This revision received 2/21/2012. 29-UNC / 13-GNC Stacked course

FORMAT 1

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).

See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/ for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	**Biology and Wildlife**	**College/School**	**CNSM**
Prepared by	**Donald A. Walker**	**Phone**	**X2460**
Email Contact	**dawalker@alaska.edu**	**Faculty Contact**	**Donald A. Walker**

1. ACTION DESIRED (CHECK ONE):	Trial Course		New Course	**X**	
2. COURSE IDENTIFICATION:	Dept	**BIOL**	Course #	**4__ / 6__**	No. of Credits **3**

Justify upper/lower division status & number of credits:

Justification for upper division: The Arctic Vegetation Ecology: Geobotany course will include detailed background and literature study of Arctic plant communities including their composition, structure, paleo-history, major environmental controls, applications of Arctic vegetation methods to current Arctic issues such as climate change, wildlife management, and changing land-use in the Arctic. It will also provide an in depth look at winter vegetation ecology and hands-on introduction of arctic vascular plants, mosses, and lichen. The course requires a solid foundation in basic biology (Biol 115 & 116) and either Introduction to Plant Biology (BIOL 239), Principles of Ecology (BIOL 271).

Justification for graduate 600 stacking: Graduate students will be expected to accomplish a greater depth of research than expected of the undergraduates. This will be demonstrated in three ways: 1) Graduate students will lead the literature discussions, each graduate student will present an in depth oral summary of the given paper to the rest of the class. Presenters are expected to bring other relevant literature to bear on the topic. These overviews should focus on the principal points of the paper and major concepts and should be presented as if in a national conference. 2) Graduate students will also act as session chairs during the literature discussions. They will introduce each speaker, ask for questions and input from the rest of the class, and keep the discussion on time. The expectation is to act as a session chair would at a conference. 3) Each graduate student will write a 2000-3000 research paper that demonstrates an in-depth knowledge of the literature related to the topic. 2) They will also deliver an oral presentation of this material.

Justification for 3 credit hours: This course consists of the following parts:
Lectures: 10 1.5-hr lectures on Arctic ecosystems (see course syllabus): = 15 hours (= 900 minutes lecture)
Winter ecology field trip: 3-day field trip to Eagle Summit including about 4 hours of lecture (= 240 minutes of lecture, 480 minutes practicum).
Plant identification: 7 45 minute lectures (= 315 minutes) lecture, 9 45-minute labs (= 405 minutes) lab.
TOTAL about 1455 minutes of lecture, 480 minutes of field practicum, and 405 minutes of lab.

3. PROPOSED COURSE TITLE:	**Arctic Vegetation Ecology: Geobotany**

4. To be CROSS LISTED? *YES/NO*	**No**	If yes, Dept:		Course #	

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. *To be STACKED?* *YES/NO*	**Yes**	If yes, Dept.	**BIOL**	**Course #**	**6__**

6. *FREQUENCY OF OFFERING:*	**Spring**
	Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. *SEMESTER & YEAR OF FIRST OFFERING* (AY2011-12 if approved by 3/1/2012; otherwise AY2012-13)	**Spring AY2013, even numbered years thereafter**

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)		*1*		*2*		*3*		*4*		*5*	X	*6 weeks to full semester*
OTHER FORMAT (specify)												
Mode of delivery (specify lecture, field trips, labs, etc)	**3-credit-hour lecture course, with lectures and 1 field trip**											

9. CONTACT HOURS PER WEEK:	**See below**	LECTURE hours/weeks	**9**	LAB hours total	**480**	PRACTICUM hours total

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing-/ for more information on number of credits.

OTHER HOURS (specify type)	**Lectures: 10 1.5-hr lectures on Arctic ecosystems (see course syllabus): = 15 hours (= 900 minutes lecture)** **Winter ecology field trip: 3-day field trip to Eagle Summit including about 4 hours of lecture (= 240 minutes of lecture, 480 minutes practicum).** **Plant identification: 7 45 minute lectures (= 315 minutes lecture), 9 45-minute labs (= 405 minutes lab).** **TOTAL about 1455 minutes of lecture, 480 minutes of field practicum, and 405 minutes of lab.**

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

BIOL F4__ Arctic Vegetation Ecology: Geobotany
3 Credits Offered Spring even numbered years
Arctic plants in relationship to the Earth, including arctic plant identification, climate, geology and geography controls on arctic plant communities, snow ecology, applications to wildlife studies and current Arctic issues. Lectures, discussion sessions, labs, and 1 winter field trip. Prerequisites: BIOL 115 and 116 or equivalent; BIOL 239 or BIOL 271; or approval of instructor. Special fees apply. Stacked with BIOL F6__ (2 + 0.5 + 0.5).

