CH EN 6171 Field Study (Credit or Non-Credit)

Overview
The Department of Chemical Engineering and the Energy & Geoscience Institute (EGI) at the University are offering an eleven-day field program exposing engineers and geoscientists to the principal aspects of petroleum field operating systems and petroleum geology. This is a required course for an MS degree in Petroleum Engineering (credit based) at the University of Utah. Information about this program and admission requirements are described in http://www.che.utah.edu/pe.

This course is also available to qualified and mature individuals who are interested in taking this as an accredited field course at another academic institution or as a non-credit continuing education experience.

2016 Meeting Times
Daily from May 8 – 20 (half-day), 2016, inclusive including Saturday, May 14. Specific field activities are not allocated on Sunday May 15, 2016.

Instructors
The three course instructors are:

Andrew Sweeney
Director, Utah Energy Research Triangle
E-Mail: asweeney@utah.gov
Office Phone: 801-585-9690
Mobile Phone: 703-593-8876

Bill Keach
Research Scientist - EGI; Visiting Associate Professor, Brigham Young University
Energy & Geoscience Institute - University of Utah
E-Mail: bkeach@egi.utah.edu
Mobile Phone: 801-857-7728

Tom Anderson
Senior Advisor to the Director and Research Scientist, EGI
Energy & Geoscience Institute - University of Utah
E-Mail: tanderson@egi.utah.edu
Registration Questions
Please contact:

Cynthia Ruiz
Graduate Advisor
Department of Chemical Engineering
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Office Phone: 801-585-7175

Catalog Course Description
CH EN 6171 Field Study (3 credits)

Prerequisites
N/A Instructor Permission Required

Course Description
Petroleum geologic principles are best illustrated in the field; by surface exposures—outcrops. The same can be said for petroleum engineering activities such as pipeline facilities, drilling operations and refining operations. Each student will be required to spend two weeks in the summer in the Central Rocky Mountains and Colorado Plateau region on a field study. Specific localities will include the Uinta Basin, Central Utah Thrust Belt, San Rafael Swell, Colorado Plateau, Uinta Uplift, Green River Basin, and Utah-Wyoming Thrust Belt. From a geologic perspective, this field program will encompass studying geologic cores, outcrops, and landforms and developing predictive geologic models. Concurrently, students will visit E&P (exploration and production) and gathering field operations, as well as mid- and downstream facilities including refineries and power generation plants. The data and insight from the culminating field site in the Green River Basin of Wyoming will be integrated into the project for CH EN 6156 Simulation, which will immediately follow the field study. Completion of CH6171 is strongly recommended prior to taking CH EN 6156 (Simulation)

Costs
Tuition is required for a three credit course. In addition, students are expected to pay a course fee to cover the field-trip costs. These are $3,000/student for double occupancy. The fee for single occupancy is $3,750. This covers transportation in the field, accommodations, meals and incidentals for the 12-day trip. Personal safety equipment will be provided (hard hats, eye protection, and flame
retardant coveralls). **Steel-toe safety shoes are required.** Students must supply this protective footwear themselves.

**Attendees are requested to register by April 8, 2016. Any registration after that could be subject to additional fees because of the restricted accommodations in these areas.**

**Tentative Grading Scheme**
The grading will be based on the following criteria.

- 25% Active and engaged participation in the field program
- 25% Assignments
- 25% Detailed journal submitted within three weeks of completion of the field study
- 25% Two, weekend exams

**Topics**
Students will be exposed to the following engineering operations and geologic features and topics and concepts.

1. Rock outcrops, comprising both clastic and carbonate exposures
2. Stratigraphy (reservoir, seal, source rocks)
3. Geologic structures (faults, folds, thrusts, unconformities, natural fractures)
4. Geologic history, tectonics, and landforms
5. Conventional and unconventional reservoirs
6. Drilling, logging, and well workover operations
7. Production gathering systems
8. Water management facilities and concepts, including reuse for secondary recovery
9. Hydraulic fracturing and completions
10. Gas processing and storage
11. Petroleum refining
12. Oil shale and coalbed methane

**Texts**
The following textbook will be provided.


Additional field guides will be provided by the instructors.
# Tentative General Schedule (for Summer 2016, subject to change)

The following tentative schedule is planned.

