Education and Training Curriculum
Course Catalog 2016

- Mentorship
- Education
- Opportunity
- Exploration
- Discovery

Society of Economic Geologists
The 2016 Committee

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The following is a preliminary list of short courses (SC) and field trips (FT) scheduled for 2016. SEG reserves the right to cancel courses or modify speakers, topics, and locations.

Official registration information will be available about three months prior to the courses. Visit segweb.org/events for the latest updates on courses and events!

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<td>SC/FT SEG-SGA-UNESCO Latin American Metallogeny Course</td>
<td>April 20–30</td>
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<td>Copiapo, Chile</td>
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<td>SC Exploration in the 21st Century</td>
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<td>August 17–25</td>
<td>N/A</td>
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<td>FT1 Biga Peninsula: Au-Cu-Mo-Pb-Zn Deposits</td>
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<td>Departs from and returns to İzmir, Turkey</td>
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<td>FT8 Balkans II: Tour of Greece and Bulgaria with a Mix of Porphyry-Epithermal Deposits and Recent Discoveries</td>
<td>September 29–October 3</td>
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<td>Voudouris, Siron</td>
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<td>SC Senior Exploration Management</td>
<td>November 29–December 2</td>
<td>N/A</td>
<td>Littleton, Colorado</td>
<td>Hronsksy, Suchomel, Margeson, Bussey, Welborn</td>
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Granite-greenstone terranes are remnants of once larger tracts of meta-volcanic, meta-plutonic and meta-sedimentary rocks now surrounded and/or intruded by granitoid rocks of similar absolute age. They are composed mainly of subaqueous volcanic and sedimentary rocks which have been metamorphosed from sub-greenschist to amphibolite facies mineral assemblages and are important sources of gold as well as other commodities.

The course will provide an overview of the fundamental geological principles and tools needed to work effectively in this geological setting with reference to illustrations from both Precambrian shields and younger accretionary orogens. The recognition, in outcrop and diamond drill core, of volcanic, sedimentary and plutonic protoliths which have been altered, metamorphosed and deformed is a recurring practical problem: the application of basic field criteria along with supporting geochemical, geophysical and geochronological data will be demonstrated as a means of establishing a structural-stratigraphic framework for gold exploration.

Geological descriptions of the main types of gold deposits typically found in this setting will be augmented by a discussion of commonly accepted exploration guidelines for them. The geological history of gold districts and gold belts will be illustrated with numerous case histories to build an overall picture of the tectonic and metallogenic evolution of these terranes.

The course will be delivered over two days and consist of eight two-hour modules including questions and breaks.

It will be aimed particularly at individuals involved in, or anticipating to be involved in, mineral exploration and mining in granite-greenstone terranes including young professionals and students, as well as managers who possess some geological background.

REGISTRATION Online at http://www.amebc.ca/roundup/short-courses

SEG & AME BC Member Price: CAD$695 • Non-member Price: CAD$850 • Student Fee: CAD$295
Mineral Resource Estimation: An Introduction
The University of Cape Town | Rondebosch, South Africa • February 7, 2016

DESCRIPTION
This SEG workshop will be held at the University of Cape Town on February 7, 2016, the Sunday prior to the Mining Indaba meeting. The workshop will focus on the fundamentals of geology and sampling that are required for robust mineral resource estimation and will include an introduction to variography and kriging. Industry geologists, mine managers and investors, and upper level undergraduate and graduate students in economic geology will find the workshop relevant and useful.

Session 1: Introduction to Mineral Resource Management (MRM), the importance of geology for estimation, and correct modeling, drilling and sampling, QA/QC.
Session 2: Data validation, statistics and Exploratory Data Analysis (EDA), introduction to geostatistics.
Session 3: Spatial analysis, variogram modeling and ordinary kriging.
Session 4: Mineral resource classification and introduction to non-linear geostatistics.
Informal reception and networking.