To be offered in Spring 2013 and even numbered years thereafter.

11. COURSE CLASSIFICATIONS: Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities		S = Social Sciences	

Will this course be used to fulfill a requirement for the baccalaureate core? **If YES, attach form**.	**YES:**		**NO:**	**X**

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, **Format 6**		W = Writing Intensive, **Format 7**		Natural Science, **Format 8**	

12. COURSE REPEATABILITY:

Is this course repeatable for credit?	YES		NO	X

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).	

How many times may the course be repeated for credit?	0	TIMES
If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course?		CREDITS
If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?		CREDITS

13. GRADING SYSTEM: *Specify only one. Note: Later changing the grading system for a course constitutes a Major Course Change.*

LETTER:	X	PASS/FAIL:	

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES	BIOL 115 and 116 or equivalent; BIOL 239 or BIOL 271; or approval of instructor

These will be *required* before the student is allowed to enroll in the course.

15. SPECIAL RESTRICTIONS, CONDITIONS	

16. PROPOSED COURSE FEES	$ 100	
Has a memo been submitted through your dean to the Provost for fee approval? Yes/No		Yes
Fee is to pay for i-button temperature loggers, required for examining winter subnivian		

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? Yes/No	Yes
If yes, give semester, year, course #, etc.:	Spring 2012, BIOL 492/692, Arctic Vegetation Ecology: Lecture

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

The main part of the course will require a lecture room with Powerpoint projector facilities.

The plant identification portion of the lab will require lab space with abundant table or bench space to arrange about 30-50 herbarium collections at a time with dissecting scopes to examine the collections. I would prefer to have this component conducted in the Museum Herbarium to minimize the need to transport herbarium collections to and from Irving.

I would like to have a few hours (approximately 15 hours) of undergraduate assistant help with this portion of the course because it is time-consuming to gather the specimens from the herbarium collections and return them at the end of the course.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No	X	Yes		The course will not require extensive library use except for student term

20. IMPACTS ON PROGRAMS/DEPTS

What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)

Only the BIOL Dept and the Museum should be impacted. Steffi Ickert-Bond and the Museum director,

Carol Diebel have been contacted (email: September 1, 2011).

21. POSITIVE AND NEGATIVE IMPACTS

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

Positive impacts:

1) **A much needed course in Arctic vegetation using an interdisciplinary geobotanical approach in the lectures and field. Increasingly needed for multi-disciplinary academic approaches to study, understand, manage, and preserve complex and changing Earth systems.**
2) **Field training in winter ecology, which has traditionally been missing.**
3) **An introduction to Arctic vegetation science. This is particularly needed for students in Alaska, many of which will be hired by government and non-government agencies to describe and manage the natural resources of the state. The courses are organized around my primary expertise and over 40-years experience working in Arctic ecosystems.**

Negative impacts:

None known.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

The course will provide a much-needed focus on Arctic Ecosystems and global Arctic tundra vegetation. The lectures provide broad interdisciplinary approach to understanding the environmental controls of Arctic vegetation. This is important background for students who seek jobs in managing Alaska natural resources and also those interested in impacts of land-use changes and climate change on Arctic systems.

During the plant identification component, students will become familiar with a wide variety of vascular plant species, mosses and lichens and plant family characteristics in the herbarium. If they chose to the take the Arctic Vegetation Ecology: Field Excursion in the summer, the plant identification will provide a solid background for vegetation sampling, where students otherwise often come with poor knowledge of the local flora.

The course will be offered in 2013, and 2014, and in even-numbered years thereafter.

APPROVALS: Add additional signature lines as needed. See attached signatures.

	Date	
Signature, Chair, Program/Department of:		
	Date	
Signature, Chair, College/School Curriculum Council for:		
	Date	
Signature, Dean, College/School of:		
	Date	
Signature of Provost (if applicable)		

Offerings above the level of approved programs must be approved in advance by the Provost.

REFER TO PAGE ABOVE FOR LATEST EDITS TO #21 and Justification blocks.

