Steve Hill, [steven.hill@adelaide.edu.au](mailto:steven.hill@adelaide.edu.au) , Ph: 08 8303 4540

**COURSE TITLE:** Mining Geology and Resource Estimation

**PROGRAM:** Offered as part of the BSc (Hons) Applied Geology and BSc (Hons) Mineral Exploration and Mining Geology courses at the WA School of Mines, Curtin University and as a component of the MTEC Minerals Geoscience Honours Program.

**COURSE PROVIDER:** Curtin University of Technology

**DATES:** 11-15 February 2008

**LOCATION:** WA School of Mines, Kalgoorlie

**DELIVERY:** Lectures, computer-based exercises and mine-site activities.

**ABOUT THE COURSE:** Many Australian geoscience graduates find employment on mine sites with responsibility for grade control, ore deposit modelling, and resource estimation, but few undergraduate degrees provide students with specific training for these duties. This course provides first-hand experience of the mining environment and a practical introduction to the roles and responsibilities of the mine geologist.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals industry and professional geologists, geophysicists and geochemists with limited knowledge of mining geology.

**LEARNING OUTCOMES:**

This course will develop the skills needed to:

- Plan a drilling program for use in exploration, resource development and mining;
- Collect geological data from drill samples and manipulate these data using standard mining software;
- Construct a geological model of an ore body using wireframing techniques;
- Estimate a mineral resource for an ore body via block modelling;
- Evaluate the impact of geological uncertainty on ore body modelling and appreciate the public reporting requirements for mineral resource data.

**COURSE CONTENT:**

The course will use dedicated computer laboratories at the WA School of Mines coupled with visits to one or more local mine sites to provide training in the basic techniques used by geologists on a daily basis in planning and monitoring mining operations.

Topics covered will include the following:

- Introduction to mining operations and activities;
- Drilling techniques and their advantages and disadvantages;
- Collection of lithological and structural data from drill core and drill chips;
- Application of mining software to geological data visualization and modelling;
- Conventional and geostatistical methods of resource estimation;
- Grade control and reconciliation;
- Quality assurance and quality control (QA/QC) for exploration and mining data;
- JORC code and mandatory reporting requirements for geological data.

**COURSE PRESENTERS:** Dr Mehrooz Aspandiar and others.

**ASSESSMENT AND CREDIT:** This course can be taken as a short course only, or taken for credit towards an honours qualification in any participating MTEC university. For award credit (including future credit) an assessment is required. Assessment will be based on practical exercises and lab tests completed during the course.

**FEES:** Free accommodation and breakfast will be provided for up to 16 MTEC Honours Students in small dormitory-style rooms from Sunday 10 February at the Goldfields Camp School. Lunch will be provided for all participants on Monday through to Friday. All participants are responsible for the cost of travel to and from Kalgoorlie.

**ADDITIONAL INFORMATION:** Participants should arrive in Kalgoorlie by 8am on 11 February. There is a daily rail service from Perth (see <http://www.transwa.wa.gov.au/>) but note that the travel time is around 6 hours. There are also several flights each day serviced by QANTAS ([www.qantas.com.au/](http://www.qantas.com.au/)) and Skywest (<http://www.skywest.com.au/>). Most flights are via Perth but Skywest will offer a direct Melbourne-Kalgoorlie service three days a week from 21 November 2007. Flights should be booked well in advance to ensure the cheapest prices. Short-term accommodation is scarce and expensive in Kalgoorlie given the current state of the mining industry. For this reason, student participants are strongly advised to take advantage of the accommodation arranged at the Goldfields Camp School.

**PARTICIPANTS SHOULD BRING:** suitable clothing for mine site visits, including boots (steel capped safety boots if you have them), and a hat will be valuable protection against the sun for outside activities. Students staying at the Goldfields Camp School should bring their own bed linen or sleeping bag.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr Mehrooz Aspandiar, [m.aspandiar@curtin.edu.au](mailto:m.aspandiar@curtin.edu.au), Ph: 08 9266 4373.

**COURSE TITLE:** Ore Textures and Breccias in Mineralised Systems

**PROGRAM:** Part of the BSc(Hons) at James Cook University and a component of the MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** James Cook University

**DATES:** March 31 to April 4, 2008

**LOCATION:** James Cook University, Townsville, Queensland

**DELIVERY:** Lectures and Practical Exercises.

**ABOUT THE COURSE:** The course is designed to provide practical tools for exploration field professionals to identify and describe ore textures and breccias in mineralised systems.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals industry; industry geologists working in gold and base metals sectors; metallurgists seeking to further their understanding of ore textures.

