Syllabus for UAF Summer Sessions Special Topic course
BIOL F495/F695, Arctic Alaska Environmental Change: Field excursion to the North Slope, 10-30 June 2015

1. Course information
   Title: Arctic Alaska Environmental Change: Field excursion to the North Slope

   **Number:** BIOL F495/Biol F695  
   **Credits:** 4  
   **Prerequisites:** BIOL 115 & 116, or equivalent introductory physical science course intended for science majors in biology, geology or geography or instructor approval  
   **Location:** Murie, Room 103  
   **Meeting time:** 10 Jun, 8:30 am

2. Instructors and contact information
   Prof. D.A. (Skip) Walker, (instructor and course leader) Alaska Geobotany Center, University of Alaska Fairbanks, Arctic Health Building, Room 254, X 2460,  
   dawalker@alaska.edu. Martha Raynolds (instructor and course manager)  
   mkraynolds@alaska.edu, Amy Breen (instructor with Wilderness First Responder training), albreen@alaska.edu. Others who have been invited to present lectures and training during the course include Emeritus Professor David Klein (wildlife), Prof. Yuri Shur (UAF, permafrost), Dr. Mikael Kanevskiy (permafrost), Dr. Ronald Daanen (Alaska Division of Geology and Geophysical Research, periglacial landforms), Dr. Donie Bret-Harte (Science Director at Toolik Lake), Dr. Bill Streever (BP Exploration Alaska, Biologist), Mr. Jack Raekoff (resident Wiseman), Ms. Heidi Schopenhorst (National Park Service, Coldfoot), Mr. Alan O’Bannon (Polar Field Services, Arctic field training, outdoor safety, field equipment).

3. Course readings/Material:
   **Readings:** Numerous papers are suggested reading and are in the course calendar and posted on the course Blackboard web site. These three references provide a good overview of the Dalton Highway:

   **Required materials:**  
   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 2015
21-day course, Includes 15-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(4)

More detailed description: This course will consist of:
1. 3 days of preparation with lectures, local field trips in the Fairbanks area and logistics for the excursion.
2. 15 day excursion
3. 3 days of student presentations and local field trip at the end.
The trip will have a strong emphasis on Arctic environments, local people, and field sampling.

5. Broad course goals
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 and boreal research sites.

6. Specific course objectives and student learning outcomes
The course has the following specific objectives: 1) Provide the students with hands-on field experience with Arctic ecosystems, local people, and issues relevant to the rapidly changing Arctic environments. 2) Provide a series of background lectures delivered by topical experts in permafrost, Arctic ecology, social-ecological systems, wildlife, geology, oilfield ecological monitoring, remote sensing of the environment, National Park Service and Bureau of Land Management oversight of nearby parks and wilderness areas, and research at the Toolik Field Station. 3) Examine field research sites at Finger Mountain, Atigun Pass, Toolik Lake, Innnavait Creek, Happy Valley, Sagwon, and Prudhoe Bay. 4) Provide students the opportunity to discuss environmental change issues with residents in the villages of Wiseman, and Minto. 5) Provide vegetation sampling field methods and remote sensing of landscapes. 6) Introduce students to a wide array of interdisciplinary literature related to Arctic environmental change. 7) Help students feel at home in the Arctic with an in depth camping experience and training in safety procedures, methods of keeping warm, eating properly, setting up camp, and traveling in the Arctic. 8) Provide a research experience for students to thoroughly investigate a topic of their choice during the course and provide a polished presentation of their results at the end of the course. All students will present an oral presentation of their results during a
final all-day workshop. Graduate students will also present a polished written summary of their results.

7. Instructional method and grading criteria:

3-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. They will also prepare for the excursion by buying food, needed supplies and personal gear. 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.

10-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 will establish camps in the Brooks Range, Arctic Foothills, and Arctic Coastal Plain — at 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. In the afternoons students will learn the methods of vegetation, soil, and permafrost sampling and collect sample data from representative ecosystems. The course includes a portion at Prudhoe Bay 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.

2-day presentation of student projects:

At the end of the course students will spend one day writing an oral presentation that summarizes their observations during the excursion. Students will present their findings on the second day 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.
## 8. Course schedule and suggested reading:

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Jun 10</td>
<td><strong>Murie Bldg, Room 103: Expedition preparation:</strong></td>
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<td>8:30-9:00 am: Welcome and introductions</td>
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<td>9:00-10:00 am: Overview of expedition route, what to expect.</td>
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<td>10:00-12:00: Erect dome and individual tents,</td>
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<td><strong>12:00-1:00: Lunch in Arctic Health Cafeteria</strong></td>
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<td>1:00-5:00 (or as late as 6:00) Safety, Risk Management.</td>
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<td>Expedition Behavior.</td>
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<td>Allen O’Bannon, Polar Field Services, Arctic Field Training (bear</td>
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<td>safety, staying found &amp; sound, basic first aid, hypothermia/heat</td>
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<td>exhaustion, dressing for the field - including review of course gear</td>
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<td>checklist)</td>
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<td>Review individual field gear.</td>
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<td>Purchase and pack food.</td>
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<td><strong>Dinner: College Pizza</strong></td>
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<td><strong>Evening: Purchase needed supplies.</strong></td>
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**Suggested reading:** All these articles will be available in the course library during the expedition and pdfs are available on the course Blackboard web site. Not all are required reading, but it would be good to read at least 2 articles from the list for each day of the course. Familiar yourself with the sources listed for the first day (6 Jun) before the course.