21. *POSITIVE AND NEGATIVE IMPACTS*

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

This lecture course is part of 3-course curriculum for arctic vegetation science (see cover letter). These courses are much needed. Previously only one 2-hour course was offered in Vegetation Description and Analysis (BIOL 475). A much needed aspect of training students in vegetation science is extensive field experience. Getting students out and observing the plants and vegetation patterns in Nature cannot be done in the classroom, but excursions are often difficult to do in Alaska during the regular academic year. The new Arctic Plants and Vegetation Ecology courses I am offering includes a spring LECTURE component and an EXCURSION component, which is offered in early summer. This is particularly needed for students in Alaska, many of which will be hired by government and non-government agencies to describe and manage the natural resources of the state. It is also increasingly needed for multi-disciplinary academic approaches to study, understand, manage, and preserve complex and changing Earth systems. The courses are organized around my primary expertise and over 40-years experience working in Arctic ecosystems.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

This course is Lecture part of the 2-course Arctic Plants and Vegetation Ecology package proposed for spring semester 2014.

The course will provide a much-needed focus on Arctic Ecosystems and global Arctic tundra vegetation. The lectures provide broad interdisciplinary approach to understanding the environmental controls of Arctic vegetation. This is important background for students who seek jobs in managing Alaska natural resources and also those interested in impacts of land-use changes and climate change on Arctic systems.

During the plant identification component, students will become familiar with a wide variety of vascular plant species, mosses and lichens and plant family characteristics in the herbarium. If they chose to the take the Excursion course, the plant identification will provide a solid background for vegetation sampling, where students otherwise often come with poor knowledge of the local flora.

The course is the lecture component of a 2-course package. A 2-credit excursion course is offered separately. (See accompanying New Course Proposal for Arctic Plants and Vegetation Ecology: Excursion.) The Lecture component will be offered in 2013, and 2014, and in even-numbered years thereafter. Students can take either the LECTURE or EXCURSION or both courses (preferred option).

APPROVALS: Add additional signature lines as needed.

	Signature, Chair, Program/Department of:	Date	Oct 3, 2011
	Signature, Chair, College/School Curriculum Council for:	Date	10/4/2011
Paul W Layer	Signature, Dean, College/School of: CNSM	Date	Oct 5, 2011
	Signature of Provost (if applicable)	Date	

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	

Signature, Chair
Faculty Senate Review Committee: ___Curriculum Review ___GAAC

___Core Review ___SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date	

Signature, Chair, Program/Department of:

	Date	

Signature, Chair, College/School Curriculum Council for:

	Date	

Signature, Dean, College/School of:

ATTACH COMPLETE SYLLABUS (as part of this application). Note: The guidelines are online:
http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/uaf-syllabus-requirements/
The Faculty Senate curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missi
or unclear, the proposed course (or changes to it) may be denied.

SYLLABUS CHECKLIST FOR ALL UAF COURSES

During the first week of class, instructors will distribute a course syllabus. Although modifications may be made throughout the semester, this document will contain the following information (as applicable to the discipline):

1. Course information:

❑Title, ❑ number, ❑credits, ❑prerequisites, ❑ location, ❑ meeting time
(make sure that contact hours are in line with credits).

2. Instructor (and if applicable, Teaching Assistant) information:

❑ Name, ❑ office location, ❑ office hours, ❑ telephone, ❑ email address.

3. Course readings/materials:

❑ Course textbook title, ❑ author, ❑ edition/publisher.
❑ Supplementary readings (indicate whether ❑ required or ❑ recommended) and
❑ any supplies required.

4. Course description:

❑ Content of the course and how it fits into the broader curriculum;
❑ Expected proficiencies required to undertake the course, if applicable.
❑ Inclusion of catalog description is *strongly* recommended, and
❑ Description in syllabus must be consistent with catalog course description.

5. ❑ Course Goals (general), and (see #6)

6. ❑ Student Learning Outcomes (more specific)

7. Instructional methods:

❑ Describe the teaching techniques (eg: lecture, case study, small group discussion, private instruction, studio instruction, values clarification, games, journal writing, use of Blackboard, audio/video conferencing, etc.).

8. Course calendar:

❑ A schedule of class topics and assignments must be included. Be specific so that it is clear that the instructor has thought this through and will not be making it up on the fly (e.g. it is not adequate to say "lab". Instead, give each lab a title that describes its content). You may call the outline Tentative or Work in Progress to allow for modifications during the semester.

9. Course policies:

❑ Specify course rules, including your policies on attendance, tardiness, class participation, make-up exams, and plagiarism/academic integrity.

