

Course syllabus

Lectures M, W, F, 8-9 am, Irving Room 208

Notes:

¹ BBPGS = Barbour, M.G., J.H. Burk, W.D. Pitts, F.S. Gilliam, and M.W. Schwartz. 1999. *Terrestrial Plant Ecology*. Menlo Park: Addison Wesley Longman.

² Walter = Walter, H. 1979. *Vegetation of the Earth and Ecological Systems of the Geo-biosphere*. New York: Springer-Verlag.

Lesson	Date	Topics/Activities	Readings
1	20 Jan	Course overview, Introduction	BBPGS ¹ , Chap 1, pp. 1-12
2	23 Jan	A brief history of plant ecology	BBPGS, Chap 2, pp. 13-30
3	25 Jan	The species in the environmental complex	BBPGS, Chap 3, pp. 31- 56
4	27 Jan	Review and journal papers	<ul style="list-style-type: none"> • Cowles, H.C. 1899. The ecological relations of vegetation on the sand dunes of Lake Michigan. Part I. <i>Botanical Gazette</i>. Vol. 27 (excerpts: p. 95-97, p. 106-112, p. 194-198, p. 374-379, p. 382-388). • Billings, W. D., 1952: The environmental complex in relation to plant growth and distribution. <i>Quarterly Review of Biology</i>, 27: 251-265.
5	30 Jan	Population structure and plant demography	BBPGS, Chap 4, pp. 57-87
6	1 Feb	Allocation and life history patterns	BBPGS, Chap 5, pp. 88-118
7	3 Feb	Review and journal papers	<ul style="list-style-type: none"> • Mooney, H. A. and Billings, W. D., 1961: Comparative physiological ecology of arctic and alpine populations of <i>Oxyria digyna</i>. <i>Ecological Monographs</i>, 31: 1-29. • McGraw, J. B., 1985: Experimental ecology of <i>Dryas octopetala</i> ecotypes. III. Environmental factors and plant growth. <i>Arctic and Alpine Research</i>, 17(3): 229-239.
8	6 Feb	Species interactions: Competition and amensalism	BBPGS, Chap 6, pp. 118-148
9	8 Feb	Species interactions: Commensalism, mutualism, and herbivory	BBPGS, Chap 7, pp. 149-178
10	10 Feb	First Exam	
11	13 Feb	Community concepts and attributes	BBPGS, Chap 8, pp. 179-209
12	15 Feb	Methods of sampling the plant community	BBPGS, Chap 9, pp. 210-239
13	17 Feb	Review and Journal papers	<ul style="list-style-type: none"> • Tilman, D. 1985. The resource-ratio hypothesis. <i>The American Naturalist</i>, 125:

