Syllabus for 2018 UAF Summer Sessions Special Topic course,  
BIOL 695, Arctic Alaska Vegetation  
14 Jun – 30 Jun 2018

1. Course information  
Title: Special Topic, Arctic Alaska Vegetation  
Number: BIOL 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 F695_ 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 F495(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 graduate students
Undergraduate and graduate 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
toposequences, 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, Innnavait Creek, and other sites along the Dalton
Highway.

In addition, graduate students should achieve the following:

a) Application of the knowledge gained from the course to a topic appropriate to their graduate student studies.
b) More in depth knowledge of the literature discussed during the course.
c) Ability to collect plants in a manner appropriate for herbarium collections.

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.
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:
All 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.

In addition, graduate students will also write a 10-15 page research paper focused on some aspect of observations during the course, which will be due 15 Jul 2018.

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>
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<tbody>
<tr>
<td>13 Jun</td>
<td>Fairbanks, Hess commons</td>
<td>Arrival, check into dorm</td>
<td>None</td>
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<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. Night: 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>
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<tr>
<td>16 Jun</td>
<td>Meet at Fairbanks Arctic Health Bldg. West</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 Dinner: at Coldfoot truck stop.</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>
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<tr>
<td>Date</td>
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<td>18-Jun</td>
<td>Coldfoot to Galbraith Lake</td>
<td>Breakfast in Coldfoot tent camp. AM: Drive to Galbraith Lake, with stops at frozen debris lobes, Sukakpak Mtn, Atigun Pass PM: Visit Arctic ground squirrel colony (Brian Barnes) Dinner: Cook camp dinner. Night: Tent camp at Galbraith Lake.</td>
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<tr>
<td>19-Jun</td>
<td>Galbraith Lake</td>
<td>Breakfast: in Galbrah Lake tent camp AM: Overview of releve sampling along Galbraith Creek PM: Atigun Gorge hike Dinner and night: Tent camp at Galbraith Lake.</td>
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<tr>
<td>21-Jun</td>
<td>Galbraith Lake</td>
<td>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 Dinner and night: Galbraith Lake</td>
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**Marshall, R. 1991 (reprint).** *Arctic Village: A 1930s Portrait of Wiseman, Alaska*, University of Alaska Press, Fairbanks, p. 3-44


<table>
<thead>
<tr>
<th>Date</th>
<th>Location</th>
<th>Breakfast</th>
<th>AM and PM</th>
<th>PM</th>
<th>Lunch</th>
<th>Dinner and night</th>
<th>Notes</th>
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<tbody>
<tr>
<td>24-Jun</td>
<td>Happy Valley</td>
<td>Breakfast at Happy Valley tent camp</td>
<td><strong>AM</strong>: Orientation to Foothills landscapes and vegetation, vegetation sampling near HV camp</td>
<td><strong>PM</strong>: Work on readings, plant collections and projects</td>
<td><strong>Dinner and night</strong>: Happy Valley tent camp</td>
<td></td>
<td>Shur, Y. L. and M. T. Jorgenson. 2007. Patterns of permafrost formation and degradation in relation to climate and ecosystems. Permafrost and Periglacial Processes 18:7–19.</td>
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<td>26-Jun</td>
<td>Sag River or Happy Valley</td>
<td>Breakfast at Sag River or Happy Valley tent camp</td>
<td><strong>AM</strong>: Hike to Percy Pingo</td>
<td><strong>PM</strong>: Discussion of pingos and floristics of pingos, return to Happy Valley or Sag R. camp</td>
<td><strong>Dinner and night</strong>: Happy Valley or Sag River camp</td>
<td></td>
<td>Walker, M.D. 1990 <em>Vegetation and floristics of pingos, Central Arctic Coastal Plain, Alaska</em> vol 149 (Stuttgart, Germany: J. Cramer). Selected readings. Assign different chapters to different students.</td>
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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:

**Graduate student grading (BIOL 695 students):**

- Attendance and participation in discussions: 200 pts
- Field notebooks and plant collections: 300
- Oral presentation of research topic: 200
- Final research paper: 200
- TOTAL: 900 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 students have the following requirements that go beyond the requirements for undergraduate students:
1. Graduate students will meet regularly as a group with one of the instructors to discuss the reading material and course content at a level specific to their thesis interests and graduate school requirements.
2. Their participation in course reading discussions will be as leaders of the discussions.
3. Their field notes and plant collections should be at a level that is appropriate for field researchers and herbarium collections, including descriptions of habitat and notation of plant community where the species are found,
4. They are required to produce 10-15 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 15 Jul 2018. Students should arrange for an incomplete grade if they cannot meet this deadline.

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 email 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


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


