

PLANT TAXONOMY

BIO 3520
Syllabus

Spring Semester, 2007

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RATIONALE AND OBJECTIVES:

WHEREAS...

1. ...God created the Earth and clothed it with living organisms which belong to Him (Psalm 24:1), and He has committed these to the care of mankind, His stewards (Gen. 1:27-30).
2. ...God ordained that human stewardship should be guided, in part, through the development of a scientific knowledge of the creation, beginning with a system of names to (a) identify each kind of creature (*i.e.* a taxonomy) and (b) express the relationship of each kind of creature to the human and to the rest of the creation (*i.e.* ecology) (Gen. 2:15-20) (*i.e.* understanding the order of creation and our relationship and responsibility in creation).
3. ...plant taxonomy and ecology both have practical relevance in modern efforts to identify, understand, and conserve plant species and the biotic communities which they inhabit and support.

...IT IS THEREFORE NECESSARY THAT BIOLOGISTS HAVE...

KNOWLEDGE:

1. PLANT IDENTIFICATION – learning to identify and distinguish plant species based upon a knowledge of reproductive and vegetative morphology and appropriate terminology.
2. PLANT CLASSIFICATION – learning to associate various plant species having similar floral and vegetative characteristics with the appropriate taxonomic family.
3. PLANT ECOLOGY – learning to identify and associate local plant species as being members of a plant community, and to observe how phenotypic and environmental factors influence species survival and distribution.
4. PLANT CONSERVATION – understanding the factors that lead to extinction or extirpation of plant species, and the role of plant taxonomists and plant ecologists in efforts to conserve plant species in the face of global habitat destruction.

SKILLS:

1. OBSERVATION – developing an alertness and attention to detail regarding plant form, distribution, and ecological relationships.
2. IDENTIFICATION – utilizing a taxonomic key to identify plant species, and then recognizing a growing number of plant species from memory.
3. MANIPULATION – collecting, drying, and mounting plants for an herbarium collection; and, using appropriate magnification tools and dissection techniques; using digital photography to begin a digital image collection.
4. DATA MANAGEMENT – keeping accurate field notes, and using a computer database to file and access specimens or digital images.
5. NETWORKING – identifying a series of internet sites that provide information and research updates relating to plant taxonomy.

ATTITUDES-VALUES:

1. Demonstrates initiative and commitment by regularly allocating sufficient time to complete supervised and unsupervised laboratory and field work.
2. Exercises thoroughness and a spirit of inquiry while making field observations and written records.
3. Demonstrates patience and persistence in developing the manipulative skills noted above.
4. Develops an awareness and respect for plants as God's creations, and plant communities as life support systems placed under human care. Shows concern for threatened or endangered species.
5. Requests permission to enter both public and private property, and respects the wishes of those who grant permission to enter. Complies with restrictions on plant collecting on the property.
6. Observes recommended precautions in the interest of personal safety during field studies.

COURSE EMPHASIS:

Plant Taxonomy is primarily a field biology course which emphasizes identification of plant species based upon visual analysis of plant form (morphology). The emphasis will be upon studying plants in the biotic communities where they are living, supported by indoor laboratory study of specimens. This emphasis is reflected in the following aspects of BIO 3520:

1. Over 50% of contact hours is devoted to laboratory and on-site field studies.
2. Reading assignments and laboratory work will be focused toward enhancing learning in the field.
3. About 50% of the course grade is based upon field studies, plant identification, and plant collection.
4. Lecture /laboratory schedules are sometimes modified in keeping with weather and work progress..

IMPLEMENTATION DETAILS:

SCHEDULE: Lecture TR 11:00 –11:50 am TYL 202 | NOTE: Some lecture periods will be devoted to lab
 Laboratory T 2:00 – 4:50 pm ENS 106 | work as noted on the Schedule, page 4.

