Economic Geology Research Centre

Pathways to Future Resources Short Courses
Professional Development for Technical & Non-Technical Professionals

2019 Courses
March to July

Geoscience
College of Science & Engineering
James Cook University
Townsville, QLD, Australia
jcu.edu.au/egru
EGRU Professional Development Short Courses

EGRU has been delivering professional development training to geoscientists for over 30 years. It is now expanding the courses on offer to include courses suitable for a range of technical and non-technical professionals who either work in, or consult to, the resources industry, and who work and communicate with geoscientists.

Courses suitable for non-geological professionals.

**QGIS for Geologists**
30 March 2019 all day
Mr Grant Boxer, Consultant Geologist
Delegate numbers are limited.
The course will also be offered on 31 March if there is sufficient demand.
QGIS is a free open-source GIS program that runs on the PC, Mac and Linux. Although QGIS is not specifically built for geological applications, the program is very capable and can do the majority of data import, data display and map production required by today’s geologists. A wide variety of geological symbols and patterns are available for geological maps.

Delegates should have some basic knowledge of Geographic Information Systems.
The workshop includes an introduction to the various features of QGIS and extensive hands-on sessions using QGIS to create maps, and to explain and demonstrate how to import and display various types of data (vector, raster, geological, geochemical, geophysical, and satellite imagery).
Registrants will use their own laptops during the course and will be requested to download and install the latest version of QGIS, together with a number of free plug-ins, before the workshop.
GIS data will be provided for the hands-on workshop together with documentation on using QGIS in mineral exploration.
Grant Boxer, a consultant geologist with over 40 years’ experience in exploration and mining, has presented more than 10 QGIS workshops in Perth.

**QAQC for Mineral Exploration & Beyond**
27 April 2019 all day
Dr Dennis Arne, CSA Global
Delegate numbers are limited.
This one-day short course is designed to present a clear and practical approach to designing, implementing and assessing QAQC protocols for exploration and drilling programs. It will involve a series of practical exercises that will allow the participants to develop confidence in plotting and assessing quality control data using real-world data. Emphasis will be placed on using quality control data to reduce ambiguities associated with the interpretation of exploration results and to help minimise errors in resource estimates.
Topics covered will include:
- Meeting the requirements of reporting codes & regulators
- Implications for exploration and resource estimation
- Representative sampling and data precision from field to instrument
- Selection of certified reference materials
- Check assays and blanks
- In-house laboratory quality control data
- Quality control for additional data sets: e.g. bulk density, collar and down-hole surveys
- Reference material control plots
- Estimates of data precision
- Acceptable carry-over vs cross contamination
- Quality control failure
- Tracking issues, actions and outcomes
- Database structure
- Data verification
- Integration of quality control data

**Integrating Geochemistry & Mineralogy for Exploration**
28 April 2019 all day
Dr Dennis Arne, CSA Global
Delegate numbers are limited.
Geochemical and mineralogical data are now routinely collected on the same sample material, but the interpretation of these data sets is often done separately. Geochemical data may include assays or multi-element data collected from crushed rock or from surficial material. Mineralogical data may include hyperspectral analyses, semi-quantitative XRD or heavy mineral separates. Integration of complementary data sets such as these on a single interpretive platform allows for a better understanding of geochemical and mineralogical processes associated with hydrothermal mineralisation and secondary dispersion.
The short course is a full day of lectures, discussions, and practical interpretive exercises. Participants will need to bring a laptop computer and download a demonstration copy of ioGAS software. Lectures on geochemical and mineralogical responses from some common hydrothermal deposit types will be integrated with exercises involving data interpretation.
Dennis Arne has over 35 years’ experience as a geologist and geochemist, working in a wide range of commodities and environments. In recent years he has consulted to exploration programs for precious and base metals exploration in Australia, North America, South America and the Middle East. This has included the design and implementation of geochemical surveys, the interpretation of geochemical data, the design...
EGRU Professional Development Short Courses

of QAQC programs, reviews of geochemical data quality, and training of personnel. He has published extensively in the areas of applied geochemistry and economic geology.

