Master of Science
in
Ore Deposit Geology and Evaluation

Coursework Program

Centre for Exploration Targeting

The University of Western Australia

The University of Western Australia
35 Stirling Highway, Crawley, WA 6009

General Enquiries
Phone: +61 8 6488 2640
Fax: +61 8 6488 1178
Email: mispagel@cyllene.uwa.edu.au

Last updated: 01.02.08

www.cet.uwa.edu.au

Last updated: 01.02.08

Overview

The coursework Masters program is designed for geoscientists who want to gain up to date knowledge and skills in economic geology and mineral exploration. The course structure is flexible with the choice between full and part-time study, coursework plus thesis or coursework- only options, three home institutions (University of Western Australia, University of Tasmania, James Cook University) and 15 coursework units offered across four institutions. There are no formal exams, a variety of entry paths (BSc + 2 years relevant experience, BSc (Hons) or Graduate Diploma of Science).

The course at UWA is part of the Minerals Geoscience Masters (MGM) program and is supported by the Minerals Council of Australia. The program is run jointly between the Centre for Exploration Targeting (CET, University of Western Australia), the Centre for Ore Deposit Research (CODES, University of Tasmania), Economic Geology Research Unit (EGRU), James Cook University and the Western Australian School of Mines, Curtin University of Technology (WASM).

Course Structure

The course structures are applicable to Australian students and can be taken full-time or part-time. Options for international students are shown on page 3.

Option 1 (8 coursework units)
Eight units of course work: at least two of which must be undertaken at UWA. The other units are done at UWA or at the other participating universities (see below).

Option 2 (6 coursework units + dissertation)
Six units of course work and a dissertation, of which accounts for 25% of overall assessment. Two of the units must be completed at UWA. The other units are completed at UWA or the other participating universities (see below).

Option 3 (3 coursework units + thesis)
Three coursework units and a thesis which accounts for 62.5% of the overall assessment. The thesis is similar to an honours project in scope.

The cost of airfare and accommodation at one of the residential colleges for 10 days (usually ~$50/day including lunch and dinner) is borne by the student.

The dissertation can be based on some aspect of the student's current work and can take the form of a literature review, a research paper or involve field work, data processing and/or analysis.

Further Information

Contact Ms. Cindi Mispagel, Academic Coordinator,
Tel.: 61 (0)8 6488 2640, Fax: 61 (0)8 6488 1178, Email: mispagel@cyllene.uwa.edu.au
http://www.cet.uwa.edu.au/about/msc_coursework

Home Institutions

Students enrolling in the Masters Coursework program must select one of the three home institutions: University of Western Australia, University of Tasmania, or James Cook University at which either 4 out of 6 or 4 out of 8 course work units must be taken depending on the course option selected (see above). University of Western Australia students are required to undertake a minimum of 2 units at UWA irrespective of the course option.

Participating Institutions

Course work units are offered at the following institutions
Centre for Exploration Targeting (CET), University of Western Australia, Perth, Western Australia
West Australian School of Mines (WASM), Curtin University, Perth, Western Australia
EGRU, James Cook University, Townsville, Queensland
CODES, University of Tasmania, Hobart, Tasmania
VIEPS, Monash University, Melbourne, Victoria**
CRC LEME (Australian National University, Canberra, ACT) **

NOTE: ** VIEPS and CRC LEME have no units available in 2008

International Students

There are three course options for international students depending on their qualifications. All options involve full-time study.

Option1: *Requires a BSc degree without 2 years of relevant work experience*
Two year program commencing with a Graduate Diploma of Science (Ore Deposit Geology) in the first year and a one-year Master of Science course in the second year based on three coursework units and a thesis (similar to an Honours thesis)

Option 2: *Requires a UWA BSc degree or equivalent,* ***OR*** *UWA BSc degree or equivalent & 2 years of relevant work experience,* ***OR*** *Graduate Diploma of Science in Ore Deposit Geology & Evaluation (with an average grade at least 60%).*
One and a half year program of which a minimum of one year minimum is spent in Australia. The course structure is the same as the part-time course for local students but it is done as a full-time course.

Students do either:
a) 6 coursework units plus a dissertation (25% of course) **or**
b) 8 coursework units.
The course requires that students attend some units at other universities that participate in the national Minerals Geoscience Masters program. With the option involving 6 coursework units & minor dissertation, some of the dissertation could be outside Australia prior to or after the course work units.