10. Evaluation:

❑ Specify how students will be evaluated, ❑ what factors will be included, ❑ their relative value, and ❑ how they will be tabulated into grades (on a curve, absolute scores, etc.) ❑ Publicize UAF regulations with regard to the grades of "C" and below as applicable to this course. (Not required in the syllabus, but may be a convenient way to publicize this.) Faculty Senate Meeting #171:
http://www.uaf.edu/uafgov/faculty-senate/meetings/2010-2011-meetings/#171

11. Support Services:

❑ Describe the student support services such as tutoring (local and/or regional) appropriate for the course.

12. Disabilities Services:

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials.

❑ State that you will work with the Office of Disabilities Services (208 WHITAKER BLDG, 474-5655)to provide reasonable accommodation to students with disabilities.

Revised syllabus received 2/21/2012.

Preliminary Syllabus for NEW COURSE, BIOL 4__ / 6__, Arctic Vegetation Ecology: Geobotany Spring 2013

1. Course information

Title: Arctic Vegetation Ecology: Geobotany
Number: BIOL 4__ / 6__
Credits: 3
Prerequisites: BIOL 115 & 116, Introduction to Plant Biology (BIOL 239) or Principles of Ecology (BIOL 271) or instructor approval
Location: 201 Irving I
Meeting time: T/Th, 2:00-3:30 pm

2. Instructor and contact information

Prof. D.A. (Skip) Walker, Alaska Geobotany Center, University of Alaska Fairbanks, Arctic Health Building, Room 254, 474- 2460, dawalker@alaska.edu. Office hours: T, Th 9:00-11:00 and 3:30-5:00 pm.

3. Course readings /materials

Numerous papers will be read and are in the assignments listed in the course calendar and will be posted on line at http://www.geobotany.uaf.edu. These three references provide a good overview of the Arctic Vegetation in North America and Russia and the current issues relevant to Arctic vegetation.

1. Bliss, L.C. 1997. Arctic Ecosystems of North America. Polar and Alpine Tundra. Elsevier. Amsterdam. pp. 551-683.
2. Callaghan, T.V., Bjorn, L.O., Chapin III, F.S., et al. 2005. Chapter 7, Arctic tundra and polar desert ecosystems. Arctic Climate Impact Assessment - Scientific Report. Cambridge University Press. Cambridge. pp. 243-352.
3. Chernov, Y.I., Matveyeva, N.V. 1997. Arctic ecosystems in Russia. Polar and Alpine Tundra. Elvesier. Amsterdam.3 pp. 361-507.

Required supplies:
10x-power hand lens for field identification of snow grains and plant specimens.
8.5 x 11-inch notebook or field book for field reference collection and methods notes.
Back country skis or snow shoes with appropriate boots and poles,
Clothing adequate for spending a full day outdoors during winter conducting field work. (including day pack, rain gear (top & bottom, necessary for digging qinzhee), warm winter clothing, including long underwear, sweater, boots, parka, warm ski cap, gloves, sun glasses, sun protection).
Sleeping bag and pad.
Water bottle, sack lunches
A full list of equipment and expectations for the field trip will be provided well before the field trip.

4. Course description

Course catalog description:
BIOL F4__ Arctic Vegetation Ecology: Geobotany
3 Credits Offered Spring
Arctic plants in relationship to the Earth, including arctic plant identification, climate, geology and geography controls on arctic plant communities, snow ecology, applications to wildlife studies and current Arctic issues. Lectures, discussion sessions, labs, and 1 winter field trip. Prerequisites: BIOL 115 and 116 or equivalent; BIOL 239 or BIOL 271; or approval of instructor. Special fees apply. Stacked with BIOL F6__ (2 + 0.5 + 0.5). Spring 2013 and even numbered years thereafter.

Expected proficiencies for taking the course: Ability to read, comprehend, and assimilate written information in scientific texts and journals; basic math skills (including algebra); basic word processing and spreadsheets; basic writing and presentation skills, background in biology, ecology, and plants and/or other biological or Earth sciences such as geology, geomorphology, zoology, climatology and remote sensing.