The JORC Code

29 April 2019
2 x half-day courses
Mr Mark Berry, Derisk Geomining
The JORC Code sets out the requirements for public reporting of exploration and mining information, however its scope is much broader than this. It sets out standards, recommendations and guidelines to assist geologists, mining engineers and other technical staff to establish sound processes for data collection; quality control and assurance; analysis; interpretation and estimation of Exploration Targets, Mineral Resources and Ore Reserves; and reporting of all of these activities. The Checklist of Assessment and Reporting Criteria (Table 1) is a valuable tool for all technical staff contributing to exploration and mining, from new graduates to experienced veterans.

Introduction to the JORC Code

29 April 2019 morning
This course is suited to both technical and non-technical professionals.

This half-day course is designed for anyone new to the JORC Code, including early career geoscientists, geoscientists and engineering students considering a career in the resources industry.

The course will provide an overview of the Code and illustrate how Table 1 can be used to guide day-to-day work flows and procedures in exploration and mining. It will also introduce the concept of the Competent Person.

The course is also open to other technical and non-technical professionals who wish to improve their understanding of the Code and its role in exploration and mining.

A JORC Code Refresher for Existing and Aspiring Competent Persons

29 April 2019 afternoon
Technical staff signing off on public reports presenting Exploration Results, Mineral Resources and Ore Reserves are accepting significant personal responsibility for these reports. This course is designed as a refresher for technical staff who are currently taking Competent Person responsibility for public reporting of Exploration Results, Mineral Resources and Ore Reserves; or those that may be in a position to do so now or in the near future.

The course will provide an overview of the key elements of the Code and how it is monitored, focusing on the issues most relevant to Competent Person responsibility. Case studies will be used to illustrate good reporting practices.

Assessing and Communicating Geological Uncertainty and Risk to Non-Geologists

30 April 2019 all day
Mr Mark Berry, Derisk Geomining
This course is suited to geologists, and to other professionals who communicate with geologists and/or work with geological data and interpretations.

No prior knowledge is assumed.

Geologists provide essential technical information during all stages of exploration, feasibility, development and mine operations. Much of this information is used by engineers, metallurgists, environmental staff, operations staff and mine management for planning and operations management. But, almost everything geologists deliver to these staff are estimates and interpretations rather than facts, so how do geologists identify, document and convey the fundamental uncertainties associated with their estimates and interpretations to non-geologists?

This workshop will review the sources of geological uncertainty that feed into exploration, mineral resource and ore reserve estimates, mine planning, scheduling, optimisation and operations – with implications from pit to port.

Workshop modules include:

- Risks and opportunities linked to the provision of geological information
- Conventional risk assessment and management systems
- Contributions to geological uncertainty
- Approaches for identifying, documenting and communicating geological uncertainty to non-geologists

Case studies emphasising the importance of assessing geological uncertainty linked to mineral resource and ore reserve estimates (including mining, processing, waste disposal and transport) are used to emphasise the importance of effectively managing geological risk. Group interaction and exercises are also used to illustrate and reinforce workshop concepts.

Mark Berry is a geologist with over 38 years’ experience, spanning exploration, feasibility and development, mine operations, management, research and development and consulting. Mark was Chairman of the Queensland Branch of the Australian Institute of Geoscientists (the professional body for geoscientists) for many years, and has extensive experience developing and presenting professional development courses.

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Individual graphic images created by Freepik, Macrovector, Katemangostar, janoon028, Ranpixel.com
Advanced Field Training
29 June - 6 July 2019
Prof. Paul Dirks, Dr Ioan Sanislav, EGRU JCU

Eastern Mt Isa Block, NW Minerals Province, Queensland

This intensive 8-day course is designed to
provide geoscientists with an
introduction to the geology of Mt
Isa Inlier, a world-class metallogenic
province, and develop essential
exploration-related field skills
applicable in complexly deformed and
altered terrains. Detailed 'form surface'
mapping of contacts, alteration zones
and structures will be integrated with
paragenesis, geophysical interpretation
and the use of alternate knowledge-
based and data-based exploration
models, including an introduction to
the simple and useful application of
semi-quantitative prospectivity tools.
The course will be based in the Eastern
Mt Isa Block, which contains world
class IOCG and Pb-Zn-Ag deposits,
as well as important U and REE
mineralization.

