

Meeting times:	Friday, 1:00 - 2:50	114 Bretske Hall
Instructor:	J. W. Mies, Ph.D.	105 Bretske Hall
	Office phone: 425-4606	E-mail: Jonathan-Mies@utc.edu
		web page: http://www.utc.edu/Faculty/Jonathan-Mies/
Text:	Selected papers on the geology of the Basin and Range and the Colorado Plateau.	
Prerequisites:	Introductory course in natural sciences and approval of instructor	
Hours:	3 credit hours (listed as variable, 1 to 6 hours)	
Catalog Description:	GEOL 496 gives students the opportunity to study the geology of a region. The course culminates with a field trip to the region of interest.	
Objectives:	The Spring 2008 offering of GEOL 496 will focus on the North American Cordillera, particularly the Basin and Range and the Colorado Plateau of the desert southwest (AZ, CA, NV, and UT). The principle objective of the course is to provide students with an experience that stimulates their interest in geology and contributes to their knowledge of the subject. As a result of this class, students should better appreciate how a multitude of field observations contribute to the interpreted geologic history of the region.	

TENTATIVE LECTURE SCHEDULE

Date	Topic
Jan 11	Introduction to Geology 496, FAQs about the class and the trip
18	Review/overview of Earth's structure and plate tectonics
25	Convergent boundaries and orogenic belts (late Paleozoic and Mesozoic Cordillera)
Feb 1	Divergent tectonics and continental rifting (late Precambrian and Cenozoic Cordillera)
8	Precambrian and Paleozoic history of the southwestern U.S.
15	Mesozoic and Cenozoic history of the southwestern U.S.
22	Igneous and metamorphic rocks and related structures of the southwestern U.S.
29	Sedimentary rocks and depositional environments of the southwestern U.S.
Mar 7	EXAM 1
14	Spring Break, no class
21	Holiday, no class
28	Discussion of specific field trip stops and related papers
Apr 4	Discussion of specific field trip stops and related papers
11	Discussion of specific field trip stops and related papers, review
18	EXAM 2 , preceded by final logistical meeting
Apr 26 to May 6	Field trip (see tentative itinerary)
	Field-trip details and logistics (expenses, payments, equipment needs, precautions, etc.) will be discussed as necessary during the semester.
May 6	Field notebooks due
June 15	Final reports due

GRADES AND RELATED MATTERS

The *final numerical grade* for the class will be computed as follows.

20 % Exam 1 (Mar 7)	_____	x 0.20 =	_____.
20 % Exam 2 (April 18)	_____	x 0.20 =	_____.
15 % Avg. of 3 to 5 assignments	_____	x 0.15 =	_____.
15 % Field notebook (due May 9)	_____	x 0.15 =	_____.
20 % Final report (due June 15)	_____	x 0.20 =	_____.
10 % Attendance and participation	_____	x 0.10 =	_____.
<i>TOTAL (Final numerical grade)</i>			= _____.

Because the grade for this class depends in part on the field trip, which will not occur until after the end of the Spring semester, all students will initially receive an *incomplete*. The incomplete will be replaced with the deserved grade after all course materials have been turned in and graded, which will have occurred by August 1.

The *final letter-grade* for this class will conform to the following scale, based upon the computed *final numerical grade*.

$$F \leq 59.9, D = 60-69.9, C = 70-79.9, B = 80-89.9, A = 90-100$$

EXAMS

Exam 1 will test a basic understanding of plate tectonics, the geology and geography of the Basin and Range and the Colorado Plateau, geologically significant features of the region, and important logistical aspects of the field trip. Preparation for Exam 1 should also provide a preparation for student-led discussions scheduled for after Spring Break.

Exam 2 will emphasize student-led discussions subsequent to Exam 1, but will also include questions related to material covered prior to Exam 1.

ASSIGNMENTS

Three to five assignments related to the geology and geography of the Basin and Range and the Colorado Plateau are anticipated.