More detailed description: This course consists of four major parts:

1. **Lectures:** Thirteen lectures. This portion will examine the tundra plant communities and ecology of Arctic tundra. The emphasis will be on Arctic Geobotany, i.e. the relationship of arctic plants and vegetation to the Earth. The focus will be on the factors controlling vegetation patterns, including climate, permafrost, geomorphology, soils, animals, zonation, paleogeography, plant communities, floristics, plant adaptations, and succession patterns. A final exam will cover the material in the lectures.
2. **Snow Ecology component:** Two lectures plus a 3-day spring field excursion to examine the taiga and tundra systems in winter conditions. The focus will be on snow as a habitat. Activities will include describing snow profiles, observing snow and snow-free habitats and their use by animals in winter, identifying plants in their winter conditions, examining subnivian environments and the effects of topography and snow distribution patterns on plant-habitat distribution. Students will keep a field book of their observations. A list of required equipment, including outdoor clothing, sleeping bags, pads and other items will be provided prior to the field trip. The trip will not be cancelled because of bad weather unless the roads are impassable. In such case, local day trips will be arranged in the UAF North Campus Lands. Students will be graded on their attendance, snow descriptions and their field notebooks.
3. **Arctic plant identification component:** Seven labs. Students will learn 160 of the most common Arctic species in Alaska, including trees, shrubs, dwarf shrubs, grasses, sedges, rushes, bryophytes, and lichens. Students will be tested over their ability to identify these species.
4. **Oral and written (graduate students only) presentations of research topics:** Presentations of in-depth literature review on Arctic Vegetation topic of choice.

5. Course goals and student learning outcomes:

General coarse goals: Provide students with an in-depth knowledge of Arctic vegetation from a geobotanical perspective, knowledge of the relevance of Arctic vegetation to

Alaskan climate- and land-use change issues, an introduction to snow ecology, and knowledge of a core set of common Arctic Alaskan plants.

Student outcomes: (1) Students will gain an understanding of the relationships of arctic plants and vegetation to climate, permafrost, geomorphology, soils, and animals, and the role of these systems in climate change and land-use change issues affecting Alaska. (2) During the snow-ecology portion of the course they will gain an in-depth understanding of the physical, chemical and biological properties of snow cover. They will learn to describe snow profiles, identify plants in winter, keep field notebooks for their field observations, and learn modern approaches of snow ecological research. (3) Students will learn to identify a foundation set of 160 Arctic plant species that will allow them to better undertake vegetation sampling and understand wildlife habitat. (4) All students will gain experience giving oral presentations regarding Arctic-vegetation topics of their choice. (5) Graduate students will gain experience in writing and giving oral reviews of the key literature regarding Arctic vegetation and summarizing and presenting material in a conference format.

6. Instructional method:

Lectures:

This portion is a series of lectures that will examine the Arctic tundra. Generally, two lectures will address a topic, followed by a class period that will be devoted to literature that addresses the topic. The emphasis of the lectures will be on the factors controlling vegetation patterns, including climate, permafrost, geomorphology, soils, animals, zonation, paleogeography, biogeographic history, plant adaptations, and succession patterns, effects of climate and land-use change. Students are expected to attend the lectures and read the assigned literature. Attendance will be recorded. There will be a final exam worth 200 points over the lecture material and the readings.

Literature discussion sessions:

Following the lecture(s) on a specific topic, students will read and discuss literature related to the topic during 4-5 literature discussion sessions. Students will be divided into two discussion groups that students will stay in for the rest of the semester. Students in each group will be responsible for reading the assigned paper for their group and actively participating in the discussion. The structure of these discussion sessions will be as follows:

1. Each session will be led by a designated **graduate student moderator** who will be responsible knowing the material covered by both papers, introduce the main speakers, ask for questions and input from the rest of the class, and keep the discussion on time. The moderator is expected to act as a session chair would at a conference. Credit will be given for this service.
2. Two designated **graduate student presenters** will present **20-minute summaries** of the assigned papers. These presentations can include slides of key figures and major discussion points. Presenters are expected to bring other literature to bear on the topic. These overviews should focus on the principal points of the paper and major concepts and should be presented as if in a national conference. Other members of the discussion group for that paper will add other points that they feel

are important. **Total time for each paper discussion is 30 minutes.** Both discussion groups in total should take 60 minutes to present the two papers.

3. At the end a general discussion, the entire class will compare and contrast the two papers and discuss their contribution to the literature on the topic.
4. Students making the presentation will be graded on criteria that will be handed out early in the semester. All students will be graded on their full participation in the presentations and discussions.

Oral and written presentation of research topics:

At the end of the lecture series (Lesson 23-29), each student will present a 30-minute oral summary of a library research topics of the student's choice — as long as the topics involve Arctic vegetation ecology. Guidelines for these presentations will be handed out early in the semester. Graduate students will be expected to also turn in a 2000-3000-word paper on an Arctic Vegetation topic of their choice at the end of the course. This paper can (but not necessarily) cover the same topic as the oral presentation.