The course is suited to professional
geologists and university students
seeking to improve their field geology
and mapping capabilities.

The course will include:
- Field visits to major structural and
terrain boundaries. This will include
discussions and assessment of the
nature, significance and potential
of these major structures for
mineralization.
- Visits to selected ore deposits, and
discussions about deposit geology
and potential exploration models.
- Veins, breccias, shear zones:
paragenesis, overprinting,
mechanisms, geometry.
- Advanced structural geology and
structural controls.
- Developing exploration strategies
from field observations.

Course Details
Part 1: General introduction to the
geology and deposit types in the
Eastern Fold Belt of the Mt Isa Inlier.
Outcrop descriptions of representative
rock types and structures. Visits to
the Au-only Tick Hill deposit, Cu-Au
Trekelano deposit, Cu-Au Mt Colin
deposit, U-REE Mary Kathleen deposit,
Cu-Au-REE Elaine Dorothy prospect.
The geology, alteration and structures
of these deposits forms the basis for
developing exploration strategies for
two prospective mapping areas.

Part 2: Mary Kathleen Domain
- We will map and explore for
mineralisation around the Elaine
Dorothy prospect, an area of awesome
exposure and outstanding geography.
This is an ideal area to appreciate
alteration recognition in the field, basic
structural geology, skarns and intense
metasomatic activity, and correlation
of geophysical data sets with geology in
order to identify drill targets.

Part 3: Soldiers Cap Domain- IOCG
deposits, breccias and crustal fluid
flow. The Eastern Succession of the
Mount Isa inlier is world renowned
for its variety of IOCG deposit types.
Part 3 will examine field aspects
of exploration for IOCG deposits,
emphasising characterisation and
mapping of breccias and fluid systems
in the field. We will map along a major
terrain boundary, the Cloncurry Fault,
which contains typical IOCG alteration
assemblages and will investigate
enigmatic breccia-pipes known to
contain anomalous Cu and Au.

Leapfrog Geo
2 x one-day courses

Fundamentals
8 July 2019 all day
Mr Barry Junor, Seequent

Leapfrog Geo is a workflow-based 3D
geochemical anomaly definition:
geochemical data analysis and mineral
potential (prospectivity) mapping
is designed to provide
geochemists with an introduction to
geochemical data analysis and mineral
potential (prospectivity) mapping
with a focus on mineral exploration.
The course will cover the relevant
theoretical background, however
frequent practical exercises will be
undertaken throughout. Emphasis will
be placed on using mineral system
understanding to underpin the data
analysis in order to maintain the
relevant geological context at all stages.
Topics to be covered include:
- Geochemical anomaly definition:
  traditional statistics, non-
  parametric statistics (univariate and
  multivariate), and analysis of stream
  sediment data
- Mineral potential mapping: mineral
  systems analysis, knowledge driven
  methods, data driven methods
Workshop participants should have
at least a basic working knowledge of
GIS to get the most out of this course.
Practical exercises will primarily be
undertaken using ArcGIS, however a
separate standalone application will
need to be installed for the multifractal
analysis on day 1.
The course will be run in a JCU GIS computer lab with the required software, however participants are welcome to bring their own laptops (those wishing to do so should contact the course leader to discuss the required software/licenses in advance). Ariane Ford is a Senior GIS Analyst with Kenex in New Zealand and previously spent 10 years in academia in Australia working on research projects focused on spatial data modelling for mineral exploration. She has presented a number of training courses to students, industry, and government on mineral potential mapping and spatial data analysis.