STUDENT-LED DISCUSSIONS

Student-led discussions of specific field-trip stops or topics are scheduled for after Spring Break. Students should be knowledgeable about the subject and prepared to engage the class in discussion, but should not compose and read their presentation or memorize it verbatim. Students are encouraged to make use of visual aids (e.g. overhead transparencies, PowerPoint presentations, etc.). Discussions begin on March 28. Topics should be decided upon and approved by the instructor by mid February.

Potential topics for student-led discussions

Badwater, DV
Bryce Canyon
Colorado River (hydrology, geology, water quality, environmental impact of dams)
Dunes of Death Valley (sand dunes)
Frenchman Mountain
Grand Staircase (Chocolate, Vermilion, White, Gray, Pink cliffs)
Hoover Dam (geology of dam site and construction history)
Lake Manly (Pleistocene climate, Shoreline Butte, relation to Great Basin)
Meteor Crater (impact craters)
Monoclines of the Colorado Plateau (Kaibab, Waterpocket, San Rafael, interpretations)
Resting Springs Pass (geologic history and implications of vitrophyre-bearing outcrop)
San Francisco Volcanic Field and SP Crater
Turtlebacks of Death Valley
Ubehebe Crater (phreatic explosion craters)
Warm Springs (geology, mining history, occurrence of talc)
Zion Canyon

Students should have selected one of these topics by mid February.

FIELD NOTEBOOK

During the field trip, students are expected to keep field notebooks, in which they should describe each field stop.

Field stop descriptions should include the date, time of day, a stop number, the location of the stop, an objective description of rocks, geologic structures, or vistas observed, and reference to any photographs taken. Sketches are useful to show relationships among outcrops and features within them and among geologically significant landmarks. While at the stop, students should also record their thoughts as to the significance of their observations.

At the end of each day, students should summarize the activities of the day in their notebooks, including logistical details, and the significance of field trip stops in the context of regional geology.

Field notebooks will be collected at the conclusion of the trip, May 6. They will be graded and will be returned to students within a week.

FINAL REPORT

Each student is expected to submit an independently prepared final report, based largely upon his/her notes and embellished with his/her photos. The report should (1) summarize the geology of the Basin and Range and the Colorado Plateau with appropriate reference to sources of information (articles discussed in class, etc.), (2) document the field trip and describe the geologic significance of important field stops, and (3) serve as a lasting memento of the class and the field-trip experience.

The final report is due on June 15. Students are advised to start work on their reports immediately following the field trip, while the experience is still fresh in their minds.

OTHER POLICIES

Students are expected to attend class regularly. Attendance and participation will be considered in the final grade. (See *Grades and related matters*.)

Students are expected to be punctual, prepared for class, attentive, and respectful of others.

Assignments are expected to be completed and turned in on time. Late assignments will be accepted in only the most adverse circumstances (e.g. serious illness or accident). Documentation of the circumstance (e.g. doctor's note or police report) may be required.

All students are expected to follow the UTC honor code.

UTC ONLINE (AKA BLACKBOARD)

Some aspects of this course are available through UTC's online course delivery system (Blackboard), which can be accessed at:

<http://utconline.utc.edu>

Your user name for logging on to the system is your UTCID (mix of letters and numbers), which appears on your Mocs card. Your password for Blackboard is the same as your password for your UTC e-mail and for your access to the Lupton Library databases. If you change your password in Blackboard, you also change your password on both of these other systems. If you forget your password, follow the "Forgot Password" link from the UTC web site (<http://www.utc.edu/>) or the Blackboard login page (<https://bb3.utc.edu/webapps/login/>).

Documentation on student use of Blackboard is available at:

<http://utconline.utc.edu/online/bbtutorials.php>

EMAIL (firstname-lastname@utc.edu)

To enhance student services, the University will use your UTC email address (firstname-lastname@utc.edu) for communications. Please check your UTC email on a regular basis. If you have problems with accessing your email account, contact the Help Desk at 423-425-2676.

It is particularly important for rapid communications related to field-trip logistics that students can be reached at their UTC email address.