Option 3: *Requires a UWA BSc (Hons) degree or equivalent* ***OR*** *Graduate Diploma of Science in Ore Deposit Geology & Evaluation (with an average grade at least 60%)*
One-year Master of Science course based on three coursework units and a thesis (similar to an Honours thesis)

Course Content

Each of the participating universities offers up to five units, with each unit being available every second year. Most units are of two weeks duration. Field-based courses can be three weeks. Current courses offered by the Centre for Exploration Targeting, University of Western Australia are:

South African Ore Deposits Field Excursion (Nov 2008- dates to be determined, even years)
Applied Structural and Field Geology (7-18 July 2008, even years)
Ore Deposit Conceptual Models (Mar. 2007, odd years)
Computer-Aided Exploration Techniques (July 2007, odd years)

Assessment

There are no formal written exams except for students seeking exemption from units or who initially fail a unit. The coursework units are assessed through assignments, reports, and a thesis or dissertation (in the case of options 1 and 3 above). At the University of Western Australia, students who have elected to write a thesis are encouraged to submit a summary of their next thesis chapter after each coursework unit is completed.

Fees

Local Students

The fees are $2100 per unit (at UWA) which amounts to a cost of approximately $16,800 AUD for the course overall. There are additional costs associated with field-based units to cover accommodation, meals and other miscellaneous expenses. For example the field component of the Structural Geology & Field Mapping course held in the Kalgoorlie-Kambalda area cost an additional $600. FEE-HELP (equivalent to HECS for postgraduate courses) is available for Australian Citizens and NZ residents within Australia during the MSc Ore Deposit & Evaluation course.

International Students

The fee for 2008 for international students is $24,200 AUD per year for the Graduate Diploma of Science (Ore Deposit Geology & Evaluation) and $24,200 AUD per year for the Master of Science (Ore Deposit Geology & Evaluation). The combined Graduate Diploma and Masters program is required for students who do not have either a BSc (Hons) degree from the University of Western Australia (or equivalent) or a UWA BSc degree (or equivalent) plus two years of relevant industry experience.

The MSc course requires a minimum of one year full-time at the University of Western Australia. Six months of the remaining time can be spent off-campus conducting project work before or after the one year at UWA.

Duration

Full-time local students only (see above for international students)

Minimum period is 18 months (full-time) – of which only 12 months is required to be spent on campus at UWA)

Maximum period is five years (part-time).

Most students that are in full-time employment will enrol part-time and elect to do 6 units plus a dissertation **OR** 8 units over a 5 year period.

Entry Requirements for international and domestic students

Graduate Diploma

Bachelor's degree in a relevant subject area from UWA, or equivalent as recognised by the Faculty. See page 5 for details of the Graduate Diploma of Science course.

MSc by way of coursework plus thesis (30 point project)

BSc (Hons) from the University of Western Australia (or equivalent)

OR

Graduate Diploma of Science (Ore Deposit Geology) with an average grade of 60% or more.

MSc by way of coursework plus dissertation (12 point project) OR coursework only

BSc (Hons) from the University of Western Australia (or equivalent)

Or

BSc (Hons) from the University of Western Australia (or equivalent) and at least two years' relevant industry experience,

Or

Graduate Diploma of Science (Ore deposit Geology) with an average grade of 60% or more.

Enrolment

Students are required to choose one of the three participating universities (University of Western Australia, James Cook University or University of Tasmania) as a home institution at which to enrol.

At least one unit is required for a valid enrolment in the MSc course at UWA. If it is not possible to complete at least one 2008 unit, Approved Leave must be taken otherwise the enrolment is lapsed. Lapsed students are required to apply for re-admission in order to re-commence at a later date, incurring additional fees.

Closing Date for New Enrolments
(Following information applies to UWA only)

New enrolments
Local students: any time of year
International students: apply by 31 August for following year

Re-enrolments
Semester 1: On-line (Monday 27 November 2006 to Thursday 21 December 2006).
Semester 2: On-line (Monday 2 July 2007 to Friday 20 July 2007).

Re-enrolments after this period will incur a penalty of $100 (second round of intakes) or $150 (third intake round), and require liaising with UWA enrolments officers to permit online enrolments.

Graduate Diploma of Science (Ore Deposit Geology & Evaluation)

Students who DO NOT have an Honours degree (honours/fourth year *must* include a thesis) OR a BSc plus two years relevant industry experience can gain entry to the Master of Science course by first completing a Graduate Diploma of Science with an average grade of 60% or more.

The course is offered on a one-year full time basis only and consists of the following units.

- EART8405 Geological Communication (8 points)
- EART8406 Geological and Industrial Experience (10 points)
- EART8407 Resource Geology (8 points)
- EART8408 Field Documentation and Thesis (10 points)
- 2 of the MSc units shown on following page (6 points each)

EART8405 Geological Communication (8 points)
Content: skills in scientific method and communication including scientific writing, report writing and preparation of journal articles, word processing of large technical documents, use of the library and electronic databases for literature searches, introduction to Endnote, reviewing literature, creating a conference poster and giving a talk or PowerPoint presentation.
Assessment: weekly assignments including essays and a presentation.

EART8406 Geological and Industrial Experience (10 points)
Content: four to six weeks of work within a geological team as arranged by the University in conjunction with an Australian exploration and mining company or geological survey organisation. The work may involve any aspect of mineral exploration or mining including mapping, data collection, geochemical surveys, open-pit or underground mining and data compilation and processing.
Assessment: a report by the student's manager or supervisor at the company or workplace.

