

MASTER OF ECONOMIC GEOLOGY SHORT COURSE

# Geometallurgy

4<sup>th</sup> – 15<sup>th</sup> November 2019

A comprehensive overview of practical geometallurgy: From mineral processing fundamentals to deposit characterisation

**CODES**

CENTRE FOR ORE DEPOSIT AND EARTH SCIENCES

CODES, Centre for Ore Deposit and Earth Sciences, University of Tasmania  
CRICOS Provider Code 00586B



UNIVERSITY of  
**TASMANIA**

AUSTRALIA

*Geometallurgy involves a quantified and comprehensive approach to ore characterisation in terms of critical processing attributes such as blasting, crushing, grinding, liberation, recovery and environmental management. Key outcomes of increased geometallurgical knowledge are improved forecasting, reduced technical risk, enhanced economic optimisation of mineral production, and improved sustainability.*

*This course introduces a range of techniques for 'early-stage' (e.g., exploration, prefeasibility) collection of geological information that is relevant to mining engineers and metallurgists. The program includes lectures, practical exercises (including a computer-based modelling exercise) and a three day field trip to north and western Tasmania. The field trip will include a visit to ALS Minerals and Geochemistry Laboratories in Burnie to view their metallurgical test work facilities, and mineral processing plants at the Renison Bell (tin) and Hellyer (gold) mines.*

*Registration fees cover the cost of course notes and the field trip (transport and accommodation). Participants are responsible for air travel to/from Hobart and accommodation in Hobart.*

*Participants must bring safety boots and a laptop computer with Microsoft Excel installed. It is recommended that all participants are familiar with the use of Microsoft Excel. Instruction in the use of other software (e.g. ioGas) will be provided during the course.*

*Geometallurgy is offered as a unit of the national Minerals Geoscience Masters program.*

## **MASTER OF ECONOMIC GEOLOGY: THE MOST COMPREHENSIVE MASTERS DEGREE IN MINERAL EXPLORATION AND MINING GEOLOGY ANYWHERE IN THE WORLD**

This course work-based Masters program is aimed at geoscientists who want to gain a thorough up-date on advances across the spectrum of economic geology applied to mineral exploration. The Master of Economic Geology at UTAS is part of the national Minerals Geoscience Masters program, jointly offered by the University of Tasmania and the University of Western Australia, in conjunction with Curtin Business School at Curtin University.

### **Course structure**

The Masters course can be completed in either of two ways:

*Option 1:* requires the completion of six coursework units and a minor research thesis. Four of the units must be completed at CODES, while the remainder may be completed at other participating universities. Duration: 18–24 months full-time; up to 30 months part-time (flexible in recognition of industry participants).

*Option 2:* requires the completion of eight units of coursework, at least four of which must be undertaken at CODES. Duration: up to 30 months part-time (flexible in recognition of industry participants).

Participating universities offer up to seven units annually or in rotation over a two-year period. Most units are of two weeks duration.

### **Courses offered by CODES**

- KEA707 Ores in Magmatic Arcs (South America): 11 – 26 October 2019
- KEA707 Ores in Magmatic Arcs (Indonesia): next offered March 2021
- KEA708 Volcanology and Mineralisation in Volcanic Terrains (New Zealand, western Tasmania): next offered March 2020
- KEA709 Ore Deposit Geochemistry, Hydrology and Geochronology: next offered June 2021
- KEA710 Exploration in Brownfield Terrains: next offered June 2020

- KEA711 Geometallurgy: 4–15 November 2019
- KEA712 Ore Deposit Models and Exploration Strategies: next offered October 2020

### **Fees**

UTAS tuition fees for 2019 are \$2,339 per unit (8 in total) for domestic students and \$7,988 (AUD) per unit for full-fee paying overseas students (FFPOS). Field-based courses have additional costs. Costs will vary for units taught by other MGM partner institutions.