REGISTRATION
Online at segweb.org/events#16RMRUCT

Early Registration
(through January 18, 2016)
Member: US$395
Non-member: US$495
Student: US$195
Student Non-member: US$245

Late Registration
(after January 18, 2016)
Member: US$495
Non-member: US$595
Student: US$245
Student Non-member: US$295

Please note that SEG reserves the right to cancel this event should minimum attendance numbers not be met by January 18, 2016. For further information on cancellation policy, event photography, and dietary restrictions, visit www.segweb.org/tc.

PRESENTER
Sean Duggan
Geologist with more than 30 years of international experience in mineral exploration and mineral resource evaluation. Currently enjoying working as a Z* consultant evaluating mineral resources. Previously employed by De Beers, Namdeb, and Anglo American in various capacities, estimating and classifying mineral resources. His main focus is currently on diamonds and base metals.
Specialties: mineral resource estimation, mineral resource classification, evaluation and mining of marine diamond placers, optimizing drilling and sampling programs, resource geology, evaluation of diamond placers, mineral resource valuation, mineral resource due diligence, and technical reviews.
Metallogeny and Exploration for Zinc Ores:
Meeting the Challenge for New Resources

Short Course: Friday, March 4 and Saturday, March 5, 2016 | 8:00 am–5:00 pm

DESCRIPTION

This short course provides an overview of the metallogeny of the most important sources of zinc ores: clastic-dominated, Mississippi Valley-type, volcanic-hosted massive sulfides and carbonate replacement deposits. The focus of the short course is to provide the exploration geologist with practical, process-based exploration tools and concept-based targeting based on insights into why and where these ores form in the Earth’s crust. The course will benefit graduate students interested in recent advances in ore models, exploration geologists targeting deposit to belt-scale resources and exploration managers wanting an update on the most recent ore guides and ideas.

Examples of the world’s important mineral districts and giant deposits will be discussed to provide insights into the coupling of geological and geochemical host-rock attributes with tectonics, structural features and fluid-flow that controlled ore deposition. To illustrate the variations within each ore type, discussions on the geological, structural and tectonic settings, alteration, zoning attributes, petrochemical constraints and distal footprints to ores will emphasize the spectrum of deposits.

PRESENTERS

- Peter K.M. Megaw, President of IMDEX/Cascabel and co-founder and CXO of MAG Silver, brings 37 years of exploring Mexico for carbonate replacement deposits (CRDs) and epithermal veins to the course. He has published extensively on CRDs and he and his team are credited with the significant Juanicipio-Fresnillo, Zacatecas; Platosa, Durango; and Cinco de Mayo, Chihuahuua discoveries. Peter was awarded the SME 2012 Robert M. Dreyer Award for Excellence in Applied Economic Geology and the Carnegie Mineralogical Medal for 2009.

- David Leach is an Affiliated Professor at the Colorado School of Mines and a consultant to the minerals industry. After 32 years at the US Geological Survey, he has spent most of his time consulting internationally for base and precious metals. He authored or co-authored more than 200 papers on the geology and geochemistry of ore deposits. His career focused on sediment-hosted Pb-Zn deposits, ore formation in metamorphic environments, global metallogeny and deposit targeting.

- Jim Franklin began his VMS career with Sturgeon Lake and soon extended his work to northern Manitoba. In 1981 he initiated the GSC’s Marine Minerals Program, discovering, mapping and drilling “black smoker” seafloor systems: From both the land and seafloor work he developed a robust set of guidelines that help steer modern exploration. In 1992 he became Chief Scientist for the Geological Survey of Canada, and since 1998 he has been advising about 50 companies on VMS-related exploration in every continent except Antarctica.

REGISTRATION

Online at www.segweb.org/events. For SEG members to receive the discounted course registration rate, please download the registration form at www.segweb.org/16PDACSEG-Form. Your SEG Member ID is required.