EART8407 Ore Deposit Genesis (8 points)
Content: ore deposits including geological setting, origin of ore-bearing magmas and hydrothermal fluids, and transport and deposition of ore and gangue minerals. Deposit types discussed include orthomagmatic (Cr-PGE-Ni-Cu), diamond, carbonatite (multi-element), iron ore (banded iron formation, magmatic, sedimentary), Mississippi Valley Type (Pb-Zn), volcanogenic massive sulphide-sedimentary exhalative (Cu-Pb-Zn-Au), Broken Hill Type (Pb-Zn), skarns (multi-element), epithermal-porphyry (Au-Ag-Cu), orogenic gold, Carlin-type (Au), granite-greisen (Sn-W) and pegmatite deposits.
Laboratory work: (1) the study of rock suites of orthomagmatic and hydrothermal ore deposits by hand lens, reflected and transmitted light microscopy and (2) interpretation of whole rock, trace element and mineral chemistry signatures of alteration zones and ore-bearing rocks. A field trip to an active mine site in Western Australia is used to gain experience in underground and open-pit mapping and diamond-core logging techniques.
Assessment: a laboratory assignment, a seminar and a final theory examination.
Contact hours—lectures: 4 hrs per week; labs: 4 hrs per week; field work: 5 days (cost of food and accommodation is borne by the student)

EART8408 Field Documentation and Thesis (10 points)
Content: four- to six-week mapping project typically organised in conjunction with a Western Australian mining company. Students learn skills in field geology, logging drill holes, field mapping, sampling and report writing. Students undertake a small research project, with guidance from a supervisor. Laboratory projects including GIS-based or geophysical data analysis are also available. Students electing to continue to the MSc (Ore Deposit Geology and Evaluation) course in the following year can use this work as an introduction to their research thesis. These students write up the work as a draft of the first two chapters of the master's thesis.
Assessment: report documenting the results of the field work or laboratory project.
Contact hours—4–6 weeks full-time (laboratory- or field-based)

Overview of units in the Minerals Geoscience Masters Program

CET, University of Western Australia, Perth

- Ore Deposit Conceptual Models; EART8508 (Feb. - Mar. 2009, odd years)
- Computer-Aided Exploration Techniques; EART8506 (July. 2009, odd years)
- South African Ore Deposits Field Excursion; EART8519 (November. 2008)
- Applied Structural and Field Geology; EART8504 (7 - 18 July 2008, even years)

EGRU, James Cook University, Townsville

- Advanced Techniques in Mining & Exploration Geology; EA5028 (April 2009, odd years)
- Advanced Field Training; EA5027 (July 2009, odd years)
- Resource Estimation & Production Geology; EA5023 (11-22 Aug. 2008 - even years)
- Business & Financial Management in the Minerals Industry; EA5024 (5-15 Feb. 2008, even years)

CODES, University of Tasmania courses, Hobart

- Ore Deposit Geochemistry, Hydrology and Geochemistry; KEA845 (June 2009, odd years)
- Ore Deposits of South America; KEA848 (March 2009, odd years)
- Volcanology & Mineralization in Volcanic Terrains; KEA843 (Mar 30 – April 13, 2008, even years)
- Ore Deposit Models and Exploration Strategies; KEA841 (27 Oct – 7 Nov. 2008 - even years)
- Brownfields Exploration; KEA847 (9-20 Jun. 2008 - even years)

WASM, Curtin University, Perth

- Natural Resource Economics 601; 10939 (6-14 Jun., annually)
- Resource Sector Finance 601; 10940 (16-21 Jun., annually; 3 points)
- Legal Regulatory Environment 602; 10942 (23-28 Jun., annually; 3 points)
- Cost and Capital Investment Estimation 602; 10943 (30 Jun – 5 Jul., annually; 3 points)
- Resource Sector Management; 306032 (7-12 Jul., annually)

Note: three of the short courses at Curtin University are half units (worth 3 points rather than the 6 points which is standard for the Minerals Geoscience Masters units). Therefore, students need to select two 3-point units if the units are to be counted as a full unit towards an MSc degree.

CRC Land Evolution & Mineral Exploration (LEME), ANU, Canberra**

- Regolith Geology & Mineral Exploration; Masters Course (12-23 Mar. 2007, annually)

VIEPS, Monash University, Melbourne**

- Geophysics -Geophysical Field Camp, 2701.GWF and
- Geophysics -Software Workshop, 2701.GSW (25 Feb-9 Mar. 2007 – annually, count as one unit)

*Note** LEME and VIEPS units are unavailable in 2008.*

Blue text denotes course-units offered in 2008 and in subsequent even years.