### **Entry Requirements**

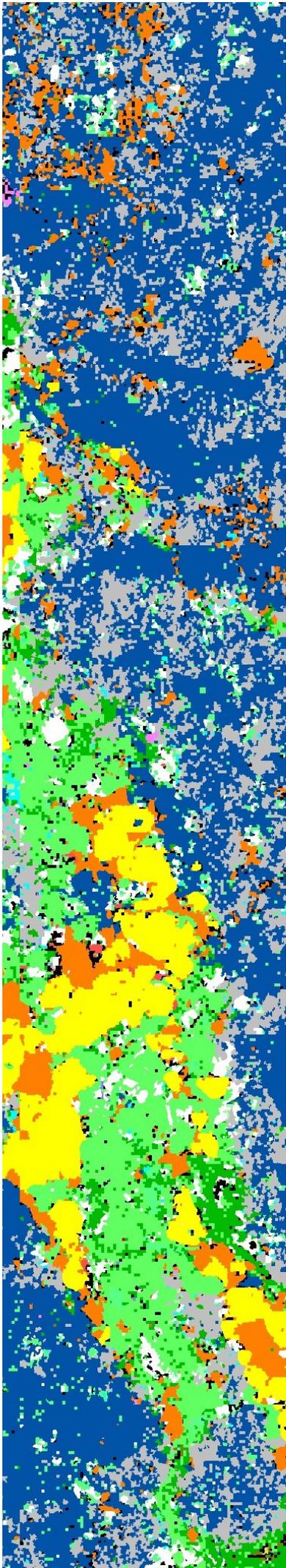
A BSc (Hons), or a BSc (majoring in geoscience) with at least two years industry experience. International students should also refer to <http://www.international.utas.edu.au>. English language proficiency requirements also apply.

### **For further information contact**

Dr Robert Scott  
Masters Coordinator, CODES  
Private Bag 79, Hobart 7001, Australia  
Tel: +61 3 6226 2786  
Email: [Robert.Scott@utas.edu.au](mailto:Robert.Scott@utas.edu.au)  
Website: <http://www.utas.edu.au/codes/masters-short-courses>



**INVITED PRESENTERS**  
**(confirmed at time of press)**



**Toni Kojovic** is a highly accomplished and recognized leader in the field of mining and mineral processing. Toni is the managing director of SimSAGe and a comminution consultant with more than 30 years of experience, both as a Senior Researcher with the JKMRC and as Manager of Technical and Applied Research at Teck Cominco's Red Dog Mine in Alaska.

**Teresa McGarth** is a Senior Research Fellow at WA School of Mines, Curtin University and Manager of the Gold Technology Group and AMIRA P420 Gold Processing Technology Project. Teresa has experience in conducting and reporting plant surveys, modelling plant optimisation, designing and implementing laboratory test work programs and delivering technology transfer workshops.

**Luke Keeney** is the Implementation General Manager at CRC ORE, and is a technical specialist with over 10 years' global experience in integrated mining related base metal and hard rock environments. Luke has worked in a variety of roles covering open pit slope design, geometallurgical research and consulting and has extensive practical and laboratory experience.

**Kathy Ehrig** is Principal Geometallurgist for BHP and has spent 25+ years unravelling the complex mineralogy and geology of the vast Olympic Dam deposit. Kathy has always focussed on how minerals behave in the processing plant, and her current work consists of optimising geometallurgy models for mine planning and developing geometallurgy testing programs to be used in exploration.

**Anita Parbhakar-Fox** is a Senior Research Fellow in Geometallurgy and Applied Geochemistry at the W.H. Bryan Mining and Geology Research Centre within the Sustainable Minerals Institute, University of Queensland. Anita's research is focussed on mine waste characterisation to improve mine planning and waste management practices. She has worked with the mining industry, METS sector and government stakeholders.

**Karyn Gardner** is Principal Geologist—Ore Body Knowledge with Newcrest Mining. Her work involves the design, implementation and analysis of metallurgical and rock property testing programs aimed at improving ore deposit knowledge to assist in the optimisation of mining and mineral processing.

**David Green** is a Senior Geologist at Mineral Resources Tasmania with over 20 year's experience. David works closely with hyperspectral mineralogy datasets produced by the HyLogger to characterise ore bodies for a range of geological and metallurgical outcomes. David has additional expertise in geoinformatics (GIS), geochemistry and structural geology.

**Scott Halley** is a highly regarded consultant specialising in applied litho-geochemistry for geochemical exploration and mineral mapping. Over the last 12 years, Scott has consulted to over 100 mining and exploration companies. He is an expert in the application of SWIR and whole-rock geochemical data to understand deposit mineralogy.