Course Fee (including course material, continental breakfast, 3 course lunch, and refreshments):

<table>
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<th>Early Registration (through February 6, 2016)</th>
<th>Late Registration (after February 6, 2016)</th>
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<tr>
<td>PDAC or SEG Member</td>
<td>US$699</td>
<td>US$899</td>
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<tr>
<td>Non-member</td>
<td>US$799</td>
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</tr>
<tr>
<td>Student Member</td>
<td>US$359</td>
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PDAC or SEG Member: US$699
Non-member: US$799
Student Member: US$359

Please note that SEG reserves the right to cancel this event should minimum attendance numbers not be met by February 6, 2016.
Gold Deposits: Their Geology, Geochemistry, and Genesis (Sat-Sun 27-28 August, 2016)

Description:
This two-day workshop is for those who want to improve their understanding about the geology and genesis of gold deposits. The course will provide a comprehensive overview of all aspects of the geology and genesis of gold deposits. Geology, geochemistry, mineralogy, alteration, structure, tectonics, and exploration approaches will be covered for the main gold deposit types.

Presenters:
Richard J. Goldfarb was senior research geologist with the Minerals Program of the U.S. Geological Survey, where he was employed for more than 32 years. His expertise is in the geochemistry and geology of ore deposits, with emphasis on Phanerozoic orogenic gold. Earlier career work concentrated on the Tertiary orogenic gold deposits of southern Alaska. Results were used to develop ore genesis models for giant gold deposits. In recent years, Rich has conducted detailed studies on the distribution of orogenic gold deposits through space and time. He has senior- and co-authored more than 195 refereed publications in economic geology.

Laurence Robb was Professor of Economic Geology at the University of the Witwatersrand (Wits), South Africa, 2001-2005, and Director of its Economic Geology Research Institute (EGRI). He is currently Visiting Professor in the Department of Earth Sciences at the University of Oxford. He has worked for over 30 years on many of the great mineral districts of the African continent and is currently involved in research on the metallogeny of Myanmar/Burma and Western Sahara. He served as a technical consultant with The Mineral Corporation and remains directly involved with various exploration ventures in Africa.

Economic Geology 101 (Sun 28 August, 2016)

Description:
This one-day course will introduce participants to the discipline of economic geology in terms of opportunities for career paths and for academic research. A series of short modules on ore deposit topics, prepared by experts in the field, will range from global metallogeny to deposit scale analysis.

Presenters:
Judith A. Kinnaird has spent most of her career as a University lecturer and has taught at University College Cork in Ireland as a distance tutor for the Open University in Scotland and Ireland. For the last 13 years, she has been at the University of the Witwatersrand in Johannesburg, where she is Associate Professor. She is Deputy Director of the Economic Geology Research Institute within the University. Project interests include dimension stone, gem deposits, Li-Be, Nb-Sn-W, REE-U, and Pb-Zn mineralization. Current research includes platinum and chromium mineralization of the Bushveld Complex with a focus on the northern limb, the link between the Damaran Orogen of Namibia and the Katangan-Lufilian of Zambia, and uranium deposits of southern Africa.

SEG EVENTS | segweb.org/events
SEG Workshops at 35th IGC

Gold Deposits: Their Geology, Geochemistry, and Genesis (Sat-Sun 27-28 August, 2016)

Description:
This two-day workshop is for those who want to improve their understanding about the geology and genesis of gold deposits. The course will provide a comprehensive overview of all aspects of the geology of gold ores in arc environments and metamorphic terranes. Geology, geochemistry, mineralogy, alteration, structure, tectonics, and exploration approaches will be covered for the main gold deposit types.

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Richard J. Goldfarb was senior research geologist with the Minerals Program of the U.S. Geological Survey, where he was employed for more than 32 years. His expertise is in the geochemistry and geology of ore deposits, with emphasis on Phanerozoic orogenic gold. Earlier career work concentrated on the Tertiary orogenic gold deposits of southern Alaska. Results were used to develop ore genesis models for giant gold deposits. In recent years, Rich has conducted detailed studies on the distribution of orogenic gold deposits through space and time. He has senior- and co-authored more than 195 refereed publications in economic geology.