Coursework Unit Descriptions

Centre for Exploration Targeting, University of Western Australia

Ore Deposit Conceptual Models (EART8504)

Dates: Feb - Mar 2009 (offered in subsequent odd years)
Location: University of Western Australia, Centre for Exploration Targeting

Experts interpret the current state of research and exploration in a series of mineral systems and exploration-oriented workshops on the following deposit types; orogenic and intrusion-related gold (2 days), iron-oxide copper gold (1 day), Carlin-style gold and Cu-Mo-Au porphyry (1 day), regional-scale metallogenic features (1 day), nickel-sulphide (2-days), uranium (1-day) iron-ore (1 day) and diamonds (1 day). Available to industry participants as individual modules.

Presenters: Prof David Groves (UWA), Dr Rich Goldfarb, Dr John Mair, Dr Craig Hart, CET staff and other recognized specialists from industry and academia.

Computer-Aided Exploration Techniques (EART8506)

Dates: July 2009 (offered in subsequent odd years)
Location: University of Western Australia, Centre for Exploration Targeting

This course is intended to give participants experience in a range of computer-based methods for the collection, integration, visualization and analysis of exploration data sets. The course covers mapping of primary, alteration, and regolith mineralogy with remote (HyMap and ASTER) and proximal (ASD, PIMA, HyLogger, FaceScanner) spectral sensors, an introduction to GIS for geoscientists, techniques for representing exploration criteria as GIS layers, spatial data analysis methods to select, test and rank exploration criteria, weights of evidence, fuzzy logic, and neural network methods for combining exploration data into a mineral prospectivity maps and numerical packages used to simulate physical and chemical processes and define target areas. Available to industry participants as individual modules.

Presenters: Dr Tom Cudahy (CSIRO Exploration & Mining), Dr Rob Hewson (CSIRO), Dr Stephen Gardoll (Redstone Resources), Dr Warick Brown (CET, UWA), Paul Roberts (pmd* CRC, CSIRO E&M), Dr Klaus Gessner (pmd* CRC, CSIRO E&M),

South African Ore Deposits Field Excursion (EART8519)

Dates: 9-23 November, 2008: (offered in subsequent even years)
Location: South Africa

South Africa is one of the best endowed mineral-resource regions on Earth with an exciting and diverse range of deposit environments. This field trip includes visits to the following deposits and surrounding areas of geological interest; western Bushveld Pt mines (Merensky Reef, UG2 chromitite), Vergenoeg fluorite mine, Platreef PGE deposits (Tweefontein stream section and Sandsloot Pt mine), Bushveld Complex Lower and Critical Zone, including UG1 chromitite, Magnet Heights magnetite layers, Tweefontein Fe-rich transgressive pipe), Phalaborwa mine, Barberton greenstone belt, Nkomati nickel mine, Premier Diamond mine, a Witwatersrand Au mine (to be determined), as well as a stop at the Kruger National Park and Sterkfontein Caves (Cradle of Humankind).

Presenters: Dr. Wolfgang Maier (UWA), Prof David Groves-tentative (UWA), CET staff and local deposit experts.

Fee: For MSc students: $2100 enrolment plus $4500 which will cover the international flight and accommodation, food and additional travel costs while in South Africa (Total = $6600). For all other participants including industry participants: $7600.

Structural and Field Geology (EART8504)

Dates: 7-18 July 2008 (offered in subsequent even years)
Location: UWA Perth campus and field trip around Kalgoorlie-Kambalda area.

A 5-day classroom-based module consisting of alternating short lectures and problem-solving exercises and a 7-day field excursion in the Kalgoorlie-Kambalda area consisting of tutorials and field exercises. Available to industry participants as individual modules.

The 3-day classroom-based course is an introduction to the principles of structural geology based on real deposits with emphasis on mineral exploration from mine to regional scale and the structural controls on hydrothermal ore deposits. Topics covered include: the visualization of geological features in three dimensions, analysis of folded rocks, faults and fault systems, regional structural and tectonic environments, tectonic styles and their geophysical expression, and the analysis of structures in drill core. The 7-day field excursion in the Kalgoorlie Terrane of the Yilgarn Craton, Western Australia, involves a series of field exercises to demonstrate: 1) what structural features to map and how to recognise them in the field, 2) show how to integrate field structural observations with regional geological and geophysical data sets, 3) how to approach mine-scale mapping; and 4) how to integrate structural field observations with an understanding of mineral systems in mine to regional scale exploration.

Presenters: Prof Cam McCuaig (CET, UWA; formerly SRK Consulting), Dr. John Miller (CET, UWA), CET staff, and recognized specialists from industry and academia.

Fee: Enrolment fee of $2100 for MSc students plus an additional $1500. For all other participants, an overall fee of $3900 or $650 per day for UWA-based modules.

EGRU, James Cook University, Townsville

Advanced Techniques in Exploration and Mining (EA5028)

Dates: April 2009 (Offered in subsequent odd years)
Location: James Cook University, Economic Geology Research Unit (EGRU).

