1. Course information
   Title: Special Topic, Arctic Alaska Vegetation
   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 330
   Meeting time: 14 Jun, 9:00 am

2. Instructors and contact information
   Prof. D.A. (Skip) Walker, (instructor and course leader, dawalker@alaska.edu). Research Prof. Amy Breen (instructor and co-course leader, albreen@alaska.edu, International Arctic Research Center and Alaska Geobotany Center, Room 252 in Arctic Health Research Building; Shawnee Gowan (teaching assistant, sagowan@alaska.edu)

3. Course readings/materials:
   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 Vegetation: Brooks Range and North Slope. 3 Credits. Offered Summer 2018
17-day course. Includes 14-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. 13 days for the field excursion
3. 2 days of student presentations and local field trip at the end.
The trip will have a strong emphasis on Arctic environments, vegetation, and field sampling.

5. Course goals
The goals for the course are to: (1) Provide students with an in-depth field experience of Arctic environments, flora, and vegetation. (2) Provide methods of field sampling of Arctic vegetation, soils, and permafrost in a variety of Arctic ecosystems. (3) Focus on vegetation and environments in the Brooks Range and areas north, including Atigun Pass, Galbraith Lake, Toolik Lake, Innnavait Creek, Happy Valley, Sagwon, and Prudhoe Bay.

6. Learning outcomes for undergraduate students
Undergraduate students should gain the following:
   a) Ability to recognize 160 common species of the boreal, alpine, and arctic regions of the forests and tundra regions of Alaska.
   b) Knowledge of the methods of vegetation sampling including plot sampling (Braun-Blanquet approach) and point sampling (line and quadrat sampling methods).
   c) Recognition and appreciation of vegetation as a key element of wildlife habitat and how to use knowledge of structure and composition of vegetation in assessing wildlife habitat.
   d) A basic understanding of permafrost, its distribution, characteristics, affects on distribution of plant communities, and vice versa.
e) Knowledge of the linkages between plant community composition/structure and key environmental factors, including toposquences, chronosequences, permafrost conditions, snow conditions, soil chemistry, bedrock geology, surficial geology, glacial history, and landscape age.

f) Knowledge of how Arctic vegetation is changing in response to climate change and infrastructure related factors, such as increased summer warming, changing permafrost conditions, thermokarst, altered snow regimes, road dust, off-road vehicle trails, and road-related flooding.

g) Insights into the history of the Prudhoe Bay oilfield, the Dalton Highway, and changes to life in a small Arctic village affected by the road.

h) Overview of Arctic research conducted at the Toolik Field Station, Innavait Creek, and other sites along the Dalton Highway.

7. Instructional method

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 second 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.

13-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 2-4 days at each location learning 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.

2-days for student presentations in Fairbanks:
At the end of the course students will spend one day presenting oral presentations that summarize their observations during the excursion. Students will present their findings 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 the Arctic environment with some element related to Arctic vegetation and environments along the Dalton Highway climate gradient. Students should keep in mind that the analysis of their data will be limited by the short time available at the end of the course. Upon our return
to Fairbanks after the excursion, 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.