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Biga Peninsula: Au-Cu-Mo-Pb-Zn Deposits

Pre-conference field trip departure and return site: Izmir
September 20–24, 2016

Field Trip Leader
Nuri Ceyhan, MSc. Principal Geologist, Teck Madencilik A.S. (Subsidary of Teck Resources)

Description
Biga Peninsula in northwestern Turkey, located within the Tethyan metallogenic belt, is an emerging gold-copper district with a number of new discoveries in the last two decades. Mineral deposits of the Biga Peninsula district are dominated by magmatic arc-related hydrothermal systems. Epithermal Au-Ag (HS & LS), porphyry Au-Cu-Mo and base-metal skarn deposits are associated with Tertiary calc-alkaline magmatism and include the economically most important deposits. We will visit Ovacık (Au), Tepeoba (Cu, Mo, Au), Balya (Pb, Zn) active operations and Kestanelik (Au), TV Tower (Au, Ag, Cu), and Halilağa (Au, Cu, Mo) deposits. Discussions on the current understanding of the geology, genesis of the deposits, discovery history, and key outcrops and deposit visits will be the main focus of the trip. In addition to site visits, participants will have the opportunity to visit the ancient cities of Troy and Pergamon on the return trip to Izmir.

Balkans II: Tour of Greece and Bulgaria with a Mix of Porphyry-Epithermal Deposits and Recent Discoveries

Post-conference field trip departure site: Izmir
September 29–October 3, 2016

Field Trip Leader
Dr. Panagiotis Voudouris, Associate Professor, National and Kapodistrian University of Athens
Chris Siron, Eldorado Gold Corporation
Dr. István Márton, Dundee Precious Metals Inc, Toronto, Canada and University of Babeș-Bolyai, Cluj-Napoca, Romania

Description
This field trip will introduce participants to the geology and mineralization that characterizes selected gold deposits in Greece and Bulgaria. It will include site visits to Eldorado’s gold operations and development projects in Greece and Dundee’s gold deposit in Bulgaria. The Skouries porphyry gold-copper deposit is a Miocene pencil-porphyry stock that intruded into schists and gneisses within the Serbo-Macedonian massif. The Olympics and Stratoni orebodies are Au-Pb-Zn-Ag-Cu carbonate replacement deposits hosted in marbles of the southern Rhodope core complex. Sapes Au-Cu-Te deposit is a telescoped porphyry-epithermal system with spectacular outcrops of advanced argillic alteration within an eroded Oligocene volcanic edifice. Perama Hill is an epithermal high sulfidation gold deposit hosted within sandstone, conglomerate, and andesite of the Petrota graben. Dundee’s Adatepe development project located in south of the town of Krumovgrad in southeastern Bulgaria is an epithermal low sulfidation adularia-sericite gold-silver deposit hosted within Paleocene sedimentary rocks overlying the Kessebir core complex. Kavala is a newly-recognized intrusion-related gold system (IRGS) with gold-rich sheeted veins hosted within the Miocene Kavala granodiorite. The field tour will also include tourist-type site visits in both countries. All trip participants will be guests of Eldorado and Dundee and will need to abide by the occupational health and safety requirements of the operations while on site.
Senior Exploration Management Course

SEG Course Center | Littleton, CO, USA
November 29–December 2, 2016, 8:30am – 5pm

Organizer: Society of Economic Geologists (SEG)
Presenter: Western Mining Services (WMS)

SCOPE

This four-day training course concerns the principles and practices of effective mineral exploration management. The curriculum covers the broad spectrum of technical and business issues that senior exploration managers typically face.

- Mineral exploration at the strategic scale – the roles of greenfields and brownfields exploration in development and implementation of corporate growth strategies
- The design and management of exploration programs and portfolios
- The importance of group structure, program design, process discipline, and effective people management in achieving exploration group objectives
- Opportunity generation including the exploration search space concept, targeting science and the application of targeting models
- How to negotiate land and minerals access deals, identify and manage nontechnical project risks, engage in early stage evaluation of project economics, and maintain the important social license to operate exploration projects in varied risk environments

The course format utilizes lecture and workshop and stresses interactive thinking and problem solving. Participants work in teams to design solutions for exploration management challenges and present their results to the larger group.