The analysis of ore body geometry and architecture based on surface and subsurface mapping, drill core data, controlling rock structures, ore associations and alteration patterns at mine to district scale are addressed in this course. These data sets are integrated into mineral prospectivity analyses.

Course Presenters: Prof. Nick Oliver, Dr. Tom Blenkinsop.

Advanced Field Training in Deformed & Altered Rocks (EA5027)

Dates: July 2009 (Offered in subsequent odd years)
Location: Based at Roxmere Field station, Eastern Mt Isa Block, north-western Queensland. Module 1 in Mary Kathleen district, Module 2 in Cloncurry district.

Intensive 8-day course as two modules available separately. This course is designed to provide geoscientists with state-of-the-art exploration-related field skills in complexly deformed and altered rocks, with an emphasis on structural geology, recognition of alteration patterns, ground truthing geophysical and geochemical datasets, and prospectivity mapping.

Module 1: Four days (closely supervised training). Hand-specimen to outcrop scale patterns. Topics include basic to moderately advanced ductile structural geology; recognition and differentiation of primary versus altered rocks, significance of different alteration patterns for broader fluid flow, identifying scales of fluid flow; new strategies for handling brittle structures; structural controls on the alteration; integration of these into a well constrained paragenetic sequence, integration into exploration strategy; introduction to rapid airphoto and geophysical image interpretation, and ground truthing techniques.

Module 2: Four days, training is a test of skills developed in Module 1. The target is to produce a structural & alteration map, a paragenetic sequence of relevant events, a prospectivity analysis and an exploration strategy, for an area of mineralized rocks. Includes ground truthing of datasets. This is a serious skills test.

Presenters: Prof. Nick Oliver, Dr Tom Blenkinsop and Dr Mike Rubenach

Fee: MSc enrolment fee; other participants $2640 per module (EGRU members), $3520 (non-members). Single module fees $2220 (EGRU member), or $1540 (non-member). Fees include full catering, meals and one night's motel accommodation in Cloncurry or Mt Isa in July. Participants Should Bring: own 4WD transport and sleeping bag. A place on a JCU 4WD vehicle can be negotiated at extra cost.

Resource Estimation and Production Geology (EA5023)

Dates: 11-22 August 2009 (Offered in subsequent odd years)
Location: James Cook University, Economic Geology Research Unit (EGRU).

Intensive 11-day course. Lectures, tutorials and practical exercises. About the Course: Mapping techniques and structural geology for resource evaluation and grade control, sampling and assaying, bulk sampling and underground evaluation programmes, drilling and core logging, resource evaluation, reporting of resources and reserves (e.g. JORC code), grade control and case histories.

Presenters: TBA

Business and Financial Management in the Minerals Industry (EA5024)

Dates: 5-15 February 2008 (Generally offered in even years, unless demand is excessive)
Location: James Cook University, Economic Geology Research Unit (EGRU).

Intensive 11-day course. This course covers a broad range of management issues pertinent to the business of exploration including team building and leadership, negotiation, taxation, financial analysis, management, exploration concepts, land tenure, mineral law, property acquisition, finance and valuation of mines and prospects, risk analysis, marketing, conservation, ethics and case histories.

Course Presenters: Mr. Andy White

CODES University of Tasmania

See (http://www.codes.utas.edu.au/masters) for further information:

Ore Deposit Geochemistry, Hydrology and Geochronology (KEA845)

Dates: June 2009, 2 weeks
Location: Hobart (CODES)

This course covers a variety of geochemical and geochronological techniques used to interpret environments of ore formation and processes of ore genesis, and discusses the implications of these datasets for mineral exploration. Topics include Ar-Ar, U-Pb and Re-Os geochronology, whole rock and trace element chemistry of igneous rocks, sulphide trace element chemistry, stable and radiogenic isotopes, fluid inclusions and hydrothermal geochemistry.

Presenters: Associate Professor David Cooke plus CODES staff and selected academic and industry lecturers.

Research interests: Fluid-rock interaction and hydrothermal geochemistry

Ore Deposits of South America (KEA848)

University of Tasmania, Centre of Excellence in Ore Deposits (CODES COE)

Dates: March, 2009, subsequent odd numbered years
Location: Chile, South America

An exciting field-based course in the Andes covering the major ore deposit styles including porphyry Cu-Mo, high sulfidation epithermal gold, low sulfidation epithermal gold and iron-Oxide Cu-Au. Mines visited include El Teniente (the world's largest underground mine) and Chuquicamata, the world's largest open pit. A series of presentations by researchers and exploration geologists working in South America will address the geology, tectonic-setting and important exploration criteria for each deposit style.