REQUIRED TEXTS* and SUBSIDIZED RESOURCES**:

*Walters, D.R., D.J. Keil., Z.E. Murrell. 2006. *Vascular Plant Taxonomy*, 5th ed. Kendall\Hunt. (i.e WKM)

*Barnes, B.V. and W.H. Wagner. 1981/2004. *Michigan Trees*. U. of Mich. Press, Ann Arbor. (i.e. BW)

**Newcomb, L. 1977. *Newcomb's Wildflower Guide*. Little, Brown, Co. Boston.

**Field Journal (purchase from Science Department), Hand Lens (loaned from Science Department)

GRADE CALCULATION:

<u>Weighting:</u>	<u>Letter grades:</u> A = $\geq 92\%$, A- = 90–91.9%, B+ = 88–89.9%
Exam I and II @10%; Ex. III(15%)	35%
Lecture Quizzes, Lab Practicals ---	25% -> (See esp. ATTITUDES-VALUES, p 2.)
Field Journal, Plant Collection-----	30% -> (Graded in 3 installments of increasing pt. value; see p. 4 dates)
Spring Trip and Essay -----	10% -> (See details below)
Total -----	100%

ACADEMIC ASSISTANCE: It is my goal to assist you in every way possible to achieve your academic goals. If you have special needs for which I should make an allowance, please let me know. You should also inform the [Academic Assistance Center](#) directed by Mrs. Kim Algrim (Ext. 3845) to partner with us. If you believe you may need support in managing the impact of a disability, please contact Marilyn Meyer, Coordinator of Disability Services, by phone at 3843 or email at meyerm@cedarville.edu. Office, CAL 164. Examples of disability categories are AD/HD, Vision, Health Impairment, Psychological. We rely on Disability Services to verify the need for accommodation and to assist in developing appropriate accommodation strategies. See www.cedarville.edu/DisabilityServices. If you have further questions or if I can assist you in any other way, please let me know.

ACADEMIC DISHONESTY POLICY is enforced in accordance with the spirit and procedures outlined in the Student Handbook, [Appendix A](#).

FIELD JOURNAL and PLANT COLLECTION:

Your most important activity in the field will be learning to observe and identify plants in their native habitats. Your field journal and your plant collection are important, but not ends in themselves. Rather they will help you become more proficient in identifying plants and associating them with plant communities. Collection should begin with a focus on live plants in their niche rather than simply making a notch in your collection "belt" (Silvius, 1990). Your collection will have the following related components:

Your field journal will become the written record of your observations made during each field excursion. You will be responsible to correctly identify and document at least one hundred (100) species of vascular plants in your field journal. In laboratory you will learn how to register locality, plant community type, plant Genus species, family, and distinguishing characteristics. Your written data will provide information necessary to document your collections of actual plant specimens. Journal entries should commence in January with as many as 30-40 species entries from common trees, shrubs, vines and herbaceous perennials (including cryptogams) recognizable in winter. These entries will be expanded in March as you observe the emergence of spring wildflowers. Specimen collections may include the following:

PC-W. Winter Collection - You will have opportunity to begin your herbarium collection and related techniques by pressing, drying and mounting five (5) woody plant or cryptogam species, at least two (2) of which are unique (*i.e.* not in a peer's collection or in CU Herbarium). Evergreens should be included.

PC-S. Spring-blooming plant collection (with leaves/reproductive parts mounted on herbarium paper with labels and database entries for each specimen) comprised of **ten (10)** or more non-threatened species of your choice, except five (5) or more must be "new entries" not already present in the Cedarville Univ. Herbarium collection or CU database. "New entries" may include corrections of misidentified herbarium specimens.

PC-P. ...up to five (5) plant species can be represented with high quality printed digital photos glued to herbarium sheets in place of dried specimens to document vegetative and reproductive characteristics. PC-P species must be unique as defined above. Photos must be taken by you or a willing cooperator.

Plant data sheets or photo entries may be completed for species in any of the following circumstances: (a) observed growing in only one population too small to collect from, (b) found only on protected lands, (c) listed on the "threatened" or "endangered" species lists. These latter species may duplicate those in the herbarium but still count toward your five (5) "new entries" within your PC-S specimen total of ten (10) species.