**Before Jun 10, read:**


**If possible purchase and become familiar with:**


**Become familiar with these guidebooks during the period of the field course (we will have copies during the course and the material will be available on course Blackboard web site):**

<table>
<thead>
<tr>
<th>Day</th>
<th>Date</th>
<th>Description</th>
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| 2   | Jun 11 | Morning, Murie Bldg, Room 103: Arctic Environment overview lectures  
9:00-10:30 Overview of the Arctic System: *Skip Walker, Tako Raynolds, Amy Breen*  
10:30-12:30 am: Northern Social Ecological Systems: *Gary Kofinas*  
12:30-1:30 pm: Lunch, Arctic Health Cafeteria  
1:30-3:30 pm: Permafrost and soils: *Yuri Shur & Misha Kanevskiy*  
3:30-5:30 pm: Development of student research topics  
Pick up vehicles  
6:00 pm: Dinner College Pizza |
| 3   | Jun 12 | Breakfast: on own.  
Meet in Murie 103, 8:30 am: Local field excursions  
Morning: 8:30-11:30 North Campus Lands: White-spruce forest, black-spruce forest, fen, and permafrost lake ecosystems.  
Lunch: Fast food on way to CRREL tunnel  
Afternoon: 1:00-3:00 CRREL Permafrost Tunnel  
4:00-7:00: Students pack and prepare for North Slope expedition, pack trailer and vehicles.  
Dinner: on own or to be determined |
| 4   | Jun 13 | MINTO FIELD TRIP:  
Depart Arctic Health Bldg, West Parking Lot 7 am.  
Pick up students at dorm.  
7:30: Breakfast at Sam’s Sourdough Cafe  

Mint field trip to be planned
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<th>Day</th>
<th>Date</th>
<th>Activity</th>
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| 5   | Jun 14 | **Breakfast in Minto vicinity**  
**Drive to Coldfoot.**  
Stops at:  
Tolovana River (black water stream, Interior bog ecosystem)  
11:00: Meet Misha Kanevskiy at Dalton Mile 9 to 12: Yukon R. loess, permafrost coring  
**Picnic at Yukon River overlook.**  
Yukon River (river, bridge construction, fire ecology)  
Finger Mountain (tor and treeline site, sorted polygons)  
**Dinner at Coldfoot Truck Stop**  
Evening discussion, time on own.  
**Camp at Coldfoot.** |
| 6   | Jun 15 | **Coldfoot vicinity:**  
**Breakfast in camp**  
Visit local community of Wiseman.  
10:30-12:00 Jack Roakoff, local ecology, history, subsistence issues.  
**Lunch: Sack lunch from camp**  
Afternoon debrief from Roakoff discussion. Local exploration  
4:00 pm: Heidi Schopenhorst (NPS) at visitors center: northern land management, agency |

**Read one of the following:**  
<table>
<thead>
<tr>
<th>Date</th>
<th>Breakfast</th>
<th>Lunch</th>
<th>Dinner and camp</th>
<th>Read one of the following:</th>
</tr>
</thead>
</table>
10 Jun 19 8

Breakfast: Camp at Galbraith Lake

Drive to Imnavait Creek.

Morning: Imnavait Creek: R4D research, hierarchical mapping of the Toolik Lake region. Sagavanirktok glaciation terrain. Relevé vegetation sampling approach.

Lunch: Sack lunch on Gal summit

Afternoon: Stops at Itkillik/Sagavanirktok boundary. Kuparuk River

Drive to Toolik Field Station

Dinner: Toolik Lake Field Station (TFS).

Stay at TFS.

ecosystems and wildlife in Atigun Canyon).

**Lunch: Sack lunch at Atigun Falls**

Possible afternoon or evening trip to aufeis if not on 11 Jun.