**UTAS presenters:** Julie Hunt, Angela Escolme, Ron Berry, Sebastien Meffre, Matthew Cracknell, Michael Roach, Karin Orth, Sandrin Feig, Thomas Rodemann, Javier Merrill

# PRELIMINARY PROGRAM

## Monday 4<sup>th</sup> November

**Introduction to geometallurgy** — Angela Escolme and Julie Hunt (UTAS)

**Participant introductions**

**Sample selection and preparation** — Julie Hunt (UTAS)

**Characterisation tools and techniques** — Sebastien Meffre, Sandrin Feig, Thomas Rodemann, Angela Escolme, Julie Hunt (UTAS, David Green (MRT)

## Tuesday 5<sup>th</sup> November

**Comminution and statistics**—Toni Kojovic (SimSAGe)

**Geophysical techniques for ore characterisation** — Michael Roach (UTAS)

**Tour of UTAS analytical facilities** — Sebastien Meffre, Sandrin Feig, Ron Berry, Thomas Rodemann

## Wednesday 6<sup>th</sup> November

**Tour of Mineral Resources Tasmania (MRT) core storage facility and hands-on experience using characterisation tools** — Angela Escolme, Julie Hunt, Michael Roach, Karin Orth (UTAS), David Green (MRT)

**Precious metal recovery** — Teresa McGarth (WASM)

## Thursday 7<sup>th</sup> November

**Base metal recovery** —TBA

**Project introduction** — Ron Berry (UTAS)

## Friday 8<sup>th</sup> November

**Heap leaching** —TBA

**Mine waste characterisation and management** —Anita Parbhakar-Fox

**Social licence** — TBC

## Saturday 9<sup>th</sup> November

**Calculated mineralogy** — Scott Halley (Mineral Mapping), Angela Escolme (UTAS)

**Grade Engineering** — Luke Keeney (CRC ORE)

## Sunday 10<sup>th</sup> November

**Private study and travel to Burnie**

## Monday 11<sup>th</sup> November

**Tour of ALS facilities, Burnie** — ALS staff

**Tour of Hellyer gold processing plant** — NQ Minerals staff

## Tuesday 12<sup>th</sup> November

**TBC** — *Tour of Renison Bell tin processing plant* — *Bluestone Mines Tasmania staff*

**Return to Hobart**

## Wednesday 13<sup>th</sup> November

**Image analysis and data analytics** — Matthew Cracknell, Javier Merrill (UTAS)

## Thursday 14<sup>th</sup> November

**Industry case studies** — Kathy Ehrig (BHP), Karyn Gardner (Newcrest Mining), Angela Escolme

**Future of geometallurgy** — Julie Hunt

## Friday 15<sup>th</sup> November

**Student presentations**



# REGISTRATION FORM

## Geometallurgy

4—15 November 2019

Please complete and return to:

Dr Robert Scott  
Masters Coordinator  
CODES/Earth Sciences  
University of Tasmania, Private Bag 79  
Hobart, Tasmania, Australia 7001  
Ph: +61 3 6226 2786  
Email: Robert.Scott@utas.edu.au

### PERSONAL DETAILS

Title—Please highlight ( Prof / Dr / Mr / Mrs / Ms / Miss )

First Name: ..... Last Name: (surname / family name): .....

Preferred Name (for use on name tag): .....

Position: .....

Company / University: .....

Address: .....

City: ..... State: ..... Postcode: ..... Country: .....

Phone (work): ..... Phone (home): ..... Phone (mobile / cell): .....

Email: .....

Dietary requirements / allergies / other health issues: .....

Next of kin (name, relationship and email/phone contact): .....

### REGISTRATION FEES

All fees are in Australia dollars (AUD) and are inclusive of GST.  
Please indicate

#### MGM Masters Students:

Balance not including tuition fee: \$400.00

#### Industry Participants:

6+ days with field trip: \$3,960

..... days (max of 6) at \$660 per day: \$.....

Industry participants please circle days to attend:

**NOV: 4 5 6 7 8 9 10 11 12 13 14 15**

*Please retain a copy of this form for your records and email or post original to Dr Robert Scott (contact details above).*

### PAYMENT

Registrations and payment must be received by **31<sup>st</sup> October 2019**.

Preferred payment method. Please indicate

- Credit Card  
Upon receipt of your registration from you will be provided with a payment reference number and web address for online payments. Please note: Credit card details cannot be accepted by email.
- Cheque or Bank Draft  
Please make cheques and bank drafts payable to "The University of Tasmania". Bank drafts must be made out in Australian currency (AUD).
- UTAS Purchase (for students with internal accounts only)  
UTAS account number.....
- Invoice  
Name, address and email address for person responsible for payment of invoice: .....