Snow Ecology field trip:

A 3-day mandatory field excursion will occur the first weekend of spring break. Students should plan in advance to attend. We will visit a variety of sites with different snow regimes, examine the vegetation beneath the snow and on exposed sites, record subnivian temperatures, and examine evidence of winter animal use in the various habitats. The field trip will be to an area with a high concentration of wildlife so students can observe winter use of plant communities by animals. Students will receive credit for attendance at during the three days of the field trip, and will be graded on their field notebooks, and field descriptions of snow pits.

Plant identification component:

Plant identification will be conducted in the Museum classroom (Room ?). Students will work with herbarium specimens and literature sources to learn to identify about 160 common Arctic Alaska plants. Students are expected to read information on plant family characteristics. The final test will cover identification of about of 75 selected plants and key plant characteristics.

7. Course Schedule and Assignments:

Lesson	Dates (to be adjusted for 2013)	Topic	Reading assignment (available online at the course web site http://www.geobotany.uaf.edu/):
1	**Jan 19**	**Introduction**	
2-3	**Jan 24, 26**	**Lectures 1-2:** Overview of Arctic Ecosystems: The role of climate and topography	Callaghan, T.V., Bjorn, L.O., Chapin III, F.S., et al. 2005. Chapter 7, Arctic tundra and polar desert ecosystems. Arctic Climate Impact Assessment - Scientific Report. Cambridge University Press. Cambridge. pp. 243-352. **This is an excellent summary of the current state of knowledge of Arctic terrestrial ecosystems. Use as a standard reference, skim it now, begin reading and complete by Mar 1, Lesson 12.**
4	**Jan 31**	**Literature discussions 1**	**Discussion group 1:** Bliss, L.C. 1997. Arctic Ecosystems of North America. Polar and Alpine Tundra. Elsevier. Amsterdam. pp. 551-683. **Focus on p. 551-568.** **Discussion group 2:** Chernov, Y.I., Matveyeva, N.V. 1997. Arctic ecosystems in Russia. Polar and Alpine Tundra. Elvesier. Amsterdam.3 pp. 361-507. **Focus on p. 361-387.** **Everyone skim both chapters. Both are long but excellent summaries for North America and Russia. Speakers should present overview of their respective chapters, but focus on the specified pages. Be prepared to discuss similarities and differences between the chapters. Why do you think the Russian and American approaches are so different?**
5-6	**Feb 2, 7**	**Lectures 3 and 4:** The role of soils: pH, texture, moisture, loess ecosystems and the Mammoth Steppe	Walker, D.A., Everett, K.R. 1991. Loess ecosystems of northern Alaska: regional gradient and toposequence at Prudhoe Bay. Ecological Monographs. 61:(4): 437-464. Walker, D.A., Bockheim, J.G., Chapin, F.S., III, et al. 2001. Calcium-rich tundra, wildlife, and "the Mammoth Steppe". Quaternary Science Reviews. 20:149-163. Walker, D.A., Auerbach, N.A., Bockheim, J.G., et al. 1998. Energy and trace-gas fluxes across a soil pH boundary in the Arctic. Nature. 394:469-472.

7	**Feb 9**	**Literature discussions 2**	**Paper 1:** Guthrie, R.D. Mammals of the mammoth steppe as paleoenvironmental indicators. In: Hopkins et al. 1987. *Paleoecology of Beringia,* New York: Academic Press, p. 307-326. **Paper 2:** Guthrie, R.D. 2001. Origin and causes of the mammoth steppe: a story of cloud cover, wooly mammal tooth pits, buckles, and inside-out Beringia. *Quaternary Science Reviews* 20: 549-574. **Speaker 1 focus on Guthrie's presentation of the Pleistocene vegetation environment of Beringia and how this affected the animal distributions.** **Speaker 2 focus on recent information that has changed our picture of Beringia.**
8-9	**Feb 14, 16**	**Lectures 5 and 6:** The role of permafrost, biocomplexity of small patterned-ground features	Walker, D.A., Epstein, H.E., Romanovsky, V.E., et al. 2008. Arctic patterned-ground ecosystems: A synthesis of field studies and models along a North American Arctic Transect. Journal of Geophysical Research - Biogeosciences. 113:G03S01. Raynolds, M. K., D. A. Walker, C. A. Munger, C. M. Vonlanthen, and A. N. Kade (2008), A map analysis of patterned-ground along a North American Arctic Transect, *J. Geophys. Res*., 113, G03S03, doi:10.1029/2007JG000512. Walker, D.A., Kuss, P., Epstein, H.E., Kade, A.N., Vonlanthen, C.M., Raynolds, M.K. Daniels, F.J.A. 2011. Vegetation of zonal patterned-ground ecosystems along the North American Arctic Transect. *Applied Vegetation Science,* 14: 440-463.
10	**Feb 21**	**Literature discussions 3**	**Paper 1:** Davis, N. 2001. Chapter 3. When the ground freezes. In: *Permafrost: A Guide to Frozen Ground in Transition.* Fairbanks: University of Alaska Press, p. 15-99. **Paper 2:** Davis, N. 2001. Chapter 4. Land forms created by cryogenic action. In: *Permafrost: A Guide to Frozen Ground in Transition.* Fairbanks: University of Alaska Press, p. 101-200. **Speaker 1 should focus on presenting an overview of the key processes described in the formation of permafrost.** **Speaker 2 focus on describing how these processes form the permafrost landforms observed in Nature.**
11-12	**Feb 23, 28**	**Lectures 7 & 8:** Snow Ecology	Walker, D.A., J.G. Molenaar, and W.D. Billings. 2001. Snow-vegetation interactions in tundra environments. In: Jones, H.G., J. Pomeroy, D.A. Walker, and R. Hoham (eds.) *Snow Ecology*. Cambridge: Cambridge University Press, pp. 264-322. Borner, A.P., K. Kielland, and M.D. Walker. Effects of simulated climate change on plant phenology and

