Syllabus for 2016 UAF Summer Sessions Special Topic course,
BIOL 495/695, Arctic Alaska Environmental Change:
Field excursion to the North Slope, 1-15 Jun 2016

1. Course information
Title: Special Topic, Arctic Alaska Environmental Change: Field excursion to the North Slope
Number: BIOL 495 / 695
Credits: 3
Prerequisites: BIOL 115 & 116, or equivalent introductory physical science course intended for science majors in biology, geology or geography or instructor approval
Location: Murie Building, Room 230
Meeting time: 1 Jun, 9:00 am

2. Instructors and contact information
Prof. Amy Breen (instructor and course leader, has Wilderness First Responder Training), albreen@alaska.edu, International Arctic Research Center and Alaska Geobotany Center, Room 252 in Arctic Health Research Building; Prof. D.A. (Skip) Walker, (instructor) dawalker@alaska.edu; Dave Klein (instructor) dklein7@alaska.edu; Jason Clark (instructor and course manager) jaclark2@alaska.edu

3. Course readings/material:
Readings (see daily readings in the course schedule):
Daily readings: Each day 1-2 papers are required readings that we will discuss over breakfast and/or dinner. The required readings are in the “Syllabus and Course Reader”. One student will be selected randomly each day to help instructors lead discussions.

Course library: The course also carries a book box with many other general references, relevant papers and books. Students can check these out for personal reading and as background for their course projects. The contents of the library are listed in the course “Syllabus and readings”.

Good general references: These references provide a good overview of the Dalton Highway and research at the Toolik Field Station.
Course equipment
The course will provide a large group meeting and eating tent, Coleman stoves, water purification, first aid kit, satellite phone, generator, and vehicles. Students will need to purchase food and have money for meals at Coldfoot and Prudhoe Bay. Students will need to enroll early and contact the organizers to get a list of required equipment including: tent, sleeping bag, sleeping pad, rain gear, footwear, sun protection, bug protection, personal gear and other camping equipment. For students traveling from abroad or that do not own extreme weather gear, tents, sleeping bags and sleeping pads are available from the course instructors or can be rented from UAF’s Outdoor Adventures.

4. Course description:
Course catalog description:
BIOL F495_ Arctic Alaska Environmental Change: Field excursion to the North Slope. 4 Credits. Offered Summer 2016
15-day course, includes 12-day field excursion along the Dalton Highway, Brooks Range, Arctic Foothills Arctic Coastal Plain, Prudhoe Bay. Climate, geology, permafrost, soils, vegetation, wildlife, local people, infrastructure impacts. Special fees apply. Stacked with BIOL F695(3)

More detailed description: This course will consist of:
1. 2 days of preparation with lectures, local field trips in the Fairbanks area and logistics for the excursion.
2. 12 day field excursion
3. 1 day of student presentations when return to Fairbanks.
The trip will have a strong emphasis on Arctic environments, local people, and field sampling.

5. Course goals and student learning outcomes
The goals for the course are to: (1) Provide students with an in-depth field experience of Arctic environments, local people, and the oil industry’s environmental research program and application to current Arctic issues. (2) Provide methods of field sampling of Arctic vegetation, soils, and permafrost in a variety of Arctic ecosystems. (3) Visit Arctic research sites, including Finger Mountain, Atigun Pass, Toolik Lake, Imnavait Creek, Happy Valley, Sagwon, and Prudhoe Bay.