Management in Mineral Exploration
22 - 26 July
5 x one-day courses

Nick Franey, NJF Consulting

In response to feedback from industry, Nick Franey has developed a series of one-day courses based on the EGRU Minerals Geoscience Masters subject, to provide a flexible option for time-poor explorers who are looking to enhance their management skills.

Most of these courses are suited to both technical and non-technical professionals involved in exploration management.

Five one day modules are offered as individual courses.

Monday 22 July
The Principles and Key Success Criteria of Mineral Exploration Management
  ➢ The Mineral Exploration Business
  ➢ Principles of general management (the management cycle) & a management toolkit
  ➢ Mission, Vision, Exploration Strategy
  ➢ Communication (& Press Releases)
  ➢ Exploration Management Success Criteria (including the McKinsey Study)

Tuesday 23 July
Day-to-Day Management for Mineral Exploration
  ➢ The Exploration Process
  ➢ Exploration Portfolio & Pipeline
  ➢ Key exploration management decisions
  ➢ Exploration methods: Geology, Geochemistry & Geophysics – from a management perspective
  ➢ Engaging consultants
  ➢ Drilling: Planning, the Drill Contract, Rig Supervision, Monitoring performance

Wednesday 24 July
Data Management for Mineral Exploration and Feasibility Studies
  ➢ Geochemical/Drilling data – the importance of a relational database
  ➢ Geochemical QAQC
  ➢ Managing geophysical data
  ➢ Spatial Data: GIS & maps
  ➢ Technical reports – why they are so important, and how to ensure they get done

Thursday 25 July
The Non-Technical Aspects of Mineral Exploration Management (e.g. HR, Administration, Logistics, HSEC)
  ➢ HR: Organisational structure, Job descriptions, Succession planning, Teamwork, Employment contracts, Performance management, Staff development & training
  ➢ Administration: Asset management, Field logistics, Tenement administration, Budgets & expenditure controls
  ➢ Health & Safety: Risk management, Promoting awareness, MERP, Incident investigations
  ➢ Environment: Approvals, Baseline Studies, Minimising impacts, Rehabilitation
  ➢ Community Relations: Engagement, why it matters, Standards & Guidelines, Sticky Issues, Security, Socio-economic development

Friday 26 July
Financial Aspects of Mineral Exploration and Project Evaluation (for experienced geologists)
  ➢ Introduction to finance, the Market, Funding exploration
  ➢ Economic Evaluation of Projects: DCF analysis, Building an economic model
  ➢ Project Valuations: Income, Cost- & Market-based methods
  ➢ Accounting Basics: the Balance sheet, Income statement & cash flow
  ➢ The use of Financial ratios

Nick Franey has taught the Business and Financial Management subject of the JCU Masters of Mineral Geoscience (MGM) since 2016, working with Andy White until Andy retired. Nick is an exploration geologist with a broad range of experience, from grassroots to advanced project (feasibility study) and near-mine operations. He has explored for most types of gold and base metal deposits in a variety of geological terranes, in more than 20 countries, on three continents.

Nick Franey also offers EGRU Exploration Management courses for Engineers and for Non-Technical Professionals. These course are aimed at professionals involved in the management of exploration companies and exploration programs.

The Exploration Management courses are flexible, can be presented in-house, and can be tailored to meet your requirements. Examples of the course modules are presented on the following page.

Contact EGRU to find out more about these courses.
EGRU Professional Development Short Courses

Mineral Exploration for Engineers
Five-day course
Suitable for engineers with > 5 years experience
  › Day 1: Overview (includes the mineral exploration business, management, success criteria)
  › Day 2: Business Development (includes exploration strategy, negotiation, corporate deals)
  › Day 3: Exploration Management (includes exploration process, resource estimation, feasibility studies, data management)
  › Day 4: Non-Technical areas (includes HR issues; administration and finance; HSEC; MERP)
  › Day 5: Personal Skills (productivity, decision making, communication, organisation)

Mineral Exploration for Non-Technical Managers
Two-day course
  › Day 2: The Exploration Process, Exploration Methods (including. drilling), Data Management.