Example Collection: A student completes field journal with 106 species documented of which five (5) species are included in (PC-W), eight (8) species are mounted as spring-blooming plants (PC-S), and two (2) are represented as photos on herbarium sheets (PC-P) to make the total of fifteen (15) specimens eligible for the CU herbarium.

SPRING TRIP to the Southern Appalachians of TN and NC will expose us to an earlier emergence of the spring flora, fellowship in and experience of "mountain living;" studying ecological effects upon plant phenology; and identifying, collecting, and pressing plant specimens. Dates, page. 3; details forthcoming.

BIO 3520 – LECTURE AND LABORATORY SCHEDULE
Spring, 2007 [Please Print Study Notes from [BIO 3520 Home Page*](#)]

DATE	Format - Location	TOPIC	Study Assign.**
January 9	Lec. – TYL 202	Introduction	
January 11	Lec. – TYL 202	Activities and Importance of Plant Taxonomy	02 WKM Ch. 1
January 16	Lec. – TYL 202	What's in a Name? Plant Taxonomy & Stewardship	03 WKM Ch. 2
January 16	Indoor Lab ENS 106	Woody Plant Morphology – I.D. & Classification	Bring WKM & BW
January 18	Lec. – TYL 202	Botanical Nomenclature	04 WKM Ch. 2
January 23	Lec. – TYL 202 ENS	Field Journaling Approaches	05
January 23	Fld. Lab ENS 106	Woody Plants - I Field I.D. and Collecting	Bring WKM & BW
January 23	Lec-Lab – ENS 106	Collecting and Preserving Plant Specimens	06 WKM Ch. 7
January 30	Lec-Lab – ENS 106	Mounting and Storing Plant Specimens	07 WKM Ch. 7
January 30	Fld. Lab ENS 106	Woody Plants - II Field I.D./ Collect./ Lab Practical	Bring WKM & BW
Feb. 1, 6	Lec. – TYL 202	Plant Classification – Approaches and Challenges	08 Ch 4, 6
February 6	Indoor Lab ENS 106	Vegetative Morphology; Twig I.D. Lab Practical	Bring WKM & BW
February 8	Lec-Lab – ENS 106	Ferns and Their Allies	09 Ch 9
February 13	Lec-Lab – ENS 106	Gymnosperms – Conifers and Others	10 Ch 10
February 13	Un-S Lab ENS 106	Unstructured Lab – Project Work & Rev. Session	[●1 st Jour. grading]
February 15	Exam –TYL 202	Exam I	
February 20	Lec. – TYL 202	Introduction to the Flowering Plants	11 Ch 11
February 20	Indoor Lab ENS 106	Angiosperms: Floral Morphology, Floral Diagrams	Bring WKM
Feb 22, 27	Lec. – TYL 202	Angiosperm Morphology and Classification	Ch 12-16 Overview
February 27	Un-S Lab ENS 106	Unstructured Lab – Project Work or Released Time	[● PC-W due]
March 1	Lec-Lab – ENS 106	Grasses, Sedges, Rushes	Assigned Articles
Mar. 3 -12	No Class or Lab	<i>Spring Break</i>	
Mar. 13	Lec. – TYL 202	Angiosperms -- Classification (continued)	WKM Ch 12-16
Mar. 13	Indoor Lab ENS 106	Grasses, Sedges, Rushes; Morphology Practical	
Mar. 15, 20	Lec. – TYL 202	Baraminology – Discontinuity Systematics	Reading/Handouts
March 20	Indoor Lab ENS 106	Baraminology and Angiosperm Phylogeny	
Mar. 22	Lec. – TYL 202 –	Completion and Exam Review (No Lec. Mar. 27am)	Ch 12-16
March 27	Afternoon Fld. Trip	A Large University Herbarium and Laboratories	
March 29	Lec. – TYL 202	Exam II	[●2 nd Jour. grading]
April 3, 5	Lec. – TYL 202	Spring Planning and Exam Discussion	
April 3	Fld. Lab ENS 106	Early Spring Flora of Cedarville Area	
April 6 - 9	No Classes	<i>Easter Break</i>	
April 10	No Lab	Released Time for Spring Trip	
April 12 -15	Lab – ENS 106	“Spring Trip South into Spring” (Ap 12, noon - Ap 15)	Alt. Date Apr. 19-22
April 17	Lec. – TYL 202	Discussion/Debriefing from Trip	
April 17	Un-S Lab ENS 106	Unstructured Lab: Collecting, Drying, Mounting	
April 19, 24	Lec. – TYL 202	Distinguishing Selected Angiosperm Families	Chapters 11 - 20
April 24	Fld. Lab ENS 106	Lab Practical - In-Field and Herbarium Specimens	Collection Check-up
April 26	Lec. – TYL 202	Concluding Topics; Work in Field and Herbarium	[● PC-S, P Due 4-27]
May 1, 10:30a	Exam TYL 202	Exam III	
May 3	Project Completion	Botany Laboratory Open	[●3 rd Jour. grading]

