

A. RATIONALE AND OBJECTIVES:

BECAUSE we believe that...

1. ...**God created** the Earth and various kinds of plants, animals, and microbes which **belong to Him** (Psalm 24:1), and He has committed them to our care as **His stewards** (Gen. 1:27-30).
2. ...stewards who prepare well for a **profession** in the biological sciences in this age of biotechnology, will have a knowledge of **organismic biology** which considers how the parts function to sustain the whole organism and how organisms interact within the context of a biotic community.
3. ...**botany** is an important component of biology through which we can explore the mechanisms that sustain plants as organisms and their interactions with animals and microbes to sustain the “web of life” on Earth (ecology). (Gen. 2: 4-20; Prov. 25:2).

...THEREFORE biology students should be able to accomplish the following:

1. **PLANT AESTHETICS:** demonstrate appreciation of the beauty and design of creation as evidenced in written and behavioral responses and contribution to mutual edification during field botany labs.
2. **HISTORY of PLANT BIOLOGY:** demonstrate an awareness of the historical roots of botany and the major contributions of plant biologists to human culture.
3. **PLANT TAXONOMY:** use taxonomic keys to identify and become acquainted with common herbs, shrubs and trees of the landscape; and, learning to assign common plants or plant-like species to the correct taxonomic kingdom and phylum based upon anatomical characteristics
4. **PLANT ORIGINS:** demonstrate an ability to explain the origin of plants and other autotrophs based upon the presuppositions and claims of the creation and evolution models.
6. **PLANT COMMUNITY ECOLOGY:** explain how plants interact with other plant, animal and microbial species at the biotic community level as a prelude to a study of ecology.
7. **ECONOMIC BOTANY:** discuss ways in which plants have attained economic importance.
8. **PLANT REPRODUCTION:** explain the generalized life cycle and the variations that are characteristic of each of the major taxonomic phyla of autotrophs.
9. **PLANT ANATOMY and PHYSIOLOGY:** distinguish the major tissues of the leaves, stems, roots, and flowers of angiosperms; and describe the structure /function of each in relation to plant-soil-water relations, photosynthesis, and growth and development.
10. **INVESTIGATIVE AND INTERPERSONAL SKILLS:** develop and test a hypothesis related to plant biology using scientific reasoning, experimental design, data gathering and analysis, and logical interpretation and reporting of the data; contributing as a member of a cooperative group intent on accomplishing the objective at hand.

...AND THEREBY ADVANCE IN THE PROFESSION OF BIOLOGY THROUGH INSIGHTS GAINED FROM THE “GREEN WORLD.”

B. IMPLEMENTATION...IN SUPPORT OF THESE OBJECTIVES:

SCHEDULE: Lecture: 9:00 MWF ENS 345 Laboratory: Sec 1 T 2:00-4:50 pm ENS 106
 Sec 2 W 2:00-4:50 pm ENS 106
 Sec 3 R 2:00-4:50 pm ENS 106

TEXTS AND RESOURCES:

Stern, K.R., J.E. Bidlack, S.H. Jansky. 2008. *Introductory Plant Biology*. 11th ed. McGraw-Hill, Boston, MA
 Molles, M.C. Jr. 2008. *Ecology: Concepts and Applications*, 4rd ed. McGraw-Hill, Boston, MA
 Barnes, B.V. & W.H. Wagner, Jr. 1981/2004. *Michigan Trees*. U. of Michigan Press, Ann Arbor, MI.
 Silvius, J.E. 2008. *General Botany Laboratory Manual*. Cedarville University.
 Silvius, J.E. 2007. *General Botany Study Guide*. Linked at the BIO 2500 Home Page. Go to <http://www.cedarville.edu/employee/silviusj/index.htm>, select "Course Syllabi & Study Aids", then "General Botany", then, "Course Schedule and Study Guides" resembling page 5 of this Syllabus; but with links to the Guide.

INDIVIDUAL STEWARDSHIP:

1. **Commitment** to God, to professor, and to our class as a "community of learners" will be emphasized.

CHALLENGE: See Phil. 2:3-4 and Col. 3:23-24. A FRUIT of this commitment is a willingness to value the course objectives enough to accept personal responsibility to achieve them.

2. **Responsibility** is demonstrated by an active participation in four learning settings:

a. **Out-of-Class** reading and study are an essential preparation for and reinforcement of the other learning settings. The *Study Guide* will stimulate reasoning, aid retention, and provide a record for review.

