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BIOO 320.01: General Botany

Kevin J. Murray

University of Montana - Missoula, kevin.murray@umontana.edu

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Recommended Citation

Murray, Kevin J., "BIOO 320.01: General Botany" (2014). *Syllabi*. 1510.
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BIOO 320

General Botany (aka Biology of Oxygenic Photoautotrophic Organisms)

Fall 2014

Instructor: Dr. Kevin J. Murray

Office: NS 113; **Phone:** 243-4495, **email:** kevin.murray@umontana.edu

Class meeting times: W-F 1:10 – 4:30 pm; HS 102

Course Overview. BIOL 320 is a one semester course exploring the biological diversity of photosynthetic organisms (plants, eukaryotic algae, cyanobacteria). The central objectives in the course are: 1) to understand the phylogenetic relationships of photosynthetic organisms and, 2) to understand the functional biology of photosynthetic organisms including modes of reproduction, anatomy, physiology and ecology. The majority of photosynthetic organisms studied in this course play important roles in the structure and function of aquatic ecosystems ranging from freshwater lotic/lentic systems, to bogs, fens and the marine realm. These roles include the foundation of food chain interactions (algae) as well as aquatic system physical structure and resilience (aquatic bryophytes, emergent vascular and other nonvascular plants). Thus the course will link frequently to the importance of photosynthetic organisms as primary components of aquatic systems, but will extend also to the roles of these organisms in upland systems and at the interface between upland and aquatic habitats.

Presentation format. In principle we will have one, 1-1.5 hour lecture and 1-2 hours of lab investigation per meeting, but this will vary.

Grading. Lecture and laboratory exams, a laboratory notebook and classroom participation will be used to assess your meeting of the above objectives. Final grade breakdown by percent value: Lecture exams (3) 40%, laboratory exams (3) 40%, laboratory notebook 20%.

Lecture exams will be of short answer format supplemented with diagrams such as life cycles and/or morphological/anatomical illustrations. Lecture exam responses will be assessed not only for content but also for clarity of writing. Lab exams will be of standard practical format and include taxonomical identification of organisms, identification of cytological/anatomical/morphological features and ecological data.

Textbook (optional): Biology of Plants. Raven, Evert and Eichhorn. W.H. Freeman. 7th or 8th Edition.

BIOO 320 Fall, 2014 Lecture/lab schedule and readings

Date	Lecture topic	ref pp.	Lab
27 Aug	course intro & autotrophy	1-6	no lab
29 Aug	Systematics & biological diversity	219-235	microscopes
03 Sep	Cyanobacteria	244-250	Cyanobacteria
05 Sep	Cyanobacteria	244-250	Cyanobacteria
10 Sep	intro. to Protista	229-237	Chlorophyta
12 Sep	Chlorophyta	327-333	Chlorophyta
17 Sep	Dinophyta & Euglenophyta	303-306	Dinophyta & Euglenophyta
19 Sep	Cryptophyta, Haptophyta, Oomycota	306-312	Haptophyta, Oomycota
24 Sep	Exam I review		
26 Sep	Exam I (lecture & lab)		
01 Oct	Bacillariophyta, Chrysophyta, Phaeophyta	312-321	Diatoms, Phaeophyta
03 Oct	Phaeophyta, Rhodophyta	321-326	Rhodophyta
08 Oct	Lichens, Chytrids, Mycorrhizae	chap 14	Lichens
10 Oct	Lichens, Chytrids, Mycorrhizae	chap 14	Chytrids
15 Oct	intro. to Bryophytes	345-350	mosses
17 Oct	Bryophyta	358-367	mosses
22 Oct	Bryophyta	358-367	<i>Sphagnum</i>
24 Oct	Bryophyta	351-358	liverworts
29 Oct	Exam II review		
31 Oct	Exam II (lecture & lab)		
05 Nov	Lycopodiophyta; Pteridophyta	368-389	Ferns
07 Nov	Pteridophyta	408-427	Horsetails
12 Nov	intro. to Gymnosperms	408-427	
14 Nov	Cycadophyta, Ginkophyta	408-427	Cycadophyta, Ginkophyta
19 Nov	Coniferophyta, Gnetophyta	408-427	Conifers, Gnetophyta
21 Nov	intro. to flowering plants	434-435	flower anatomy
26 Nov	Thanksgiving		
28 Nov	Thanksgiving		
03 Dec	flowering plants	434-435	LAB EXAM III
05 Dec	Angiosperm diversity	452-456	
11 Dec	Final exam (3:20-5:00 pm)		

BIOO 320 Lecture Schedule and Learning Outcomes

<u>Date</u>	<u>Lecture topic</u>	<u>Learning Outcomes</u>
28 Aug 30 Aug	course intro & autotrophy autotrophy	Nature of autotrophy, oxygenic and non-oxygenic photosynthesis, chemosynthesis; phylogenetic distribution of such traits
04 Sep 06 Sep	Cyanobacteria Cyanobacteria	Fundamental features of prokaryotes and cyanobacteria: metabolic diversity, reproduction, ecological importance: cultural eutrophication
11 Sep 13 Sep	intro. to Protista Chlorophyta	Origins of eukaryotes: primary endosymbiotic events. Protist diversity and disparity. The green algae: diversity, reproduction and ecological importance
18 Sep 20 Sep	Dinophyta & Euglenophyta Cryptophyta, Haptophyta, Oomycota	Origins of eukaryotes: secondary endosymbioses. Dinophyte general morphology and ecological importance: red tide and paralytic shell-fish poisoning (PSP)
25 Sep 27 Sep	Exam I review Exam I (lecture & lab)	
02 Oct 04 Oct	Bacillariophyta, Chrysophyta, Phaeophyta Phaeophyta, Rhodophyta	Phylogentic affinities of the heterokontous algae. Diatom cellular features and metabolism. Ecological, geological and industrial uses of diatom frustules; invasive species. Marine macro-algae diversity, ecology and economic importance: inter-tidal habitat structure, commercial uses of marine macro-algae
09 Oct 11 Oct	Lichens, Chytrids, Mycorrhizae Lichens, Chytrids, Mycorrhizae	Fungal diversity, morphology, cytology and reproduction; ecological interactions: mycorrhizae, parasites, mutualists
16 Oct 18 Oct	intro. to Bryophytes Bryophyta	General feature of plants and their proposed evolutionary origins: colonization of terrestrial world.
23 Oct 25 Oct	Bryophyta Bryophyta	Bryophyte diversity and proposed relationships to other terrestrial plants, reproduction and physiological ecology. Bryophyte ecological importance: permafrost, forest palludification and global carbon cycle
30 Oct 01 Nov	Exam II review Exam II (lecture & lab)	
06 Nov 08 Nov	Lycopodiophyta; Pteridophyta Pteridophyta	General features of vascular plants; xylem and phloem cytology and function. Seedless vascular plants: current diversity and evolution
13 Nov 15 Nov	intro. to Gymnosperms Cycadophyta, Ginkophyta	What are seeds and pollen? Importance of seed-bearing plants in present-day floras. Gymnosperm diversity, morphology and reproduction

20 Nov	Coniferophyta, Gnetophyta intro. to flowering plants	General features of the angiosperm flower and reproduction: double fertilization. Angiosperm innovations: life histories, leaf modifications, adaptive radiation
22 Nov		
27 Nov		Cooking instructions, anatomy and morphology of your basic turkey
29 Nov		
04 Dec	flowering plants Angiosperm diversity	
06 Dec		