Presenters: Prof. J. Bruce Gemmell and industry geologists working in South America.
Fee: to be determined

Volcanology and Mineralisation in Volcanic Terrains (KEA843)

Dates: March 30 – April 13, 2008, and subsequent even numbered years, 2 weeks
Location: Field based, New Zealand and Tasmania

Intensive program of fieldwork in New Zealand (8 full days) and Tasmania (3 full days) plus some lectures. This course provides an introduction to the processes and products of different eruption styles, contrasts in scale and structure of volcanoes, identification of key volcanic facies associations and interpretation of facies variations. Mineralisation and alteration processes related to hydrothermal systems in subaerial and submarine volcanic environments and implications for mineral exploration are included. This course is a field based unit with trips to the North Island of New Zealand to examine modern volcanic and geothermal systems and a trip to the West Coast of Tasmania to examine the well mineralised and altered, Cambrian Mt Read Volcanic Belt

Presenters: Prof. Jocelyn McPhie, Prof. J. Bruce Gemmell
Fee: An Enrolment fee for Master students is $4000 and $6000 for all other participants. Course fees include some meals, accommodation, field transport, entry fees (Tarawera, Waiotapu, Waimangu), course notes and field guide. Travel to and from New Zealand and accommodation in

Hobart is each participant's responsibility. Note that a valid passport is required for entry into Australia on return from New Zealand. For further information contact CODES.

Ore Deposit Models and Exploration Strategies (KEA841)

Dates: 27 October – Fri 7 November, 2008, and subsequent even numbered years, 2 weeks
Location: Hobart (CODES)

Ore Deposit Models and Exploration Strategies is an up-to-date synopsis of ore-deposit types and their characteristics. Important features which relate to their genesis and exploration will be discussed and exploration models will be presented for each style. Deposit styles covered include VHMS, Broken Hill Type, Proterozoic Cu-Au, Porhyry Cu-Mo-Au, Skarn Deposits, Sediment Hosted Massive Sulphides and Epithermal Au-Ag.

Course Presenters: Professor Ross Large and CODES staff, plus Australian and international experts on each deposit style.

Brownfields Exploration (KEA847)

Dates: Mon 9th - Fri 20th June, 2008, and subsequent even numbered years, 2 weeks
Location: Hobart (CODES)

The compilation of large datasets that are common in areas of significant previous exploration can present a challenge for any geologist. This course is a lab- and field-based unit that looks at exploration in and around mine sites where there is often abundant data. This course will cover GIS applications, and the interpretation of geochemical and geophysical data at various scales. This information will be enhanced by practical exercises involving the integration of multiple datasets from world-class mineralised districts. A field excursion to the west coast of Tasmania will examine real life exploration issues at several mine sites.

Presenters: Assoc. Prof. Steve Walters, CODES staff and selected industry and academic lecturers.

CRC LEME (Australian National University).

Regolith Geology and Mineral Exploration (REG08503)

Dates: NOT OFFERED IN 2008
Location: Fowlers Gap (100 km north of Broken Hill)

Introduction to regolith geology for mineral explorers. The course runs over an intensive 11 days including integrated lectures at Fowlers Gap and field site visits around the highly prospective Broken Hill, Curnamona and northwest NSW areas. The second week will be combined with an intensive regolith-landform mapping Honours field class.

Topics covered include: regolith terminology, materials and their geneses, landscape evolution models for mineral exploration, economic mineral deposits in the regolith); regolith mapping and remote sensing, rock and mineral weathering in the regolith, regolith of Australia (where is it? What are the exploration problems associated with it?), exploration geochemistry and exploration strategies in regolith-dominated terrains, (recognising transported from in situ), choosing sampling materials, successfully, alternative sampling materials), regolith mineral exploration case studies, regolith sampling media, data handling, basic statistics and how to characterise anomalies.

Presenters: Dr Ian Roach. Fee: $2000 plus $550 full board for the 11 days at Fowlers Gap plus incidental accommodation and meals in Broken Hill (depending on flight schedules).

VIEPS, School of Geosciences, Monash University

Geophysical Field Camp (GFW) and Geophysics Software Workshop (GSW)

Dates: NOT OFFERED IN 2008
Location: School of Geosciences, Monash University. Field area to be advised.

Two one-week short courses; a geophysics hardware-based field camp and a software course based at Monash University. The field camp consists of morning field sessions and afternoon lectures and tutorials. Each day of the software course consists of a two-hour formal lecture followed by an interactive three-hour tutorial/workshop session.

The field camp course (GFW) provides a field-based introduction to high definition geophysical surveys with emphasis on practical aspects of survey design and procedures. The course covers instrument operation, software options and survey parameters. Each geophysical technique (gravity, magnetics, electromagnetics, seismic reflection, IP resistivity, ground penetrating radar, inductively coupled resistivity, ± magnetotellurics, and ± passive seismic) is explained and demonstrated prior to participants gaining first-hand experience in its operation. A range of techniques are applied to locating and mapping a gold-bearing paleo-channel buried beneath flat pastureland near Maldon, Central Victoria.