WHO SHOULD ATTEND?

This course is ideal for regional and country exploration managers, for senior project managers who are on track to move into positions of senior responsibility, and for geoscientists who aspire to senior exploration management roles. The course is also recommended for commercial managers who participate in mineral exploration programs as well as government and academic professionals who interact with the mineral exploration industry.

This course is fundamental to the understanding of complexities in managing and leading exploration programs in the modern minerals industry. The highly trained and experienced team from WMS provides tools to design and execute the different aspects of exploration strategy and process. All the key topics are presented in a methodical and systematic way, and enriched with real case studies. I strongly recommend this course to any professional explorer who wishes to excel in the business of mineral exploration.

César Aguirre - VP Exploration Hochschild Mining (2011), SEG Regional VP Lecturer (2016)

This SEG-sponsored course in November-December 2016 will be the eleventh SEM Course presentation. WMS has also presented numerous in-house courses, each tailored to the needs of the individual client.
Senior Exploration Management Course
SEG Course Center | Littleton, CO, USA | Nov. 29–Dec. 2, 2016

FACULTY

- **Jon Hronsky (BAppSci, Ph.D., MAIG, FSEG)**
  With more than 30 years of experience in mineral exploration, Jon has worked across a diverse range of commodities, including discovery of the West Musgrave nickel sulfide province in Western Australia. Prior to joining Western Mining Services (WMS), he served as Manager of Strategy & Generative Services for BHP Billiton Mineral Exploration and as Global Geoscience Leader for WMC Resources Ltd. He is chairman of the board of the Centre for Exploration Targeting in WA.

- **Steven Bussey (BA, M.Sc, PhD)**
  At WMS, Steve’s focus is on framework studies, mineral exploration targeting, and project due diligence. He has more than 35 years experience in mineral exploration. Before joining WMS in 2007, Steve worked in a number of senior exploration roles, including principal geoscientist for WMC Resources Ltd.

- **Brad Margeson (BA, M.Sc., SME, FSEG)**
  Brad held several senior management roles for WMC Resources Ltd. prior to co-founding WMS in 2005. At WMC, he was global manager of exploration projects, leading teams that discovered gold deposits in Canada. With 35 years experience in the industry, Brad’s focus is on exploration strategy/planning, greenfield and brownfield exploration targeting, and due diligence.

- **Jeff Welborn (BA, JD)**
  Jeff is a co-founder and partner at WMS and has more than 40 years experience as a mining, oil & gas and natural resources lawyer. His experience covers a broad range of commercial, legal, and risk management matters in mineral exploration and mining. He assists WMS clients globally with commercial strategy development, program design and planning, deal analysis and negotiation, and minerals and land access.

Registration (early deadline: November 10, 2016)
Register online: segweb.org/events#16RWMSSEM
Member (Early / Late) – US$3,200 / US$3,400
Non-member (Early / Late) – US$3,500 / US$3,700

CURRICULUM

Day 1
- Mineral Exploration Principles, Philosophies and Culture
- Mineral Exploration Strategy, Business Planning and Portfolio Management
- People in Mineral Exploration
- Introduction of Exploration Strategy Exercise

Day 2
- Minerals Access and Deal Making
- Commercial Risk Management
- Mineral Exploration Targeting
- Introduction of Commercial Risk Management Exercise

Day 3
- Group Discussion
- Mineral Exploration Targeting (cont.)
- Mineral Exploration Tactics
- Group Exercise

Day 4
- Commercial Risk Management Exercise Presentations
- Exploration Strategy Exercise Presentations
- Feedback, Awards, and Group Discussion
- Wrap-up

Please note that SEG reserves the right to cancel this event should minimum attendance numbers not be met by November 10, 2016. For further information on cancellation policy, event photography, and dietary restrictions, visit www.segweb.org/tc.