**LEARNING OUTCOMES:** This course will develop skills to:

- Characterize ore textures;
- Identify different breccia textures;
- Distinguish between infill and alteration textures;
- Determine paragenetic sequences;
- recognizing these textures in drill core.

**COURSE CONTENT:** This course aims to develop field-relevant recognition skills. It covers:

- recognition criteria for infill, alteration, overprinting and breccias;
- breccia components, types and systems;
- paragenetic sequencing in drill core and hand specimens;
- description and interpretation of alteration products and metamorphosed alteration in thin sections;
- applications to porphyry copper-gold, skarn, epithermal, lode gold and iron oxide-copper-gold deposits.
- Several examples may include Grasberg, Oyu Tolgoi, Olympic Dam and Ernest Henry.

**COURSE PRESENTERS:** Dr Pat Williams, Dr Roger Taylor

**ASSESSMENT AND CREDIT:** This course can be taken as a 5 day short course only. Assessment is via a laboratory assignment (50%) and practical test (50%)

**ADDITIONAL INFORMATION:** Students need to be in Townsville ready for a 9am start on Monday, 31 March. The course will be completed by 5pm on Friday, March 4. Contact JCU (see below) for accommodation options

**PARTICIPANTS SHOULD BRING:** Hand lens, hardness tester, magnetic pencil, notepad, pens, pencils, and a desire to learn some genuinely useful practical skills.

**REGISTRATION:**

*MTEC Minerals Geoscience Honours Students* use the Registration Form attached.

**COURSE ENQUIRIES:**

Dr Cameron Huddleston-Holmes [cameron.hholmes@jcu.edu.au](mailto:cameron.hholmes@jcu.edu.au) ph: 07 4781 6911  
fax: 07 4781 4020

**COURSE TITLE:** Regolith Geoscience and Mineral Exploration

**PROGRAM:** Offered as part of the Geosciences Honours Program at the Australian National University and the MTEC Minerals Geoscience Honours Program

**COURSE PROVIDER:** Australian National University

**DATES:** 14-18 April 2008

**LOCATION:** Canberra, ACT

**DELIVERY:** Lectures, practicals and field excursions

**ABOUT THE COURSE:** This course is focussed on regolith, a vital part of Australian landscapes that is becoming increasingly important in mineral exploration and land management. We begin by presenting basic and advanced concepts in the formation and evolution of regolith, including its physical and chemical characteristics, the physical and biogeochemical processes that affect its structure and composition, as well as the dispersion and concentration of elements. This is followed by presenting concepts and applications of geochemical and geophysical exploration methods that are used to assess the potential for mineralisation within and underneath the regolith. Field excursions will help to consolidate knowledge and understanding developed in lectures and practical exercises.

**THE COURSE IS FOR:** Eligible honours students looking to take specialist courses to prepare them for work in the minerals and other industries, and professional exploration geoscientists wishing to extend their knowledge of and ability to explore in regolith covered terrains.

**LEARNING OUTCOMES:**

You will gain understanding of:

- key concepts of regolith characteristics and evolution;
- biophysical processes that affect the regolith, e.g., weathering, erosion and transport;
- regolith materials, including mineralogy and geochemistry;
- element dispersion and/or concentration in the regolith;
- exploration methods using geochemistry and geophysics for mineralisation within and below the regolith; and
- sampling and analytical methods for regolith, water and biota.

**COURSE CONTENT:**

- Basic and advanced concepts in regolith geoscience
- Regolith characteristics, materials and evolution (*in situ* and transported)
- Weathering and transport processes
- Methods for exploration geochemistry and geophysics in the regolith
- Field excursions (day trips)

**COURSE PRESENTERS:** Dr D.C. "Bear" McPhail, Prof Brad Pillans and others

**ASSESSMENT AND CREDIT:** This course can be taken as a short course only, or taken for credit towards an Honours qualification in any participating MTEC university. For award credit (including future credit) assessment is required. The assessment will be based on short practical exercises submitted during the first 4 days, plus an exercise and report prepared and submitted on the final afternoon of the course.

**PARTICIPANTS SHOULD BRING:** normal clothing and material for field excursions, including appropriate safety items such as sunscreen, hats and water bottles.

**REGISTRATION:** Use the Registration Form attached.

**ENQUIRIES:** Dr D.C. "Bear" McPhail, [bear.mcphail@anu.edu.au](mailto:bear.mcphail@anu.edu.au) , Ph: 02 6125 2776