The software course (GSW) is an introduction to geological modelling based on commercial geophysical packages commonly used in mineral exploration (Oasis Montaj, ERmapper, GM-SYS). The course systematically progresses through data preparation, interpolation, presentation, and interpretation using suites of data from gravity, magnetics, and EM surveys. Raw data collected in the field course are processed and interpreted in the computer laboratories of Monash University to produce a map of the buried gold-bearing paleo-channels. Familiarity with computer systems is recommended, although some fundamental training is provided.

Both courses are for VIEPS Honours, MSc students and are open to industry geoscientists.

Course Presenters: GSW Dr Laurent Ailleres assisted by Dr Pete Betts and Dr Duncan Massie, in collaboration with industry representatives from Des Fitzgerald and Associates, ENCOM Technologies and Geosoft. GFW Prof Jim Cull

WASM, Curtin University of Technology

Natural Resource Economics (full unit), Unit code: 10939

Dates: 6-14 June 2008 (offered every year)
Location: Bentley (Perth) campus, Curtin University of Technology

Intensive 9-day short course. Each involves attendance in class for four hours per day (usually in the morning) and associated activity outside class in the afternoons and evenings. There is typically an examination scheduled on the final day of each unit. Topics include; The study of mineral economics, Review of economic concepts and theories, The framework for the analysis of natural resources, Economic rent, renewable resources, environmental resources, non – renewable resources, minerals and economic development, mineral abundance – curse or blessing, mineral policy and mineral taxation, mining and the environment, mining and sustainable development.

Presenters: Dr. Dinty Mather and Prof. Philip Maxwell

Resource Sector Finance 601 (half unit), Unit code: 10940

Dates: 16-21 June 2008 (offered every year)
Location: Bentley (Perth) campus, Curtin University of Technology

Intensive 6-day short course. Each involves attendance in class for four hours per day (usually in the morning) and associated activity outside class in the afternoons and evenings. There is typically an examination scheduled on the final day of each unit. Topics include; fundamental differences between cash (management) accounting and financial accounting on an accrual basis. Construction of simple Discounted Cash Flow (DCF) models of mining projects under assumed certainty. Investment choices based on the main DCF criteria of value (i.e. NPV, IRR, discounted payback etc.), the role of equity and debt in funding projects to generate financial leverage the concept of risk, our attitudes to it and how to make decisions under uncertainty using either the expected value or the expected preference value criteria, sensitivity and scenario analyses and Monte Carlo simulations.

Presenters: Assoc Prof Pietro Guj

Legal and Regulatory Environment 602 (half unit), Unit code: 10942

Dates: 23-28 June 2008 (offered every year)
Location: Bentley (Perth) campus, Curtin University of Technology

Intensive 6-day short course. Each involves attendance in class for four hours per day (usually in the morning) and associated activity outside class in the afternoons and evenings. There is typically an examination scheduled on the final day of each unit. Topics include; introduction to the common law system, the contextual legal framework within which Australia business functions, the law of contract, and an analysis of fundamental issues of Western Australian mining law.

Presenters: Gavin Jahn and Phil Davies (Curtin Business School)

Cost and Capital Investment Estimation 602 (half unit), Unit code: 10943

Dates: 30 June - 5 July 2008 (offered every year)
Location: Bentley (Perth) campus, Curtin University of Technology

Intensive 6-day short course. Each involves attendance in class for four hours per day (usually in the morning) and associated activity outside class in the afternoons and evenings. There is typically an examination scheduled on the final day of each unit. Topics include; a first exposure to the field of cost engineering designed to generate general awareness of the related methodologies rather than specialised technical expertise in the area. After a revision of fundamental Financial Accounting and Discounted Cash Flow (DCF) concepts and principles, students will be exposed to a number of different cost estimation methods including:

- Order-of-magnitude estimates using aggregate, average industry costs.
- Top-down modelling of broad component costs using empirical cost-throughput curves.
- Bottom-up estimation of disaggregated component costs using detailed estimates of their inputs quantities and unit costs, including equipment, labour, supplies etc
- The use of DCF models to determine and assess contract-mining prices.

Course Presenters: Ryan Hair (BHP Billiton)

Resource Sector Management 601 (full unit), Unit code: 306032

Dates: 7-12 July 2008 (offered every year)
Location: Bentley (Perth) campus, Curtin University of Technology

Intensive 9-day short course. Each involves attendance in class for four hours per day (usually in the morning) and associated activity outside class in the afternoons and evenings. There is typically an examination scheduled on the final day of each unit. Topics include; Strategic Management Porter's Five Forces and Generic Strategies, Porter's Value Chain - Influence upon Organisational Structure: The resource-based view of the firm (Core & Key Competence), Does industry matter? Competitive Strategy, Co-operative Strategy and "Co-opetition",McKinsey's Seven S's (Strategy, Structure, Skills, Style, Staff, Shared Values, System), Corporate Strategy (The role of the corporate centre), Portfolio Theory & Conglomerates, 'New' Economy versus 'Old' Economy Business Models: Is there a difference? Operations Management Principles of Scientific Management (Taylorism), Theory of Constraints (Goldratt), Critical Path Project Management, 'Lean' Production (The Toyota Production System), Inventory Management (Is inventory an asset or liability?), Management Accounting (Why use it?), Operations Performance Metrics.

