EGRU
Economic Geology Research Centre
Professional Geologist Short Courses
2019 Courses
March to July 2019
Geoscience
College of Science & Engineering
James Cook University
Townsville, QLD, Australia
jcu.edu.au/egru
EGRU has been delivering professional development training to geoscientists for over 30 years. This year the range of courses offered has been developed after discussions with professional geoscientists and with industry. EGRU is also expanding its range courses to include courses suitable for non-geological professionals who either work in, or consult to, the resources industry, and who work and communicate with geoscientists. To find out more about EGRU courses please visit the EGRU web site and/or contact the EGRU Manager.

QGIS for Geologists
30 March 2019
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
Dr Dennis Arne, CSA Global
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
Dr Dennis Arne, CSA Global
Delegate numbers are limited.
Delegates should have some basic knowledge of Geographic Information Systems.

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.
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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 consists 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. Topics covered will include:
- Introduction to the integration of geochemical and mineralogical data
- Introduction to exploration data analysis (exercise)
- Review of hydrothermal alteration systems
- Defining hydrothermal alteration using geochemical data (exercise)
- Introduction to mineralogical data in mineral exploration
- Case studies illustrating data integration
- Data integration exercises
EGRU Professional Geologist Short Courses

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 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

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, geoscience 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 work within, or consult to, the resources industry, and wish to increase their understanding of the Code and its role in exploration and mining.

A JORC Code Refresher for Existing and Aspiring Competent Persons

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

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 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.
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 geology. 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 characteristion 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
Mr Barry Junor, Seequent

Leapfrog Geo is a workflow-based 3D geological modelling software that allows you to build models directly from various data, including drillholes, points and surfaces. Models update dynamically when new data is added to a project, facilitating efficient model updates.

The course will be situated in a JCU computer lab. A Leapfrog Geo training licence will be provided.

Intermediate
9 July 2019

Mr Barry Junor, Seequent
This will follow on from the Fundamentals course and is the next step to building your skills.

The course will be situated in a JCU computer lab. A Leapfrog Geo training licence will be provided.

Spatial Data Analysis
10 - 11 July 2019
Dr Arianne Ford, Kenex

This 3-day workshop on spatial data analysis is designed to provide geoscientists 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.
EGRU Professional Geologist Short Courses

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).

Arianne 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
› The Geochem/Drilling data – the importance of a relational database
› Geochem 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
› Admin: 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 Geologist Short Courses

Mineral Exploration for Engineers

Five-day course
Dr Nick Franey, NJF Consulting
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; admin and finance; HSEC; MERP)
- Day 5: Personal Skills (productivity, decision making, communication, organisation)

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 for full day courses.

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.

Mineral Exploration for Non-Technical Managers

Two-day course


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.

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.

Additional EGRU Courses

Topics covered include infill; alteration; overprinting & paragenesis; breccias - recognition and types; paragenetic core logging.

Next course scheduled for early 2020.
## Short Course Registration Fees 2019

<table>
<thead>
<tr>
<th>Date</th>
<th>Course Title</th>
<th>Registration Fees (AUD inc GST)</th>
</tr>
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<tbody>
<tr>
<td>30 March</td>
<td>QGIS for Geologists (one-day course)</td>
<td>EGRU Members: $330.00</td>
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<td></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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<tr>
<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>
<td>EGRU Members: $550.00</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>Non-Members: $300.00</td>
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<tr>
<td>29 April pm</td>
<td>A JORC Code Refresher (afternoon)</td>
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<td>30 April</td>
<td>Assessing and Communicating Geological Uncertainty and Risk to Non-Geologists</td>
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<td>29 June - 6 July</td>
<td>Advanced Field Training</td>
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<td>8 July</td>
<td>Leapfrog Geo - Fundamentals</td>
<td>EGRU Members: $550.00</td>
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<td>9 July</td>
<td>Leapfrog Geo - Intermediate</td>
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<td>10 - 12 July</td>
<td>Spatial Data Analysis</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