Ore Textures & Breccias Recognition Techniques
Three-day course
Dr Gavin Clarke, JCU
This course covers the fundamentals of textural observation and interpretation in mineralised hydrothermal systems.

Registration & Cancellation - 2019 Courses
Register for EGRU short courses on the EGRU web site: https://www.jcu.edu.au/economic-geology-research-centre-egru/professional-development/courses. The short course cancellation policy is included below and on the EGRU web site.

Registration Fees include: Morning and/or Afternoon Tea; Lunch
Additional information on individual courses will be available on the EGRU web site.
Courses will be held at the JCU Townsville campus unless otherwise specified.

Cancellation Policy
EGRU reserves the right to cancel or reschedule any or all of the courses if minimum numbers are not registered by:
  › Wednesday 13 March 2019 (QGIS)
  › Wednesday 17 April (QAQC / Integrated Geochemistry / JORC / Uncertainty & Risk)
  › Friday 31 May (Advanced Field Training / Leapfrog / Spatial Data Analysis / Management Courses)
or if unforeseen circumstances require the cancellation/ rescheduling of any courses.

Registration fees will be fully refunded should EGRU cancel or reschedule a course.
EGRU is not responsible for cancellation fees incurred by registrants that are imposed by airlines, accommodation venues or other entities as a result of the any courses being cancelled or rescheduled.

If a delegate cancels a place on a course there will be a full refund of the registration fees for cancellations on or before:
  › Wednesday 13 March 2019 (QGIS)
  › Wednesday 17 April (QAQC / Integrated Geochemistry / JORC/Uncertainty & Risk)
  › Friday 31 May (Advanced Field Training / Leapfrog / Spatial Data Analysis / Management Courses)

Fees will not be refunded after Wednesday 13 March 2019 (QGIS) and/or Wednesday 17 April (QAQC / Integrated Geochemistry / JORC / Uncertainty & Risk) and/or Friday 31 May (Advanced Field Training / Leapfrog / Spatial Data Analysis / Management Courses), but registration can be transferred to an alternative delegate.

Core Logging Techniques
Two-day course
Prof Paul Dirks, JCU
This course introduces the basic skills and methodology to review and log geological drill core. It consists of lectures and practical group exercises with oriented drill core.
Next course scheduled for early 2020.
<table>
<thead>
<tr>
<th>Date</th>
<th>Course Title</th>
<th>Registration Fees (AUD inc GST)</th>
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<tr>
<td>30 March</td>
<td>QGIS for Geologists (one-day course)</td>
<td>EGRU Members $330.00</td>
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<td>AIG Members $440.00</td>
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<td>Non-Members $495.00</td>
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<td>31 March</td>
<td>QGIS for Geologists (subject to demand)</td>
<td>Fees as for 30 March QGIS course</td>
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<td>27 April</td>
<td>QAQC for Mineral Exploration &amp; Beyond</td>
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<td>28 April</td>
<td>Integrating Geochemistry &amp; Mineralogy for Exploration</td>
<td>Fees as for QAQC Course</td>
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<td>29 April am</td>
<td>Introduction to the JORC Code (morning)</td>
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<td>A JORC Code Refresher (afternoon)</td>
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<td>Advanced Field Training</td>
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<td>22 - 26 July</td>
<td>Management in Mineral Exploration 5 x 1 day Modules</td>
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The Economic Geology Research Centre (EGRU) at James Cook University connects researchers, students, industry, and government organisations, and builds productive working relationships by:

- Promoting collaborative research
- Providing applied research services
- Delivering professional development training

EGRU Members receive discounted registration for EGRU conferences, short courses and workshops. Delegates at EGRU events may earn Professional Development points from their professional bodies.

For further information about EGRU activities see the EGRU Research & Services booklet on the web site.

jcu.edu.au/egru