ATTENTION: If you are a student with a disability and think that you might need special assistance or special accommodation(s) in this class or any other class, call the Office for Students with Disabilities/College Access Program at 425-4006 or come by the office, 110 Frist Hall.

This syllabus is subject to minor changes.

TRIP TO THE DESERT SOUTHWEST

Tentative dates: April 26 to May 6, 2008 (11 days, 10 nights).

Faculty leaders: J. W. Mies and A. E. Holmes

About the trip:

The group will fly, round trip, to Las Vegas and will travel the field-trip route in rented passenger vans. (See itinerary and map, p. 6.) We will camp for all but the final evening, which will be spent in Las Vegas. Typically, we will arrive at campsite by dark and will break camp and be on the road by 8:00 am. **Campsites will be primitive** (note emphasis implied by bold typeface); most will be far removed from the nearest facilities; and most will be free of charge. Most meals will be self-prepared at campsites, at field-trip stops, or on the roadside, though there will be opportunity for fast food and the occasional restaurant meal along the route. Campfires are forbidden or impractical at all but one campsite; cooking will require some sort of camp stove. There will be frequent opportunity to purchase groceries and other supplies (fuel, ice, batteries, etc.). We should be prepared for very warm (near 100°) and dry conditions with intense sunshine during the day in the desert (e.g., Death Valley, floor of Grand Canyon, Cathedral Valley) and quite cold (near freezing) and wet conditions during evenings at higher elevations (e.g. rims of Grand Canyon, Boulder Mountain). Elevations will range from 282 feet below sea level, in Death Valley, to over 8,500 feet, where we camp on Boulder Mountain.

Estimated Expense:

¹ Airfare	\$250 to \$450	Round trip, Chattanooga (CHA), Atlanta (ATL), or Nashville (BNA) to Las Vegas, NV (LAS)
Lodging	\$45 to \$54	3 nights @ \$5 to \$8 (campgrounds) + 1 night @ \$30 (Las Vegas hotel)
Van Rental	\$0 to \$0	Van rental is normally paid by the University
Meals	\$198 to \$275	11 days @ \$18 to \$25/day
Nat. Park fees	\$0 to \$0	Fee waivers will be secured for 6 parks (otherwise \$10 to \$20 each)
Priv. Park fees	\$10 to \$10	Meteor Crater normally offers a reduced entrance fee (approx. \$10)
² TOTAL	\$503 to \$789	plus other personal expenses.

¹At the time of this preparation, 12/22/07, Southwest Airlines offered a \$300 roundtrip fare, BNA/LAS/BNA; United Airlines (using Orbitz or Travelocity) offered a \$325 roundtrip fare.

¹Payment of airfare may be required early in the semester, at time of ticket purchase.

²With an airfare of \$325, total cost would be approximately \$650, plus other personal expenses.