			827-852. <ul style="list-style-type: none"> Grime, J.P. 1977. Evidence for the existence of three primary strategies in plants and its relevance to ecological and evolutionary theory. <i>The American Naturalist</i>, 111: 1169-1194.
14	20 Feb	Methods of sampling the plant community II.	BBPGS , Chap. 9, p. 210-239
15	22 Feb	Classification of plant communities	BBPGS, Chap 10, p. 240-257
16	24 Feb	Review and Journal papers	<ul style="list-style-type: none"> Gleason, H.A. 1926. The individualistic concept of the plant association. <i>Bulletin of the Torrey Botanical Club</i>, 53: 7-26. Clements, F.E. 1928. Nature and structure of the climax. <i>Journal of Ecology</i>, 24: 253-284
17	27 Feb	Direct gradient analysis	<ul style="list-style-type: none"> BBPGS, Chap. 10, pp. 257-267
18	1 Mar	Indirect gradient analysis	<ul style="list-style-type: none"> BBPGS, Chap. 10, pp. 257-267
19	3 Mar	Review and Journal papers:	<ul style="list-style-type: none"> Bray, J.R. and J.T. Curtis. 1957. An ordination of the upland forest communities of southern Wisconsin. <i>Ecological Monographs</i>. 27: 326-348. Whittaker, R. H. and Neiring, W. A., 1968: Vegetation of the Santa Catalina Mountains, Arizona. IV. Limestone and acid soils. <i>Journal of Ecology</i>, 56: 523-544.
20	6 Mar	Succession	BBPGS, Chap 11, 268-302
21	8 Mar	Review and Journal papers	<ul style="list-style-type: none"> Van Cleve, K., and L. A. Viereck. 1981. Forest succession in relation to nutrient cycling in the boreal forest of Alaska. Pages 185-211 <u>in</u> D. C. West, H. H. Shugart, and D. B. Botkin, editors. <i>Forest succession, concepts and application</i>. Springer-Verlag, New York.. Walker, L.R., J.C. Zasada, and F.S. Chapin, III. 1986. The role of life history processes in primary succession on an Alaskan floodplain. <i>Ecology</i> 67: 1243-1253.
22	10 Feb	Second Exam	
SPRING BREAK			
23	20 Mar	Light and temperature	BBPGS, Chap 14, 375-410
24	22 Mar	Photosynthesis	BBPGS, Chap 15, pp. 411-440
25	24 Mar	Productivity	BBPGS, Chap 12, pp. 303-333
26	27 Mar	Skip Walker at NSF SASS meeting: No class	
27	29 Mar	Soil	BBPGS, Chap 17, pp. 473-500
28	31 Mar	Mineral cycling	BBPGS, Chap 13, pp. 334-373
29	3 Apr	Mineral cycling (cont')	BBPGS, Chap. 19, pp. 533-557
30	5 Apr	Review and Journal papers	<ul style="list-style-type: none"> Van Cleve, K., F.S. Chapin, III, C.T. Dyrness, and L.A. Viereck. 1991. Element cycling in taiga forests: State factor control. <i>BioScience</i>,

			41: 78-88. <ul style="list-style-type: none"> Chapin, F. S., III, D. A. Johnson, et al. (1980). "Seasonal movement of nutrients in plants of differing growth form in an Alaskan tundra ecosystem: implications for herbivory." <i>Journal of Ecology</i> 68: 189-209.
31	7 Apr	Plant water dynamics	BBPGS, Chap 18, pp. 501-532.
32	10 Apr	Plant water dynamics (cont')	BBPGS, Chap 18, pp. 501-532.
33	12 Apr	Arctic tundra	Bliss, L.C. 1988. Arctic tundra and polar biome. Pp. 1-32 in Barbour, M.G.. and Billings, W.D. (eds.) <i>North American Vegetation</i> . Cambridge: Cambridge University Press.
34	14 Apr	Final Exam	
35	17 Apr	Student Presentations: (1, 2) Evergreen tropical rainforests (two presentations);	Walter ² , Scan pp. vii-xiv; read pp. 1-21; read pp. 22-41. Study pp. 42-59, 65-67.
36	19 Apr	Student Presentations: (3) Deciduous tropical forests; (4) tropical savannas	Walter, pp. 67-71, 72-90, 91-95.
37	21 Apr	Student Presentations: (5, 6) Subtropical deserts (two presentations)	Walter, pp. 96-130, 131-132.
38	24 Apr	Student Presentations: (7) Mediterranean shrublands; (8) Temperate evergreen rainforests	Walter, 133-153, 154-162.
39	26 Apr	Student Presentations: (9, 10) Temperate deciduous forests and forest steppes; (2 presentations)	Walter 163-182, 189-192,
	28 Apr	UAF Springfest No Class	
40	1 May	Student presentations: (11, 12) Temperate grasslands, Temperate semi-desert grasslands and steppes (2 presentations)	pp. 193-226
41	3 May	Student presentations: (13, 14) Boreal evergreen and deciduous needleleaf forests (2 presentations)	pp. 227-229, 230-244, 245-246.
42	5 May	Student presentations: (15) Temperate alpine tundra; (16) Tropical alpine	Billings, W.D. 1988. Alpine vegetation. pp. 391-420 in Barbour, M.G.. and Billings, W.D. (eds.) <i>North American Vegetation</i> . Cambridge: Cambridge University Press. Walter, pp. 59-65, 182-188.