### 8. Course calendar

<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Activity</th>
<th>Reading to be done in preparation for each day</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 Jun</td>
<td>Fairbanks, Hess commons</td>
<td>Arrival, check into dorm</td>
<td>None</td>
</tr>
<tr>
<td>14-Jun</td>
<td>Fairbanks, Margaret Murie Bldg Room 330</td>
<td>9:00 am: Cold breakfast. Introductions. Talks: Overview of course, discussion of student projects. 12:00 noon: Lunch 1:00 pm: Risk assessment; health &amp; safety, equipment check. 6:00 pm: (College Pizzaria), dinner. <strong>Night:</strong> UAF Dorms or elsewhere in Fairbanks</td>
<td>Start on: Marshall, R. 1991 (reprint). Arctic Village: A 1930s Portrait of Wiseman, Alaska, University of Alaska Press, Fairbanks, p. 3-44 Finish by breakfast 5 Jun.</td>
</tr>
<tr>
<td>15-Jun</td>
<td>Meet at Fairbanks Arctic Health Bldg. West Parking Lot</td>
<td>Breakfast: on own 9:00 am: Permafrost coring (Misha Kanevskiy), boreal forest plants (Amy Breen), meet at Arctic Health Bldg, West Parking Lot, travel together to coring sites. <strong>Lunch:</strong> To be determined. 1:00 pm: CRREL Permafrost Tunnel (Elliot Highway) (Yuri Shur &amp; Misha Kanevskiy). Help pack trailer for trip. Get ready for next day. <strong>Evening:</strong> Dinner on own, <strong>Night:</strong> UAF Dorms or elsewhere in Fairbanks</td>
<td>Kanevskiy, M., et al. 2008. Late-Pleistocene syngenetic permafrost in the CRREL permafrost tunnel, Fox, Alaska. University of Alaska, Institute of Northern Engineering, Fairbanks, Alaska.</td>
</tr>
<tr>
<td>16-Jun</td>
<td>Meet at Fairbanks Arctic Health Bldg. West Parking Lot</td>
<td>Breakfast: Sourdough Sam’s or Hilltop 6:30 am: Arctic Health West Parking Lot: Final packing, drive to breakfast. 8:00 am -12:00 noon: Drive to Yukon river, insect ecology (Derek Sikes) 12:00 noon: Lunch at Yukon River. 1:00 4:00 pm: Drive to Coldfoot with stop at Finger Mountain <strong>Dinner:</strong> at Coldfoot truck stop. <strong>Night:</strong> Tent camp in Coldfoot vicinity</td>
<td>Chapin, F. S. et al. 2010. Resilience of Alaska’s boreal forest to climatic change. Canadian Journal of Forest Research, 2010, 40(7): 1360-1370, 10.1139/X10-074</td>
</tr>
<tr>
<td>17-Jun</td>
<td>Coldfoot vicinity</td>
<td>Breakfast in Coldfoot tent camp. <strong>AM:</strong> Wiseman, Jack Reakoff talk; <strong>PM:</strong> Heidi Schoppenhorst, Interagency Visitor Center. <strong>Dinner:</strong> Cook camp dinner. <strong>Night:</strong> Tent camp in Coldfoot vicinity.</td>
<td>Marshall, R. 1991 (reprint). Arctic Village: A 1930s Portrait of Wiseman, Alaska, University of Alaska Press, Fairbanks, p. 3-44</td>
</tr>
<tr>
<td>18-Jun</td>
<td>Coldfoot to Galbraith Lake</td>
<td>Breakfast in Coldfoot tent camp. <strong>AM:</strong> Drive to Galbraith Lake, with stops at frozen debris lobes, Sukakpak Mtn, Atigun Pass <strong>PM:</strong> Visit Arctic ground squirrel colony (Brian Barnes)</td>
<td>Daanen, R. P., G. Grosse, M. M. Darrow, T. D. Hamilton, and B. M. Jones. 2012. Rapid movement of frozen debris-lobes: implications for permafrost degradation and slope</td>
</tr>
<tr>
<td>Date</td>
<td>Location</td>
<td>Activities</td>
<td>References</td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 19-Jun | Galbraith Lake                | Breakfast: in Galbraith Lake tent camp  
**AM**: Overview of releve sampling along Galbraith Creek  
**PM**: Atigun Gorge hike  
| 20-Jun | Galbraith Lake                | Breakfast: in Galbraith Lake tent camp  
**AM**: Overview of research at TFS talk ([Donie Bret-Harte](#)); plant collections, journals.  
**Lunch**: Summit of Atigun Pass.  
**PM**: South slope of Atigun Pass  
| 21-Jun | Galbraith Lake                | Breakfast: in Galbraith Lake tent camp  
**AM and PM**: Hike to Grizzly Glacier. High Alpine Environments and vegetation in the vicinity of Grizzly Glacier. All day hike.  
**Lunch**: Grizzly Glacier  
| 22-Jun | Toolik Lake vicinity          | Breakfast at Galbrah Lake.  
**AM and PM**: Overview of research at TFS talk ([Donie Bret-Harte](#)); plant collections, journals.  
| 23-Jun | Toolik Lake-Happy Valley      | Breakfast at TFS.  
**AM**: Innuvait Creek, Drive to Happy Valley. Visit poplar stand on Sag River.  
**Lunch**: Sack lunch from TFS  
**PM**: Drive to Happy Valley, Catch up on readings, plant collections & projects  
| 24-Jun | Happy Valley                 | Breakfast at Happy Valley tent camp  
**AM**: Orientation to Foothills landscapes and vegetation, vegetation sampling near HV camp  
**PM**: Work on readings, plant collections and projects  
**Dinner and night**: Happy Valley tent camp |  |
<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Activity</th>
<th>Reading</th>
</tr>
</thead>
</table>
| 25-Jun | Happy Valley –   | Breakfast at Happy Valley tent camp  
**AM:** Drive to Sag R. camp, stops at Sagwon, Gyrfalcon nest  
Orientation to Coastal Plain landscapes and riparian vegetation of the Sagavanirktok River  
**PM:** Work on class notes, plant collections, projects  
|       | Sagavanirktok    |                                                                                                   |                                                                                             |
|       | River – Sagwon    |                                                                                                   |                                                                                             |
| 26-Jun | Sag River or     | Breakfast at Sag River or Happy Valley tent camp  
**AM:** Hike to Percy Pingo  
**PM:** Discussion of pingos and floristics of pingos, return to Happy Valley or Sag R. camp  
**Dinner and night:** Happy Valley or Sag River camp | [Walker, M.D. 1990 Vegetation and floristics of pingos, Central Arctic Coastal Plain, Alaska vol 149 (Stuttgart, Germany: J. Cramer). Selected readings. Assign different chapters to different students.](#) |
|       | Happy Valley     |                                                                                                   |                                                                                             |
| 27-Jun | Sagavanirktok    | Breakfast: Prudhoe Bay Hotel  
**All day** field trip in Prudhoe Bay oil field *(Kyla Choquette, and Tom Barrett)*  
**Dinner:** Prudhoe Bay  
|       | River-Prudhoe     |                                                                                                   |                                                                                             |
|       | Bay-Sag River     |                                                                                                   |                                                                                             |
| 28-Jun | Sag River to     | Breakfast: Sag River or Happy Valley tent camp  
**AM:** Drive to Coldfoot. Impacts of Dalton Highway. Stops at Sukakpak Mtn, and Frozen Debris Lobes.  
**Lunch:** Coldfoot Truck Stop  
**PM:** Drive to Fairbanks.  
|       | Fairbanks         |                                                                                                   |                                                                                             |
| 29-Jun | Fairbanks         | Breakfast: Dorm room or other.  
**All day:** Preparation for final presentations.  
**Dinner:** On own or BBQ  
**Night:** Dorms in Fairbanks. | None                                                                                         |
| 30 Jun | Fairbanks         | Breakfast: Dorm room or other.  
**All day:** Final presentations and course wrap up.  
**Dinner:** Celebration at local restaurant  
**Night:** Dorms in Fairbanks. | None                                                                                         |
| 1 Jul  | Depart            |                                                                                                   |                                                                                             |
9. Course policies