**Dinner and camp at Galbraith Lake**


Sheriff, M. J., M. M. Richter, C. L. Buck, and B. M. Barnes. 2013. Changing seasonality and
| 11 Jun 20 | **Morning:** Lecture regarding Toolik Lake Research (Donie Bret-Harte)  
**Afternoon:** Hike to Jade Mountain stopping at research sites on the west side of the lake or personal time.  
**Dinner:** Toolik Lake Field Station (TFS).  
| 12 Jun 21 | **Breakfast:** TFS  
**Drive to Prudhoe Bay:**  
**Morning:** Overlook of Sag River, Itkillik glaciation and terraces.  
Slope Mountain, dall sheep.  
DOT Camp poplar grove.  
Willow invasion along the buried pipeline corridor.  
Happy Valley Ice Cut, gyre falcon nest site.  
Sagwon MAT site.  
**Lunch:** Sack Lunch from TFS at Sagwon MAT site.  
**Afternoon:**  
Hike to MNT site and meet vehicles along the main road.  
Franklin Bluffs: Photo stop.  
**Camp and dinner along the Sagavanirktok River** | **Read 2 starred reference and one other:**  
<table>
<thead>
<tr>
<th>Date</th>
<th>Jun 22</th>
<th>Breakfast at Prudhoe Bay Hotel</th>
<th>Papers on oil-field environmental research programs, read starred reference and 1 other:</th>
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<tr>
<th>Date</th>
<th>Jun 23</th>
<th>Breakfast: Camp along the Sag R.</th>
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<tr>
<td></td>
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<td>Day in the Prudhoe Bay vicinity</td>
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<td>Morning: periglacial landforms:</td>
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<td>Sagavanirktok River, braided rivers and relevance of loess to local ecosystems</td>
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<td>Low-centered polygons near airport</td>
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<td>Hike to Percy Pingo</td>
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<td>Lunch at Percy Pingo (sack lunch from camp)</td>
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<td>Afternoon: Colleen Site A road effects site.</td>
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<td>Drive to Happy Valley.</td>
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<tr>
<th>Date</th>
<th>Jun 23</th>
<th>Read starred reference and one other:</th>
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<tr>
<td>Date</td>
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| 15 Jun 24 | **Breakfast**: Happy Valley camp  
**Morning**: Foothill ecosystems.  
Tussock tundra, riparian vegetation, water tracks  
Sagavanirktok River floodplain.  
Biocomplexity research site.  
**Lunch**: Sack lunch in field  
**Afternoon**: Point sampling and biomass sampling.  
**Camp and dinner**: Happy Valley |
| 16 Jun 25 | **Breakfast**: Happy Valley camp  
**Morning**: Catch up on plant collections and plant id.  
**Lunch**: Sack lunch in field  
**Afternoon**: Personal time, swimming, hikes in Happy Valley vicinity.  
**Camp and dinner**: Happy Valley |


**Read starred reference and one other:**


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| 17 Jul 26 | Breakfast: Happy Valley camp  
Drive to Toolik Lake: LTER and other Toolik Lake Research:  
All day: Visit Toolik Lake research sites:  
Toolik outlet area:  
Exclosures  
Rainwater experiment  
Itkillik II glaciation terrain  
South side of lake:  
Snow fence experiment sites  
Greenhouses  
Overview of lakes research ?  
Lunch: TFS dining hall  
Afternoon: South side of Lake  
Snow fence experiment  
Greenhouses  
Other LTER research sites  
Dinner and stay at TFS | Read 2 chapters of interest from the Toolik LTER book:  
| 18 Jul 27 | 5 am Breakfast: TFS  
Depart Toolik 6 am  
Drive to Fairbanks:  
Stops at:  
9:00 am, frozen debris lobes (Mile D-219) and Sukakpak Mountain (Mile D204) (Ronnie Daanen and Margaret Darrow).  
Lunch at Coldfoot  
Return to Fairbanks  
Dinner at Hilltop Café or Silver Gulch  
Read 2 chapters of interest from the Toolik LTER book:  
<p>| 19 Jul 28 | All meals on own: Students prepare oral presentations summarizing field observations. | |
| 20 Jul 29 | Breakfast: on own | |</p>
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<tr>
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<td>Student oral presentations. 20 minutes for each presentation plus 20 minutes for discussion.</td>
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<td><strong>Lunch:</strong> Delivered pizza</td>
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<td><strong>Dinner:</strong> on own</td>
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<td>21</td>
<td><strong>Jun 30</strong> Breakfast, Sam’s Sourdough Café.</td>
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<td>All day field trip to Murphy Dome or Angel Rocks, or Eagle Summit: Alpine Ecosystems of the Interior Alaska.</td>
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<td><strong>Dinner:</strong> BBQ at Tako’s place or Skip’s place.</td>
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<tr>
<td>3 Jul</td>
<td><strong>GRADUATE STUDENT PAPERS DUE</strong></td>
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</table>
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.

9. Evaluation:  
Summary of grading points:  
**Undergraduate student grading (BIOL 495 students):**
- Attendance and participation lectures, field trips, and discussions: 200 pts
- Field notebooks 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 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 that 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.

10. Support Services:  
Students are encouraged to contact the instructor with any questions, or to clarify the lecture or the assignments. I will be happy to review drafts of assignments and answer questions any time. Arctic Health, Room 254. Phone 474-2460, dawalker@alaska.edu. Home phone: 451-0800.

11. Disabilities services:  
The instructor will work with the Office of Disabilities Services (203 WHIT, 474 7043, to provide reasonable accommodation to students with disabilities.