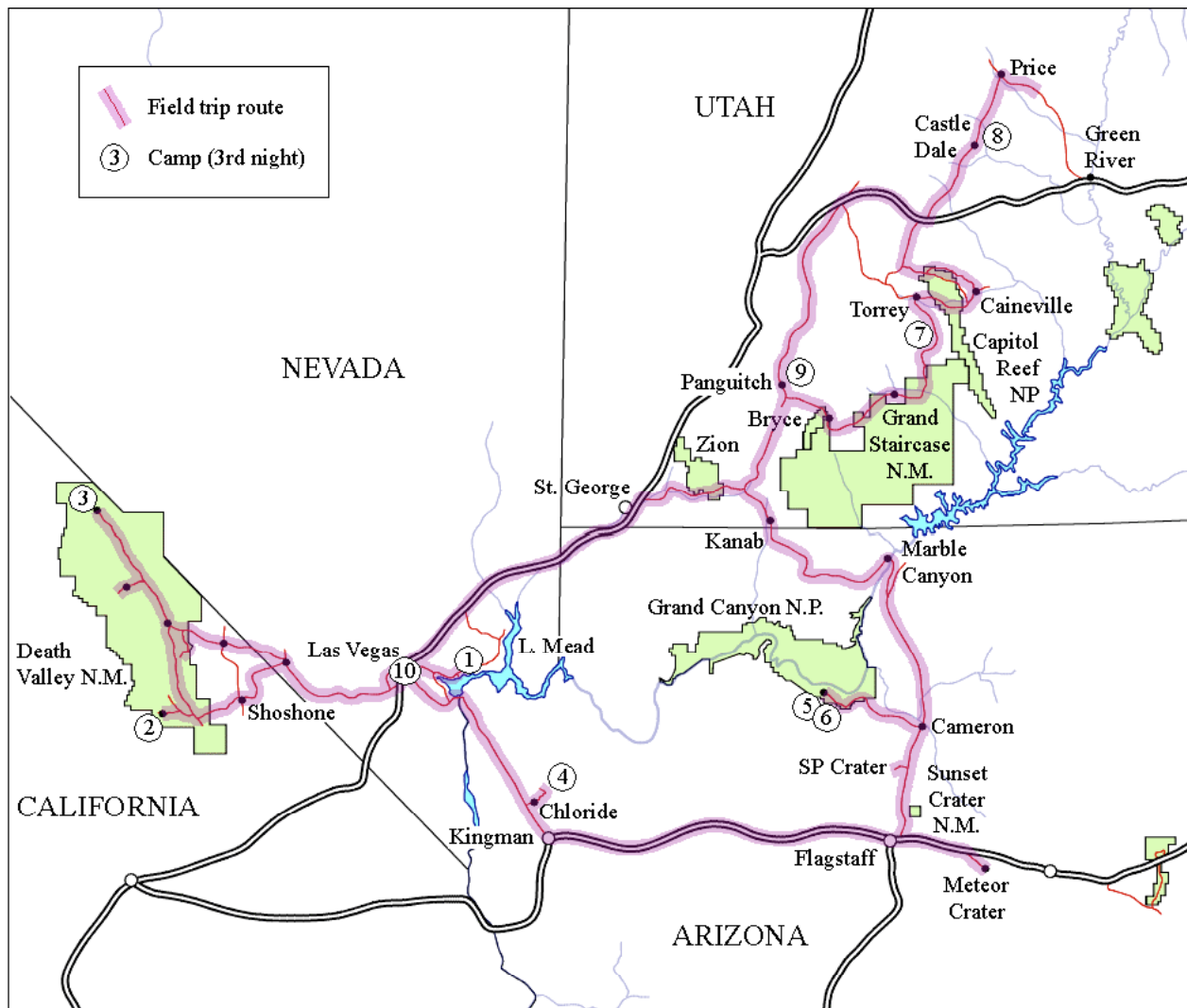
Principal Field Trip Stops (in approximate order):

Frenchman Mountain (northeast of Las Vegas)	Meteor Crater
Valley of Fire State Park (NE of Las Vegas, L. Mead)	San Francisco volcanic field and SP crater
Red Rocks Canyon (west of Las Vegas)	Grand Canyon
Resting Springs Pass	Echo Cliffs/Paria Plateau/Vermilion Cliffs
Warm Springs (Death Valley, talc and prec. metal mines)	Kaibab Monocline
Shoreline Butte (remnant of L. Manly), DV	Grand Staircase of the Escalante
Turtlebacks, DV	Boulder Mountain (vista of Henry Mountains, etc.)
Badwater, DV	Capitol Reef (Waterpocket mono., dikes, sills, etc.)
Dunes, DV	San Rafael Swell (monocline)
Mosaic Canyon, DV	Book Cliffs (Cretaceous stratigraphy)
Ubehebe, DV	Bryce Canyon
Dante's View, DV	Zion Canyon
Hoover Dam	St. George (volcanics, inverted topography)

For an aerial preview of the field trip, view the file *sw496tour.kml* as a tour in *Google Earth*. *sw496tour.kml* can be downloaded from Blackboard (URL) or <http://www.utc.edu/Faculty/Jonathan-Mies/photos/swusa.html>. *Google Earth* can be downloaded from <http://earth.google.com/>.