<table>
<thead>
<tr>
<th>Date</th>
<th>Itinerary</th>
<th>Locations and topics</th>
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<tbody>
<tr>
<td>Sunday</td>
<td>Icebreaker</td>
<td>1800-2000 at EGI: Introductions, course overview, petroleum geology overview</td>
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<td>May 8</td>
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<tr>
<td>Monday</td>
<td>Depart 7:30 am</td>
<td>- 0700 Great Salt Lake, Wasatch Fault, Intermountain Seismic Belt</td>
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<td>May 9</td>
<td>Salt Lake City to Price</td>
<td>- 0830-1030 Utah Core Lab, DNR</td>
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<td>- Box lunch during drive to Orem – pick up near DNR</td>
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<td>- 1130-1300 Lakeside power plant</td>
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<td>- 1400 Spanish Fork Canyon: Thistle Landslide; Regional Tectonics, Utah Hingeline, Eocene to Cretaceous stratigraphy; Green River Fm.</td>
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<td>- 1600 Price River Canyon: Castlegate and Blackhawk sandstones and coals</td>
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<td>- 1800 Lodging – Price</td>
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<td>- 1900 Dinner in Helper</td>
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<tr>
<td>Tuesday</td>
<td>Depart 8:00 am</td>
<td>- 0830 –0930 Oil rail car loading facility: Savage in Price</td>
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<td>- Lunch – pizza with ConocoPhillips</td>
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<td>- 1400 – 1500 XTO Castle Valley amine plant, CO₂ extraction</td>
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<td>- Buckhorn Draw: San Rafael Swell, Mesozoic stratigraphy, petroglyphs</td>
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<td>- Black Dragon/Spotted Wolf rest stop/overlook: Laramide structure; Sinbad Limestone</td>
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<td>- Crescent Junction rest stop/overlook: Salt Valley anticline and Paradox Basin</td>
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<td>- 1830 Dinner- Ray’s Tavern in Green River</td>
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<td>- 1900 Lodging – Moab</td>
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<tr>
<td>Wednesday</td>
<td>Depart 8:00 am</td>
<td>- 0900-1000 Fidelity production operations in Cane Creek Shale</td>
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<td>May 11</td>
<td>Moab to Bluff</td>
<td>- Dead Horse Point: Canyonlands overview, stratigraphy, potash mining</td>
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<td>- Lunch – box lunches from Leger’s</td>
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<td>- Arches National Park, development of arches – joints and fractures</td>
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<td>- View of La Sal Mountains and discussion of laccoliths</td>
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<td>- Salt Valley Anticline; Paradox Basin salt tectonics</td>
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<td>- 1800 - Dinner - Early dinner in Moab</td>
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<td>- 2000 - Lodging – Recapture Inn, Bluff</td>
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<tr>
<td>Thursday</td>
<td>Bluff “loop” (raft trip)</td>
<td>- Breakfast at Twin Rocks Café on May 14</td>
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<td>May 12</td>
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<td>- Anticline and monocline structures, Comb Ridge</td>
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<tr>
<td>Day</td>
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<td>6</td>
<td>Friday, May 13</td>
<td>Depart 7:30 am&lt;br&gt;Bluff to Richfield&lt;br&gt; • Breakfast at Twin Rocks Café on May 15 + 30 box lunches&lt;br&gt; • 0900 – 1400 Aneth Oil Field, EOR, Montezuma Creek&lt;br&gt; • Colorado River Canyon Hwy 128 (salt withdrawal, SE extension of SV Anticline)&lt;br&gt; • Optional: Possible stop in Lisbon Valley?&lt;br&gt; • Dinosaur Trail, Mill Canyon Road, lower Cretaceous dinosaurs&lt;br&gt; • ~1800 Lodging – Green River Hampton Inn&lt;br&gt; • ~1900 Dinner – Ray’s Tavern</td>
