

Short course

# Structural Geology for Exploration and Mine Geologists

17-26 March 2024

Jointly sponsored by Lowell Program in Economic Geology  
and Arizona Geological Survey, University of Arizona

Structural geology is important to the sound practice of mineral production, development, and exploration, and it has played a central role in the discovery of deposits such as Kalamazoo and Ann-Mason.

#### Why this course?

This intensive 10-day course is designed as an immersive experience. It follows the design of the long-running LPEG short courses on Ore Deposits Mapping and Porphyry Deposits that have trained over 1000 participants from more than 30 countries.

#### Who should take this course?

The course is suitable for professionals of any career stage who want to improve their skills in structural geology. It is designed to accommodate participants with a wide range of experience, from recent graduates in geology with some industry experience or graduate students to current or specialists in the structural geology of mineral deposits.

#### Instructors

The instructors are current and former industry, academic, and government geologists with expertise in structural geology and mineral deposits.



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**Topics of this short course address questions that have practical applications for the mineral industry, such as:**

? What **structural levels**, ranging from shallow to very deep, are represented by local geologic exposures? Is the deposit or district structurally intact and upright, or is it dismembered by faulting, tilted, or folded? How does this impact the choice of location or orientation of drill holes? What are some of the potential pitfalls in working with volcanic rocks in the field when assessing whether rocks have been tilted by normal faults?

? At any stage in its exploration, development, or mining, do you have multiple working hypotheses regarding the **structural geology** of the deposit or district? How do you objectively test the potential viability of differing interpretations without gathering additional data?

? Did pre- or syn-ore faults localize a particular mineralizing intrusion or the mineral deposit? Are there other types of controls or drives for circulating ore fluids or localizing intrusions, other than structure? How might these impact regional **exploration strategy**?

? What are the **ore controls**? Do they include stratigraphic controls, such as bedding, karst, or an unconformity, or are they pre- or syn-ore faults or fold hinges? In various structural environments, which pre- or syn-ore faults, or which portions of those faults, are most likely to be mineralized? Are post-ore faults important controls on grade, either hypogene or supergene? How do these affect exploration tactics and estimation of mineral resources or ore reserves?

During the evolution of magmatic-hydrothermal systems, is there a transition from ductile to brittle conditions, and

how does the relative importance of stresses produced by intrusions and associated **hydrothermal systems** change over time compared to regional stress? How does this affect the orientations of successive generations of veins? In what types of systems is it most and least likely for veins to be folded as a hydrothermal system evolves during emplacement of intrusions?

What structural observations and measurements are required for **design** of open pits and selective underground and block cave mines? Why are some faults critical in geotechnical considerations that might largely be ignored for purposes of grade interpolation in a block model?

What **types of measurements** are most useful for understanding the overall structural geology of mineral deposits? What are advantages and disadvantages of different ways to collect and to display measurements?



## Course format

Lectures and laboratories/desktop exercises, plus three days of field trips with exercises.

## Principal venue

Tucson Marriott University Park Hotel on the edge of the UArizona campus.

## Schedule outline (preliminary):

- **March 16:** Participants arrive for a no-host mixer at the hotel.
- **March 17-18:** Fundamentals of structure and the themes of the course.
- **March 19-20:** Crustal shortening (fold-and-thrust belts and basement-cored uplifts) and applications to mineral deposits, including a one-day field trip.
- **March 21-23:** Crustal extension and applications including one day in the field examining brittle normal faults and another day in a local metamorphic core complex.
- **March 24-25:** Strike-slip faulting and applications; structures in specialized settings, such as volcanic and plutonic environments, and structural tools.
- **March 26:** Synthesizing structures in key mineral deposit types and exploration targeting strategies. Final dinner.
- **March 27:** Departure

## Course fee:

Early registration (until 23 February)	Registration 24 February – 8 March
\$3,700	\$3,900

Group discount for groups of 4 or more registrants: 15%. Substitution of registrant or half of registration fee may be refunded by March 8, 2024. Registration closes March 8, 2024.

Included in course fee	You may incur additional cost for
<ul style="list-style-type: none"><li>• course materials</li><li>• transportation and bag lunches for three days of field trips</li><li>• one buffet lunch with guest speakers</li><li>• two dinners at the hotel.</li></ul>	<ul style="list-style-type: none"><li>• room accommodations (room rate: \$174 per night)</li><li>• transportation</li><li>• additional meals</li></ul>

**The course language** is English. Several instructors will have knowledge of languages other than English. Program Coordinator Rocio Brambila can field questions about the course in Spanish. Email: [brambila@arizona.edu](mailto:brambila@arizona.edu)

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