6. Instructional method and grading criteria:
2-day preparation in Fairbanks:
Introductory lectures will give an overview of the course and Arctic ecosystems, permafrost and local people along the Dalton Highway. Students will develop a research topic to be examined during the excursion. On the third day students will visit local boreal forest ecosystems and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) Permafrost Tunnel at Fox. Students should become familiar with the field guides (Walker et al. 2009, Brown & Krieg 1983, Huryn & Hobbie 2013) for the Dalton Highway route.
12-day field excursion:
The course will follow the route of the Dalton Highway. The course will examine Arctic environments, with in depth examination of the physical, biological, and human responses and adaptations to changing climate. We visit the old mining town of Wiseman to gain an understanding of village. We will establish camps in the Boreal Forest, Brooks Range, Arctic Foothills, and Arctic Coastal Plain — Coldfoot, Galbraith Lake, Happy Valley, and near Deadhorse — where we will camp and spend two days at each location exploring the local vegetation, soils, permafrost, geology, and land-use and climate-change issues. The course will have field lectures, conducted during hikes to different areas, using materials from past and existing research projects in the region. Students will learn the methods of vegetation, soil, and permafrost sampling and collect sample data from representative ecosystems. The course includes visits to the Arctic Research Station at Toolik Lake and the oilfield at Prudhoe with an overview of the environmental research of the oil companies at Prudhoe Bay. We will then return to UAF driving south from Prudhoe Bay to Fairbanks.

1-day presentation of student projects:
At the end of the course students will spend the morning working on their oral presentation that summarizes their observations during the excursion. Students will then present their findings in the afternoon with ample time for group discussions.

Research topics:
Students will develop a research topic that fits with the planned excursion. The topics should focus on descriptive aspects of Arctic environment along the climate gradient. Students should keep in mind that the analysis of the data will be limited by the short time available at the end of the course. At the end of the course, students will present 15-minute oral presentations summarizing aspects of their field observations, focusing on their research topic. Guidelines for these presentations will be handed out at the beginning of the course. Graduate students will also write a 10-15 page research paper focused on some aspect of observations during the course, which will be due 3 Jul 2014.

Academic integrity:
Plagiarism and cheating will not be tolerated. Plagiarism is presenting another’s work as new or original without citing your source. For additional detail, see http://www.uaf.edu/library/instruction/handouts/Plagiarism.html
Please speak with me if you have any questions about how to properly use other people’s work.

Attendance policy:
Students are expected to actively participate in both the academic part and expedition part of camp, cooking, clean-up, waste management, emergencies, group decisions, and keeping a cheerful attitude in sometimes difficult field conditions such as rain, cold or snow.
7. Evaluation:

Summary of grading points:

**Undergraduate student grading (BIOL 495 students):**
- Attendance and participation lectures, field trips, and discussions: 200 pts
- Field notebooks and plant collections: 200
- Oral presentation of research topic: 200
- TOTAL: 600 pts

**Graduate student grading (BIOL 695 students):**
- Attendance and participation in discussions: 200 pts
- Field notebooks and plant collections: 200
- Oral presentation of research topic: 200
- Final research paper: 200
- TOTAL: 800 pts

These criteria may be modified somewhat as the course progresses.
Final grades will be as follows: greater than or equal to 90% = A; 80-89% = B; 70-79% = C; 60-69% = D; < 60% = F.

**Graduate student grading:**
Graduate students will be graded according to the same criteria as the undergraduate students except the graduate students are required to turn in 3-5 page research paper on a topic of their choice. Guidelines for this paper will be handed out on the first day of class. Due date is 3 Jul. Students should arrange for an incomplete grade if they cannot meet this deadline.

8. Support services:
Students are encouraged to contact the instructor with any questions, or to clarify the lecture or the assignments. We will be happy to review drafts of assignments and answer questions any time. Skip Walker’s lab and office is in Arctic Health Research Building Room 254. While in Fairbanks, Amy will reside in Skip’s lab. Lab phone 474-2459, Amy’s cell phone: 907 750-1311, Skip’s home phone: 451-0800.

9. Disabilities services:
The instructor will work with the Office of Disabilities Services (203 WHIT, 474 7043, to provide reasonable accommodation to students with disabilities.
## 10. Course schedule and reading assignments:

