

Graduate Courses 2019-2020

Fall 2019

Course	Course Title	Units	Instructor	Breadth area
GEL 219	Fracture and Flow of Rocks	3	Billen	3 or 6
GEL 227	Isotope Biogeochemistry	4	Spero	4
GEL 261	Topics in Paleobiology	3	Carlson	1
GEL 290	Seminar	1	TBD	N/A
GEL 294	Structure & Tectonics forum	1	Roeske	N/A
GEL 390	Methods of Teaching Geology	2	Mukhopadhyay	N/A

Winter 2020

Course	Course Title	Units	Instructor	Breadth area
GEL 206	Carbonate Diagenesis & Geochemistry	3	Montanez	2 or 4
GEL 230	Geomorphology and River Management <i>Application required for enrollment</i>	3	Pinter	5
GEL 260	Paleontology	3	Vermeij	1
GEL 290	Seminar	1	TBD	N/A
GEL 294	Structure & Tectonics forum	1	Roeske	N/A

Spring 2020

Course	Course Title	Units	Instructor	Breadth area
GEL 281N	Instrumental Techniques	3	Yin	N/A
GEL 298	Foundations of Geophysics	3	Rudolph and Stewart	6
GEL 290	Seminar	1	TBD	N/A
GEL 294	Structure & Tectonics forum	1	Roeske	N/A

Course Descriptions

Fall 2019

GEL 219: Fracture & Flow of Rocks, Billen

Graduate course breadth area: #3 or 6

The class will have a combination of lectures on the theory and other background of brittle and viscous rheology and article-based discussions focused on review papers on the topics introduced in lecture. Includes two oral presentations by students. Topics include: rheology, stress & strain, brittle vs ductile deformation, plasticity, viscous deformation, grain growth and recrystallization, effect of melt and water on viscous rheology

GEL 227: Stable Isotopes Biogeochemistry, Spero

Graduate course breadth area: #4

Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes.

GEL 261: Paleobiology Seminar: Evolutionary Aspects, Carlson

Graduate course breadth area: #1

Using a new book on Rates of Evolution, the seminar will build on previous classes on estimating time in the rock record and scales of analysis.

Winter 2020

GEL 206: Carbonate Diagenesis & Geochemistry, Montanez

Graduate course breadth area: #2 or 4

This course will cover the span of the carbonate diagenetic environments, starting with syndepositional marine diagenesis through the meteoric (vadose and phreatic) to deep-burial diagenetic realms. We will also address non-marine carbonate formation & diagenesis (soils, lacustrine, palustrine, speleothems, travertines), dolomitization, and evaporates of a range of origins. Includes petrographic labwork on suites of samples.

GEL 230: Geomorphology and River Management, Pinter

Graduate course breadth area: #5

This graduate seminar is preparatory to the private and optional Grand Canyon field trip, March 10-28, 2020. Currently, ~40 million people rely on the water in the Colorado River, but changing precipitation patterns and increasing population and water demands are adding challenges to river management. The US Bureau of Reclamation recently published a study assessing supply and demand under various climate and demand scenarios. American Rivers listed the Colorado River as the most endangered river in the United States.

GEL 260: Paleontology, Vermeij

Graduate course breadth area: #1

Topic undecided; previous topics have explored symbiosis, the Pliocene, contingency & necessity, and the North Pacific biota.

Spring 2020

GEL 281: Instrumental Techniques for Earth Scientists, Yin

Graduate course breadth area: N/A

This course is designed to familiarize students with analytical facilities available in the Department of Earth and Planetary Sciences and in other campus and regional facilities. Each week there will be a lecture providing background on one or more instruments, followed by hands-on demonstrations and instruction in the lab. Students are expected to attend all lectures and labs, and all participants must register for the course. In addition to the scheduled lectures and labs, each student will be required to participate in one of group research projects using a particular instrument suite. Project results will be presented to the class and instructors by each group at the end of the quarter.

GEL 298: Foundations of Geophysics, Rudolph & Stewart

Graduate course breadth area: #6

This course presents foundational concepts in geophysics at a level accessible to all graduate students in the EPS department. Topics to be covered include the geophysical constraints on the large-scale structure and dynamics of Earth and planetary interiors such as seismology, gravity, heat flow, magnetic field, and geodesy. We will explore the physics of the processes that shape planetary surfaces and interiors including impact events, differentiation, mantle convection, and tectonics. The course will include a computer laboratory with hands-on programming activities in Python that reinforce the concepts covered in lecture.

Format: Lectures, weekly problem sets/labs, midterm, final

Note: This course is one of several regular 'core classes' being developed to strengthen our graduate curriculum.