			nitrogen mineralization in Alaskan Arctic tundra. *Arctic, Antarctic, and Alpine Research,* 40: 27-38. Sturm, M., J. P. McFadden, G. E. Liston, F. S. Chapin, III, C. H. Racine, and J. Holmgren, 2001. Snow-shrub interactions in Arctic tundra: a hypothesis with climatic implications. *Journal of Climate,* **14**, 336-344.
13	**Mar 1**	**Literature Discussion 4**	**Discussion Group 1:** Pomeroy, J.W. and E. Brun. 2001. Physical properties of snow. In: Jones, H.G., J. Pomeroy, D.A. Walker, and R. Hoham (eds.) *Snow Ecology*. Cambridge: Cambridge University Press, pp. 45-117. And Sturm, M. et al. 2001. Snow-shrub interactions in Arctic tundra: a hypothesis with climatic implications. *Journal of Climate,* **14**, 336-344. **Discussion Group 2:** Tranter, M. and G. Jones. 2001. In: Jones, H.G., J. Pomeroy, D.A. Walker, and R. Hoham (eds.) *Snow Ecology*. Cambridge: Cambridge University Press, pp. 127--156. And Borner, A.P., K. Kielland, and M.D. Walker. Effects of simulated climate change on plant phenology and nitrogen mineralization in Alaskan Arctic tundra. *Arctic, Antarctic, and Alpine Research,* 40: 27-38.
	Mar 6 & 8	**No class. Field trip instead Mar 9-11.**	
14-16	**Mar 9-11**	***Spring Break field trip to Cantwell cabin*** ***Turn in field notebook and snow pit descriptions at end of field trip***	
17	**Mar 20**	**Lecture 9:** Arctic Vegetation Mapping	Raynolds, M.K., Walker, D.A., Maier, H.A. 2006. Alaska Arctic Tundra Vegetation Map. 1:4,000,000. U.S. Fish and Wildlife Service. Anchorage, AK. Walker, D.A., Maier, H.A. 2008. Vegetation in the Vicinity of the Toolik Lake Field Station, Alaska. Biological Papers of the University of Alaska, No. 28, Institute of Arctic Biology. Walker, D.A., Raynolds, M.K., Daniëls, F.J.A., et al. 2005. The Circumpolar Arctic Vegetation Map. Journal of Vegetation Science. 16:(3): 267-282.
18	**Mar 22**	**Lecture 10:** Climate change and circumpolar Arctic vegetation	Bhatt, U.S., Walker, D.A., Raynolds, M.K., et al. 2010. Circumpolar Arctic tundra vegetation change is linked to sea-ice decline. Earth Interactions. 14:(8):1-20.
19-21	**Mar 27, 29, Apr 3**	**Oral presentation of research topics**	**3 presentations each session**