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<th>Date</th>
<th>Location</th>
<th>Activity</th>
<th>Reading to be done in preparation for each day</th>
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<tr>
<td>31 May</td>
<td>Fairbanks, Hess commons</td>
<td>Arrival, check into dorm</td>
<td>None</td>
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| 1-Jun      | Fairbanks, Margaret Murie Bldg Room 230        | **9:00 am:** Cold breakfast in break room  
**9:15 am:** Introductions, course schedule and expectations, readings & student projects, equipment list (Amy Breen)  
**9:45 am:** Overview of the Arctic system and Dalton Highway (Skip Walker)  
**10:45:** Overview of permafrost systems (Yuri Shur & Misha Kanevskiy)  
**Lunch:** In Murie break room  
**1:00 pm:** Risk assessment; health & safety (Matt Irinaga), equipment check  
**6:00 pm:** (College Pizzaria), dinner.  
| 2-Jun      | Fairbanks, Meet at Arctic Health Research Building West Parking Lot | **Breakfast:** On own*  
**9:00 am:** Permafrost coring (Misha Kanevskiy), boreal forest plants (Amy Breen), animals (David Klein); meet at Arctic Health Bldg, West Parking Lot, travel together to coring sites  
**Lunch:** Fast food on way to Fox*  
**1:00 pm:** CRREL Permafrost Tunnel (Elliot Highway) (Yuri Shur & Misha Kanevskiy). Help pack trailer for trip. Get ready for next day’s departure.  
**Dinner:** On own*  
**Night:** UAF Dorms or elsewhere in Fairbanks | Kanevskiy, M. et al. 2008. Late-Pleistocene syngenetic permafrost in the CRREL permafrost tunnel, Fox, Alaska. University of Alaska, Institute of Northern Engineering, Fairbanks, AK. |
| 3-Jun      | Fairbanks to Coldfoot, Meet at Arctic Health Research Building West Parking Lot | **Breakfast:** Sourdough Sam’s  
**6:30 am:** Final packing, drive to breakfast.  
**8:00 am:** Drive to Yukon river, insect ecology (Derek Sikes)  
**Lunch:** Yukon River picnic  
**PM:** Drive to Coldfoot with stop at Finger Mountain  
**Dinner:** Coldfoot Truck Stop  
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| 4-Jun | Coldfoot vicinity     | **Breakfast**: In camp.  
**10:30 am**: Wiseman tour (Jack Reakoff)  
**Lunch**: Picnic at Koyukuk River bridge  
**PM**: Nolan Creek, ecology of willow carr  
**Dinner**: Cook camp dinner  
**8:00 pm**: Interagency Visitor Center presentation (Heidi Schoppenhorst). Tent camp in Coldfoot vicinity.  | **Marshall, R.** 1991 (reprint). *Arctic Village: A 1930s Portrait of Wiseman, Alaska*, University of Alaska Press, Fairbanks, AK, pp. 3-44 |
| 5-Jun | Coldfoot to Galbraith Lake | **Breakfast**: Coldfoot Truck Stop.  
**AM**: Drive to Galbraith Lake, with stops at frozen debris lobes, Sukakpak Mtn, Atigun Pass  
**Lunch**: Picnic at Atigun Pass summit  
**PM**: Set up camp. Catch up on readings, plant collections & projects  
**Dinner**: Cook camp dinner  
| 6-Jun | Galbraith Lake vicinity | **Breakfast**: In camp  
**AM**: Overview of releve sampling along Galbraith Creek  
**Lunch**: In camp  
**PM**: Atigun Gorge hike, plant collections  
| 7-Jun | Galbraith Lake-Toolik Lake | **Breakfast**: In camp  
**Lunch**: Sack lunch at solifluction lobes  
**PM**: South slope of Atigun Pass, Drive to Toolik  
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| 8-Jun  | Toolik Lake vicinity | **Breakfast:** TFS. AM: Drive to Imnavait Creek. Imnavait Creek orientation, R4D research, point-frame sampling  
**Lunch:** Sack lunch from TFS at Imnavait Creek  
**PM:** Drive to Toolik Lake, Overview of research at TFS talk (Donie Bret-Harte), drive back to Galbraith Lake  
| 9-Jun  | Galbraith Lake-Happy Valley | **Breakfast:** In camp.  