* Subject to change in the event of unforeseen conflicts; changes be announced and will appear in BIO 3520 Home Page version of this schedule.

** Study Assignment to complete before this lecture

RELATED REFERENCES

- Braun, E. Lucy. 1961. *The Woody Plants of Ohio*. Ohio State U. Press. Columbus.
- Brown, L. 1979. *Grasses: An Identification Guide*. Houghton Mifflin Co. Boston, MA.
- Dirr, Michael. 1998. *Manual of Woody Landscape Plants: Their Identification, Ornamental Characteristics, Culture, Propagation, and Uses*. 5th ed. Stipes Publishing Co., Champaign, IL.
- Gleason, H.A. 1963. *The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada*. Hafner Publ. Co. New York. Three illustrated volumes on reference shelves in library.
- Gleason, H.A. and A. Cronquist. 1991. *Manual of Vascular Plants of the Northeastern United States and Adjacent Canada*. 2nd ed. The New York Botanical Garden, Bronx, NY.
- Holmgren, Noel H. 1998. *Illustrated companion to Gleason and Cronquist's manual : Illustrations of the vascular plants of northeastern United States and adjacent Canada*. Bronx, N.Y. : N.Y. Botanical Garden.
- Heywood, V.H. ed. 1985. *Flowering Plants of the World*. Prentice Hall. Englewood Cliffs, NJ.
- Silvius, J.E. 1988. Christian stewardship of the environment. *Creation Social Sciences, and Humanities Quarterly* 10(3): 24-27.
- Silvius, J.E. 1990. Environmental stewardship in plant collecting: Niche versus notch. *American Biology Teacher* 52: 112-115.
- Silvius, J.E. 1992. Plant Species Composition and Distribution in the Sara Lee Arnovitz Nature Preserve, Greene County, Ohio. Report submitted to Greene County Park District; result of research grant, 47 pp.
- Silvius, J.E. 1993. Using a computer database in the biology laboratory with specific application to the herbarium collection. *American Biology Teacher* 55(4): 245-246.
- Silvius, J. E., C.A. Lowell, C.J. Knickerbocker. 2003. The Tawawa Woods Natural Landmark II. Plant Species Composition and Recovery from Disturbance. *Ohio J. Science* 103(2): 12-18.
- Silvius, J.E. 2007. Environmental Ethics Resource Web page, Center for Bioethics at Cedarville University. http://www.cedarville.edu/centerforbioethics/resources/env_ethics.htm
- Silvius, J.E. 2007. Caring for creation breathes new life into the Great Commission. TheGoodSteward.com <http://www.thegoodsteward.com/article.php3?articleID=3062>
- Silvius, J.E. 2005. Useful Websites in Plant Taxonomy. From: BIO 3520 Home Page www.cedarville.edu/academics/sciencemath/silvius/3520/352sites.html
- Stuessy, T. F. 1990. *Plant taxonomy : the systematic evaluation of comparative data*. Columbia University Press, New York.
- Vankat, J.L. 1979. *The Natural Vegetation of North America*. Wiley. New York.
- Watts, M.T. 1975. *Reading the Landscape of America*. Collier. New York.
- Woodland, Dennis. 2000. *Plant Systematics*, 3rd ed. Andrews University Press, Barrien Springs, MI.