**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](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.

10. Evaluation:

**Summary of grading points:**

**Undergraduate student grading (BIOL 495 students):**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attendance and participation lectures, field trips, and discussions:</td>
<td>200 pts</td>
</tr>
<tr>
<td>Field notebooks and plant collections</td>
<td>200</td>
</tr>
<tr>
<td>Oral presentation of research topic</td>
<td>200</td>
</tr>
<tr>
<td>TOTAL</td>
<td>600 pts</td>
</tr>
</tbody>
</table>

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.

11. 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.

12. Disability Services:

UAF is obligated to provide accommodation only to the known limitations of an otherwise qualified student who has a disability. Please identify yourself to UAF Disability Services by applying for accommodations. To be considered for UAF Disability Services accommodations individuals must be enrolled for at least one credit as a UAF student. For more information send Disability Services an e-mail at uaf-disabilityservices@alaska.edu by phone at (907)474-5655, or by TTY at (907)474-1827.

13. Discrimination policy:

University of Alaska Board of Regents have clearly stated in BOR Policy that discrimination, harassment and violence will not be tolerated on any campus of the University of Alaska. If you believe you are experiencing discrimination or any form of harassment including sexual harassment/misconduct/assault, you are encouraged to report that behavior. If you disclose sexual harassment or
sexual violence to a faculty member or any university employee, they must notify the UAF Title IX Coordinator about the basic facts of the incident. Your choices for disclosure include:

1) You may confidentially disclose and access confidential counseling by contacting the UAF Health & Counseling Center at 474-7043
2) You may access support and file a Title IX report by contacting the UAF Title IX Coordinator at 474-7599
3) You may file a criminal complaint by contacting the University Police Department at 474-7721.
Course Library (2018)

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
PLANTS


SOILS AND PERMAFROST