Presenters: Professor Christian Moscoso (University of Chile)

Contact Details for Program Co-ordinators from institutions participating in the National Masters Geoscience Teaching Network.

Note: Prospective students can choose between The University of Western Australia, The University of Tasmania or James Cook University as their home university for the Masters course.

For further information on the National Minerals Geoscience Masters (MGM) Program and the National Master (by Coursework) Program at The University of Western Australia please contact either:

Mr. Scott Collins
National MGM Co-ordinator
Centre for Exploration Targeting (M006)
The University of Western Australia
35 Stirling Highway
Crawley, WA 6009
AUSTRALIA
Ph: (08) 6488 3370
Fax: (08) 6488 1178
Email: collinss@cyllene.uwa.edu.au

Ms. Cindi Mispagel
Academic Co-ordinator
Centre for Exploration Targeting (M006)
The University of Western Australia
35 Stirling Highway
Crawley, WA 6009
AUSTRALIA
Ph: (08) 6488 2640
Fax: (08) 6488 1178
Email: mispagel@cyllene.uwa.edu.au

For further information on the coursework-units offered by other participating institutions, please contact:

Dr Tony Webster
MSc Co-ordinator /Senior Lecturer
CODES University of Tasmania
Private Bag 79
Hobart, Tasmania 7001
AUSTRALIA
Ph: (03) 6226 1942
Fax (03) 6226 7662
Email: awebster@utas.edu.au

Dr Cameron Huddleston-Holmes
Lecturer / MSc Co-ordinator
Economic Geology Research Unit
School of Earth and Environmental Sciences
James Cook University
Townsville, QLD 4811
AUSTRALIA
Ph: (07) 4781 6911
Fax (07) 4725 4020
Email: cameron.hholmes@jcu.edu.au

Dr Peter Betts
MSc Coordinator /MCA Lecturer
VIEPS
Monash University
School of Geosciences
Room 243, Building 28
Monash University, VIC 3800
AUSTRALIA
Ph (03) 9905-4888
Fax (03) 9905-4903
Email: Peter.Betts@sci.monash.edu.au

Isabella "Izzy" von Lichtan
Masters Administrative Officer
CODES, University of Tasmania
Private Bag 79
Hobart, Tasmania 7001
AUSTRALIA
Ph: (03) 6226 2453
Fax (03) 6226 2547
Email: ij_von@utas.edu.au

Prof Philipp Maxwell
Head of Mineral Economics & Mine Management
WASM
Curtin University of Technology
GPO Box U 1987,
Perth, Western Australia 6845
AUSTRALIA
Ph. (08) 9266 7757
Fax (08) 9266 3764
Email p.maxwell@curtin.edu.au

Dr. D.C. "Bear" McPhail
Key Researcher in the CRC for Landscape Environments and Mineral Exploration
Research School of Earth Sciences
Australian National University
Building 47, Geology Building
Australian National University, ACT 0200
AUSTRALIA
Ph: (02) 6125 2776
FAX: (02) 6125 5544
Email: bear@ems.anu.edu.au

TIMETABLE FOR 2008 NATIONAL MINERALS GEOSCIENCE MASTERS PROGRAM- AVAILABLE UNITS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January																															
February					JCU Business and Financial Management in the Minerals Industry (EA5024) 5-15 Feb																										
March																															
April	CODES Volcanology and Mineralisation in Volcanic Terrains (KEA843) March 30 - April 13																														
May																															
June									CODES Brownfields Exploration (KEA847) 9-20 June																						
July							UWA Applied Structural and Field Geology (EART8504) 7-18 July																								
August											JCU Resource Estimation and Production Geology (EA5023) 11-22 August																				
September																															
October																											CODES Ore Deposit Models and Exploration Strategies (KEA841) 27 Oct - 7 Nov					
November	CODES Ore Deposit Models and Exploration Strategies (KEA841) 27 Oct - 7 Nov								UWA South African Ore Deposits Field Excursion (EART8519) 9-23 Nov																						
December																															

TIMETABLE FOR 2008 NATIONAL MINERALS GEOSCIENCE MASTERS PROGRAM- WASM AVAILABLE UNITS																														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
June						Natural Resource Economics 601 (10939) 6-14 June										Resource Sector Finance 601 (10940) - 16-21 June: 3 credit points							Legal and Regulatory Environment 602 (10942) 23-28 June: 3 credit points								
July	Cost and Capital Investment Estimation 602 (10943) 30 June - 5 July : 3 credit points						Resource Sector Management 601 (306032) 7-12 July																								