Tentative Itinerary:

Date	From	To	Comments/Principal Stops	Camp/Lodging
Sa Apr 26	Chattanooga	Las Vegas	Air travel, supplies, Frenchman Mtn.	Valley of Fire or LMNRA
Su Apr 27	Las Vegas	Death Valley	Red Rocks, Resting Spr. Pass, etc.	Warm Springs, S. DV
Mo Apr 28	S. DV	N. DV	Turtlebacks, alluvial fans, dunes, etc.	Mesquite Springs, N. DV
Tu Apr 29	N. DV	Chloride, AZ	Ubehebe, Hoover Dam, etc.	Packsaddle, Cerbat Mts.
We Apr 30	Chloride	Grand Canyon	Meteor Crater, SF volc., etc.	Mather CG, S. Rim
Th May 1	Visit Grand Canyon		Hike, tour canyon, etc.	Mather CG, S. Rim
Fr May 2	Grand Canyon	Boulder Mt., UT	Marble Canyon, Escalante, etc	Dixie NF, Chriss L. TH
Sa May 3	Boulder Mtn	Castle Dale area	Capitol Reef, Cathedral Valley, etc.	BLM, San Rafael Swell
Su May 4	Castle Dale	Panguitch area	Book Cliffs, etc.	NF, Valley west of Bryce
Mo May 5	Panguitch	Las Vegas	Bryce, Zion, St. George, LV, etc.	Las Vegas hotel
Tu May 6	Las Vegas	Chattanooga	Air travel	Home



Map showing tentative field-trip route.

Some basic rules (that should go without saying) and facts you should know:

- Use good judgment in all circumstances. (We can't afford the mishaps, medical emergencies, etc. that can result from poor judgment.)
- National parks strictly forbid taking samples of rock, mineral, plant, animal, etc. (There will be opportunity to collect samples outside of national parks.)
- Arizona, California, Nevada, and Utah adhere to the national minimum drinking age of 21.
- No open (or opened) alcohol containers are permitted in vehicles under Arizona, California, Nevada, and Utah state laws.
- No consumption of alcohol is permitted during the day.
- No illegal drugs.

Some Useful Websites:

Photos from previous UTC geology trips to the southwest (1994 - 2006)

<http://www.utc.edu/Faculty/Jonathan-Mies/photos/swusa.html>

Maps from the University of Texas Libraries

<http://www.lib.utexas.edu/maps/arizona.html>

<http://www.lib.utexas.edu/maps/california.html>

<http://www.lib.utexas.edu/maps/nevada.html>

<http://www.lib.utexas.edu/maps/utah.html>

http://www.lib.utexas.edu/maps/national_parks.html

National Park Websites (National Park Service)

<http://www.nps.gov/findapark/index.htm>

Geology of the National Parks (USGS, all parks)

<http://3dparks.wr.usgs.gov/>

Arizona gis (DOQ's, DRG's, etc.)

<http://agis.az.gov/>

<http://aria.cals.arizona.edu/>

Arizona geology (geologic maps)

<http://www.azgs.az.gov/>

http://geology.about.com/library/bl/maps/n_statemap_AZ1250.htm

California gis (DOQ's, DRG's, etc.)

<http://gis.ca.gov/>

California geology (geologic maps)

<http://www.conservation.ca.gov/cgs/Pages/Index.aspx>

http://www.conservation.ca.gov/cgs/information/geologic_mapping/maps/geology/Documents/big_geol.pdf

Nevada gis (DOQ's, DRG's, etc.)

<http://keck.library.unr.edu/datawarehouse.html>

Nevada geology (geologic maps)

http://geology.about.com/library/bl/maps/n_statemap_NV800.htm

<http://www.nbmjg.unr.edu/dox/e30.pdf>

Utah gis (DOQ's, DRG's, etc.)