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<td>7</td>
<td>Saturday, May 14</td>
<td>Depart 8:00 am&lt;br&gt;Richfield to Salt Lake City&lt;br&gt; • Dakota and Morrison channels west of Green River&lt;br&gt; • Salina Canyon angular unconformity&lt;br&gt; • Covenant Oil Field, near Sigurd, UT&lt;br&gt; • Pick up sandwiches&lt;br&gt; • Canyon Range Thrust Fault&lt;br&gt; • Nebo Thrust Fault&lt;br&gt; • Faulted alluvial fans: Wasatch Fault&lt;br&gt; • Lodging – University of Utah Guest House ~ 1500</td>
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<td>8</td>
<td>Monday, May 16</td>
<td>Depart 7:00 am&lt;br&gt;Salt Lake City to Vernal via Parley’s - Wolf Creek&lt;br&gt; • 1000 – 1200 Drilling and production fluid management: IWM&lt;br&gt; • Box lunch from Cowen’s – Christen 435 738 5609&lt;br&gt; • 1300 – 1700 Drilling Rig visit at Ft Duchesne: Crescent Point&lt;br&gt; • 1730-1830 MCW Oil Sand Facility&lt;br&gt; • Lodging – Vernal, Landmark Inn&lt;br&gt; • Dinner – Vernal Brewery, Mexican or scatter</td>
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<td>Tuesday, May 17</td>
<td>Depart 8:00 am&lt;br&gt;Vernal to Rangely to Vernal&lt;br&gt; • 0930-1500 Workover Rig visit in Rangely, CO – Chevron coil tubing operations, lectures&lt;br&gt; • Lunch provided by Chevron&lt;br&gt; • Split Rock Anticline&lt;br&gt; • Dinosaur Nat’l Monument&lt;br&gt; • 1800 Lodging – Vernal, Landmark Inn&lt;br&gt; • 1900 Dinner – Vernal Brewery, Mexican or scatter</td>
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<td>Day</td>
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<tr>
<td>Wednesday</td>
<td>May 18</td>
<td>Depart 8:00 am</td>
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<td>Vernal to Rock Springs</td>
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<td>• 0900 Flaming Gorge Overlook</td>
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<td>• Pick up lunch at Dutch John (Flaming Gorge)</td>
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<td>• 1200-1400 Clay Basin natural gas storage; Dakota and Frontier production</td>
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<td>• 1530–1700 Halliburton office; wireline tools, stimulation equipment, engineering careers</td>
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<td>• 1730 Lodging – Green River, WY</td>
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<td>• 1800 Dinner – Coyote Creek</td>
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<td>Thursday</td>
<td>May 19</td>
<td>Depart 7:00 am</td>
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<td>Kemmerer to SLC</td>
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<td>• 0900 – 1330 Opal Williams lunch provided</td>
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<td>• 1445-1530 Fossil Butte National Monument, Green River shale and fish fossils (3hr30min drive to EGI w/o stops – 1830. May need to skip)</td>
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<td>• Utah-Wyoming Thrust Belt play and discoveries (Pineview, etc.)</td>
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<td>• ~1730 Echo Canyon conglomerate</td>
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<td>• ~1830 Unload and Dinner – Pi Pizza at EGI</td>
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<td>• Lodging – University of Utah Guest House</td>
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<tr>
<td>Friday</td>
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<td>Depart 8:00 am</td>
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<td>Salt Lake City</td>
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<td>• 0900 – 1130 Tesoro Refinery</td>
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<td>• EGI Lunch at 1200 and Graduation at 1300</td>
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<td>• Gas up and turn in vehicles</td>
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