22	**Apr 5,**	**Arctic plant identification Lab 1:** UAF Museum Room ?: Overview of plant morphology and dichotomous keys.	Review required tree and shrub species: Trees (6 species) and tall shrubs (4 species), and low shrubs (12 species). Read Web site links to family characteristics for Betulaceae, Salicaceae, Pinaceae
23	**Apr 10**	**Arctic plant identification Lab 2:** Dwarf shrubs	Review required dwarf shrub species (24 species). Read Web site links to family characteristics for Betulaceae, Salicaceae, Caprifoliaceae, Elaeagnaceae, Myricaeae, Rosaceae,
24	**Apr 12**	**Arctic plant identification Lab 3:** Grasses, sedges, rushes	Review required Grasses (11 species), sedges (11 species), rushes (5 species) Read Web site links to family characteristics for Poaceae, Cyperaceae, Juncaceae
25	**Apr 17, 19**	**Arctic plant identification Labs 4-5:** Common forbs	Review required Forbs (50 species) Read Web site links to family characteristics for Asteraceae (Compositae), Caryophyllaceae, Cruciferae, Fabaceae (Leguminosae), Liliaceae, Onagraceae, Polygonaceae, Ranunculaceae, Rosaceae, Saxifragaceae, Umbelliferae
26	**Apr 26**	**Arctic plant identification Lab 6:** Bryophytes	Review photos and descriptions of required Bryophyte species (14 mosses and 2 liverworts)
27	**May 1**	**Arctic plant identification Lab 7:** Lichens	Review photos and descriptions of required lichen species (22 species)
28	**May 3**	**Arctic Plant Identification Review**	
29-30	***May 7-10, Finals Week, Lecture and plant identification exam*** ***Graduate student papers due May 10***		

8. Course policies:

Academic integrity:

Anyone observed cheating on an examination will receive a "0" for that examination. Anyone found to have used someone else's work without crediting that person (plagiarizing) will receive a "0" for the assignment. When in doubt, always identify your sources. This applies to all material derived from the web. Please speak with me if you have any questions about how to properly use other people's work.
For additional detail, see

http://www.uaf.edu/library/instruction/handouts/Plagiarism.html

Attendance policy:
Students are expected to attend every class and lab and be seated at the beginning of the class. Student will receive 10 points for attendance at each lecture and each of the student oral presentation classes.

9. Evaluation:

Summary of grading points:

Undergraduate student grading (BIOL 4__ students):

Attendance at lectures and labs (10 pts/class, 30 classes)	300 pts
Oral presentation of research topic	200
Snow Ecology snow pit descriptions & field book	100
Final Lecture Exam	200
Final plant identification exam	200
TOTAL	1000 pts

Graduate student grading (BIOL 6__ students):

Attendance at lectures and labs (10 pts/class, 30 classes)	300 pts
Oral presentation of research topic	200
Snow Ecology snow pit descriptions & field book	100
Final plant identification exam	200
Final research paper	200
Lecture on literature review (discussion session)	100
Moderator for discussion session (50 pts)	50
TOTAL	1350 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.

Undergraduate student expectations and grading:

All students are expected to accomplish the following:

(a) Attend all lectures, literature discussion groups, labs and exams on time There will be no make-up for missed classes and half credit for late attendance. Good reasons for missing the classes will be accepted if cleared with the instructor before the class. (10 points for each for 30 sessions, 300 total points).

(b) Give a 30-minute oral presentation (including discussion) of a literature review of a topic of interest related to Arctic vegetation. Guidelines for the presentations and grading criteria for the presentations will be handed out early in the semester. (200 points).

(c) Attend the 3-day snow ecology field trip, describe 3 snow pits and keep field book of observations (100 points).

(d) Do the readings, study the on-line material including lecture slides and complete final lecture exam (200 points).

(e) Learn 160 Arctic plant species and take the exam (200 points).

Graduate student expectations and grading:

Graduate students will be graded according to the same criteria as the undergraduate students except for the following:

(f) Act as Moderator for at least one literature discussion sessions. This will involve thorough reading of the papers to actively lead the discussion and act as moderator for the session (50 points for each session).

(g) Present at least one paper during the literature discussion sessions. These presentations can include slides of key figures and major discussion points. Presenters are encouraged to also bring other literature to bear on the topic. These overviews should focus on the principal points of the paper and major concepts and should be presented as if in a national conference (100 points).

(h) Write a 2000-3000-word research paper on an Arctic Vegetation topic of your choice. This paper should have at least 10 literature citations and can include additional tables and figures. This can be the same topic as that of your oral presentation. Late papers will receive a deduction of 15 points of the 200 total for every day late and no credit beyond 3 days late. Students should arrange for an incomplete grade if they cannot meet this deadline (200 points).

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. AHRB, 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 (208 WHIT, 474-5655) to provide reasonable accommodation to students with disabilities. Any student needing special accommodation should talk with the instructor before the class or lab in question. These discussions will be held confidential.