<http://agrc.its.state.ut.us/>

Utah geology (geologic maps)

http://geology.about.com/library/bl/maps/n_statemap_UT1600.htm

<http://geology.utah.gov/maps/geomap/index.htm>

Paleogeography of the southwestern United States

<http://jan.ucc.nau.edu/~rcb7/paleogeogwus.html>

Cenozoic volcanism in the desert southwest

<http://www.geosci.unc.edu/faculty/glazner/navdat/movie4.mov>

Book Cliffs

<http://strata.geol.sc.edu/BoocliffslustExercise/ClasticlithofaciesBC.html>

http://www.paleocurrents.com/book_cliffs/index.html

http://en.wikipedia.org/wiki/Book_Cliffs

Bryce Canyon

<http://www2.nature.nps.gov/geology/parks/brca/>

www2.nature.nps.gov/geology/education/foos/bryce.pdf

Capitol Reef

<http://www2.nature.nps.gov/geology/parks/care/>

<http://www.nps.gov/archive/care/geology1.htm>

www2.nature.nps.gov/geology/education/foos/capitol.pdf

Colorado Plateau

www2.nature.nps.gov/geology/education/foos/plateau.pdf

Death Valley

<http://geology.wr.usgs.gov/docs/usgsnps/deva/devaft.html>

<http://www2.nature.nps.gov/geology/usgsnps/deva/deva1.html>

<http://wrgis.wr.usgs.gov/docs/parks/deva/troxel.pdf>

<http://www.geosci.unc.edu/faculty/glazner/dvflight/dv.html>

http://www.exploratorium.edu/learning_studio/news/january98.html

<http://geology.csupomona.edu/drjessey/fieldtrips/kingston/snow.htm>

<http://palomar.edu/geology/DVWeb.htm>

Frenchman Mountain

<http://geoscience.unlv.edu/pub/rowland/Virtual/virtualfm.html>

Grand Canyon

<http://www2.nature.nps.gov/geology/parks/grca/>

http://www.kaibab.org/geology/gc_geol.htm

<http://www.nps.gov/grca/grandcanyon/quicklook/Geologicstory.htm>

www2.nature.nps.gov/geology/education/foos/grand.pdf

Grand Staircase

http://jan.ucc.nau.edu/~rcb7/Grand_Staircase.html

Hoover Dam

http://en.wikipedia.org/wiki/Hoover_Dam

Meteor Crater:

http://www.lpl.arizona.edu/SIC/impact_cratering/Enviropages/Barringer/barringerstartpage.html

Red Rocks Canyon

<http://www.sunsetcities.com/redrockgeology.html>

<http://www.sunsetcities.com/Red-Rock-Canyon/keystonethrust00.html>

San Francisco Volcanic Field

<http://geopubs.wr.usgs.gov/fact-sheet/fs017-01/>

Zion Canyon

<http://www2.nature.nps.gov/geology/parks/zion/>

<http://www.nps.gov/zion/Geology.htm>

www2.nature.nps.gov/geology/education/foos/zion.pdf

Some Useful Files:

At the time of this preparation, 12/22/07, several files are available to students and can be downloaded from Blackboard (Course Documents).

syl496_sp08.pdf	This syllabus
sw496tour.kml sw496tour.kmz	Google Earth placemarks for an aerial preview of the field trip featuring selected field trip stops and campsites (Play tour, Tools menu in Google Earth)
cord_sw.jpg	Generalized geology of the western Colorado Plateau and Basin and Range in Arizona, southern California (Death Valley), Nevada, and Utah (large poster, 5300 x 2600, 2 MB)
xs_ariz.jpg	Generalized Geology (Cross Section) of the Western Colorado Plateau in Arizona (part of large poster, 770 KB)
xs_utah.jpg	Generalized Geology (Cross Section) of the Western Colorado Plateau in Utah (part of large poster, 1.1 MB)
xs_model_gt.jpg	Cross Sectional Tectonic Model for the Development of the North American Cordillera <i>with geologic time scale</i> (part of large poster, 1.2 MB)
xs_model_maps.jpg	Cross Sectional Tectonic Model for the Development of the North American Cordillera <i>with maps for selected geologic times</i> (part of large poster, 1.4 MB)
strat_s_nv.jpg	Stratigraphic Relationships in the Cordilleran Miogeocline Through Southern Nevada (part of large poster, 550 KB)