

REGISTRATION OPEN
Structural Geology for Exploration and Mine Geologists
19-28 March 2023, based in Tucson, Arizona

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

Organized by Carson A. Richardson and Eric Seedorff

Assisted by Rocío Brambila, with many co-organizers, collaborators, and advisors

Structural geology is important to the sound practice of mineral production, development, and exploration, and it has played a central role in discovery of deposits such as Kalamazoo and Ann-Mason. **The course is designed as an immersive experience**, an intensive ten-day course following the design of the long-running LPEG short courses on *Ore Deposits Mapping* and *Porphyry Deposits* that have trained >1000 participants, about 70% from industry, from >80 companies and >30 countries. **The intended customers / target audience** are the global, early- to late-career professionals who want to improve their skills in structural geology. The course is designed to accommodate **participants with a wide range of experience**, from those having little experience (e.g., an undergraduate degree in geology plus one year of industry experience *or* one year of graduate education) to those who are, or aspire to be, specialists in the structural geology of mineral deposits. **The instructors** are current and former industry, academic, and government geologists with expertise in structural geology, mineral deposits, or both, including structural geology specialists from industry, who will offer personal interaction with participants.

This Structure Short Course is designed to address questions that have practical applications for the mineral industry, such as:

1. 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?
2. 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?
3. 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?
4. 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?

5. 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?
6. 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?
7. 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?

The principal venue of the inaugural offering is the Tucson Marriott University Park Hotel on the edge of the U of A campus. Participants arrive on Saturday, 18 March 2023, for a no-host mixer that evening at the hotel. The course, including field trips, runs Sunday 19 March through a final dinner on Tuesday 28 March, with departure on Wednesday morning 29 March 2023.

The format of the course includes lectures and laboratories/desktop exercises, plus three to four days of field trips with exercises. **The schedule** begins with two days on fundamentals of structure and the themes of the course, preparing all participants for the heart of the program. Then two days will be devoted to crustal shortening (fold-and-thrust belts and basement-cored uplifts) and applications to mineral deposits, including a one-day field trip. We will cover crustal extension and applications in about three days, including one day in the field examining brittle normal faults and another day in a local metamorphic core complex. Strike-slip faulting and applications are covered in one-half day. Two-thirds of a day will address structures in specialized settings, such as volcanic and plutonic environments, and structural tools. More than one day is used synthesizing structures in key mineral deposit types and exploration targeting strategies.

Registration opens 10 January and closes 10 March 2023. The course fee is \$3500 for early registration (10 January – 25 February) and \$3700 for late registration (25 February – 10 March). Organizations receive a group discount of 15% for 4 or more registrants. Substitution of registrant or half of registration fee may be refunded by 10 March 2022. The **course fee** includes course materials, transportation and bag lunches for four days of field trips, and two dinners at the hotel, but it does not include room accommodations, transportation, or additional meals.

The language of the course is English, though Rocio Brambila can field questions about the course in Spanish. Several instructors will have knowledge of languages other than English.