Lab schedule: Wednesdays 2:15-5:15; Irving, Room 208

Most reading assignments for the labs are available on the web at
<http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html>

Lab	Date	Topic	Assignment
1	25 Jan	UAF Museum Herbarium: Overview of plant morphology and dichotomous keys	None
2	1 Feb	Plant identification: Trees (6 species), tall shrubs (4 species),	Read Family characteristics for Betulaceae, Salicaceae, Pinaceae, and review photos and descriptions for species within with the trees and tall shrubs at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
3	8 Feb	Plant identification: Low Shrubs (12 species)	Read Family characteristics for Betulaceae, Salicaceae, Caprifoliaceae, Elaeagnaceae, Myricaceae, Rosaceae and review photos and descriptions for the listed species of low shrubs at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html :
4	15 Feb	Plant identification: Dwarf Shrubs (24 species)	Read Family characteristics for Betulaceae, Cornaceae, Cupressaceae, Ericaceae, Rosaceae, Caprifoliaceae, Diapensiaceae, Pyolaceae, Salicaceae and review photos and descriptions for species within the erect dwarf shrubs and prostrate dwarf shrubs at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
5	22 Feb	Lab Exam 1 (46 species)	
6	1 Mar	Plant identification: Forbs (25 species): Campanulaceae, Caryophyllaceae, Compositae (Asteraceae), Cruciferae (Brassicaceae), Eleagnaceae, Haloragaceae	Read Family characteristics for Campanulaceae through Halograceae and review photos and descriptions for the listed species within these families at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
7	8 Mar	Plant identification Forbs (24 species): Leguminosae (Fabaceae), Liliaceae, Onagraceae, Orobanchaceae, Papaveraceae, Polygonaceae, Ranunculaceae, Rosaceae	Read Family characteristics for Fabaceae through Rosaceae and review photos and descriptions for the listed species within these families at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
8	22 Mar	Plant identification Forbs (12 species): Rubiaceae, Sanatalaceae, Saxifragaceae, Umbelliferae (Apiaceae)	Read Family characteristics for Rubiaceae through Apiaceae and review photos and descriptions for the listed species within these families at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
9	29 Mar	Lab Exam 2 (61 species)	

10	5 Apr	Plant identification: Grasses Graminae (Poaceae) (11 spp.); sedges, Cyperaceae (11 spp.); rushes: Juncaceae (5 spp.)	Read Family characteristics for Poaceae, Cyperaceae, and Juncaceae and review photos and descriptions for the listed species within these families at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
11	12 Apr	Plant identification: Club mosses , Sellaginellaceae and Lycopodiaceae (4 spp.); horsetails , Equisetaceae (4 species); ferns , Athyriaceae and Aspidiaceae (2 species)	Review photos and descriptions for the listed species of club mosses, horsetails and ferns at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
12	19 Apr	Plant identifications: Mosses (14 species): In the Families Amblystegiaceae, Aulacomniaceae, Brachytheciaceae, Dicraneaceae, Entodontaceae, Polytrichaceae, Rhytidiaceae, Sphagnaceae, Splachnaceae Liverworts (2 species), In the Families Ptilidiaceae, Marchantiacea	Review photos and descriptions for the listed species of Bryophytes at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
13	26 Apr	Plant identification: Lichens (22 species): In the Families Lecanoraceae, Lecideaceae, Nephromataceae, Peltigeraceae, Umbilicariaceae, Cladoniaceae, Parmeliaceae, Pertusariaceae, Sphaerophoraceae, Usneaceae	Review photos and descriptions for the listed species of Lichens at http://www.geobotany.uaf.edu/teaching/biol474/plantlist.html
14	3 May	Lab Exam 3 (76 species)	