**AM:** Drive to Happy Valley. Visit poplar stand on Sag River.  
**Lunch:** Picnic along the drive  
**PM:** Catch up on readings, plant collections & projects  
| 10-Jun | Happy Valley | **Breakfast:** In camp.  
**AM:** Orientation to Foothills landscapes and vegetation, Buckner sampling  
**Lunch:** In camp  
**PM:** Work on readings, plant collections and projects  
**Dinner and night:** Happy Valley | **Schurr, E. A. G. et al. 2015. Climate change and the permafrost carbon feedback. Nature 520: 171-179.** |
| 11-Jun | Happy Valley-Sag River | **Breakfast:** In camp  
**AM:** Drive to Sag River camp, stops at Sagwon, gyrfalcon nest, orientation to Coastal Plain landscapes and vegetation  
**Lunch:** Sack lunch on Sag River by gyrfalcon nest  
**PM:** Work on class notes, plant collections, projects  
| 12-Jun | Sag River | **Breakfast:** In camp  
**AM:** Hike to Percy Pingo  
**Lunch:** Sack lunch at pingo  
**PM:** Discussion of pingos and floristics of pingos  
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<tr>
<td>13 Jun</td>
<td>Sag River-Prudhoe Bay-Sag River</td>
<td><strong>Breakfast:</strong> Prudhoe Bay Hotel&lt;br&gt;<strong>All day</strong> field trip in Prudhoe Bay oil field <em>(Kyla Choquette, and Tom Barrett)</em>&lt;br&gt;<strong>Lunch:</strong> BP cafeteria&lt;br&gt;<strong>Dinner:</strong> Prudhoe Bay Hotel or back in camp&lt;br&gt;<strong>Night:</strong> Return to Sag River camp, discussion of BP tour</td>
<td><em>Raynolds, M.</em> et al. 2014. Cumulative geoecological effects of 62 years of infrastructure and climate change in ice-rich permafrost landscapes, Prudhoe Bay Oilfield, Alaska. Global Change Biology doi: 10.1111/gcb.12500 <strong>AND Streever, B.</strong> et al. 2011. Environmental change and potential impacts: applied research priorities for Alaska’s North Slope. <em>Arctic</em> 64: 390-397.</td>
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<td>14 Jun</td>
<td>Sag River to Fairbanks</td>
<td><strong>Breakfast:</strong> In Camp&lt;br&gt;<strong>AM:</strong> Drive to Coldfoot&lt;br&gt;<strong>Lunch:</strong> Coldfoot Truck Stop&lt;br&gt;<strong>PM:</strong> Drive to Fairbanks.&lt;br&gt;<strong>Dinner:</strong> Someplace in Fairbanks*&lt;br&gt;<strong>Night:</strong> Dorms in Fairbanks</td>
<td><em>Streever, B.</em> 2002. Science and emotion, on ice: the role of science on Alaska’s North Slope. <em>Bioscience</em> 52: 179-184.</td>
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<td>15-Jun</td>
<td>Fairbanks, Margaret Murie Bldg Room 230</td>
<td><strong>Breakfast:</strong> On own*&lt;br&gt;<strong>8:00 am:</strong> Unload vehicles&lt;br&gt;<strong>AM:</strong> Prep of presentations&lt;br&gt;<strong>Lunch:</strong> Take out pizza in classroom&lt;br&gt;<strong>PM:</strong> Final presentations and evaluations&lt;br&gt;<strong>Dinner:</strong> Celebration&lt;br&gt;<strong>Night:</strong> Dorms in Fairbanks</td>
<td>None</td>
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<td>16-Jun</td>
<td>Depart</td>
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* Students will purchase these meals on their own
Course Library (2016)

Items not in manila folders:
Books, data reports, natural history guidebooks, guides to the Dalton Highway and floras


Items in manila folders (arranged alphabetically by author within subject folders):
Journal articles and book chapters

ANIMALS

CLIMATE CHANGE

GEOLOGY

HUMAN, INDUSTRIAL & SOCIAL SYSTEMS
Klein, David R. 2002. Perspectives on wilderness in the Arctic. Wilderness in the circumpolar north: searching for compatibility in ecological, traditional, and ecotourism values. USDA, Ogden UT.

PLANTS

SOILS AND PERMAFROST