CHALLENGE: Personally commit yourself to regular completion of reading/study assignments which require an average of 2 hours "out-of-class" for each "in-class" hour. Pray for an alert, inquiring mind. See SUGGESTED STUDY APPROACH (p. 4) for a good means of accomplishing the "3 R's" noted above. See also COOPERATIVE LEARNING, p. 5.

b. **Laboratory** represents the core of our study through the following:

- > FIELD BOTANY trips to study plants in the context of their habitats within the biotic community, to learn observation-identification skills, and to become familiar with species studied later in lab.
- > GROWING / STUDYING live plants, and studying preserved specimens and micro-slides for first-hand exposure to plant structures and processes.
- > EXPERIMENTATION, involving hypothesis testing, experimental design, data gathering and record-keeping, data analysis, and communication.

CHALLENGE: Come to lab with an attitude of inquiry, prepared by completion of any "pre-lab assignments." Review content of the previous lab. During lab, actively pursue the investigations so as to gain hands-on experience. Follow instructor's guidelines for suitable laboratory attire as deemed appropriate for comfort, safety, and testimony.

ASSESSMENT: Assessment and feedback regarding your laboratory progress will be based upon:

1. *Pre-Lab Assignments* or *Lab Prep. Quizzes* which will occasionally be collected.
2. *Lab Practical Quizzes* will be given periodically \geq 1 week following a given lab.
3. *Lab Report* featuring statistical analysis of data and brief written interpretation.
4. *Botany Lab Drawings* will be collected occasionally at the beginning of the following lab; assessment criteria: completeness, accuracy, and neatness.

c. **Class Discussions** will facilitate your learning by INTEGRATING out-of-class and laboratory learning experiences, and by REINFORCING learning by oral discussion and clarification. Usually, you will encounter concepts in lab before lecture, thus providing first-hand experience in support of learning.

COOPERATIVE LEARNING GROUPS will be utilized in some class discussions and in lab. See p. 5.

CHALLENGE: Attend lecture faithfully, arrive on time, having prepared to receive and give. Make good lecture notes and add to them ("fill gaps") as soon as possible after class.

ASSESSMENT: *Cooperative Group Work* and *Take-at-Home Quizzes* involve 10% of your grade because of the importance of your faithful attendance, participation in group and class discussion (in class and via WebCT). This approach will also provide feedback to you and me on your progress. Questions will be derived from the questions and outlines in the [General Botany Study Guide](#).

d. **Office Conferences** may be scheduled to provide additional assistance and counsel.

CHALLENGE: Please come by ENS 272, or call 7948, or e-mail me [or call 766-1331 (8 to 10:00 pm)] if I can help you or your group academically, or personally.

INDIVIDUAL EVALUATION

Your learning will require your personal response to each "CHALLENGE" above. Assessment of your learning will occur according to the means noted in "ASSESSMENT" statements above and on page 5. Although I will not collect your complete Botany Journal for grading, the achievement level of many previous students on exams can be correlated with the quality of their journals. I encourage you to merge what you have already found to be a successful study approach with the "study guide and journal-based" study approach outlined on page 4 and in the "Reading and Study Plan" **BOTANY REVIEW** on CedarNet provides interactive quiz questions to test your comprehension in botany after your thorough study.

EXAMS will provide feedback to you (and me) on your progress, and enhance your learning through the challenge of answering a variety of objective and short essay questions (identical to or similar to "Study Guide" questions). Exams III and IV will measure your comprehensive grasp of botany and are weighted more heavily. Make-up exams are given for legitimate reasons and only after prior arrangement.

GRADE CALCULATION

Point Distribution:

Letter Grades:

Exam I, II @125 -----	250	A. = 900 - 1000	Plus (+) and minus (-) grades
Exam III (@200), IV(@150)--	350	B = 800 - 899	are awarded for the upper and
Quizzes /Coop. Group	100	C = 700 - 799	lower 20 points of each grade
Laboratory -----	150	D = 600 - 699	interval, respectively. e.g. 880-899 = B+
Inquiry Project (BLIP)*	150		
TOTAL -----	1000		

*Inquiry Projects (Botany Lab Inquiry Projects, BLIP's) are explained in Laboratory Manual, Exp. #15.

SUGGESTED STUDY APPROACH:

Like other sciences, botany focuses upon structures, functions, processes, and relationships. Therefore, meaningful learning requires that you take responsibility to *read*, *reason*, and *record* responses to questions. You must also learn to *recognize* structures and relationships by studying drawings and models. A consistent effort will propel you from *recognition* and *definition* to being able to *interrelate* and *apply* to a conceptual framework.

The [General Botany Study Guide](#) (refer back to page 2) is intended to help you maximize your efforts and efficiency in learning. It includes a "[Reading and Study Plan](#)" which includes instructions for organizing your "Botany Journal," from a 1.5" 3-ring binder. Then, the *Study Guide* explains each assignment, provides additional questions and outlines that reflect my approach to the concepts, and guides your use of the text.

COOPERATIVE LEARNING GROUPS:

Background: During the past few years, several factors have begun to influence my approach to teaching:

1. Today's digital technology gives both students and faculty greater access to information, causing me to see my role more as a facilitator of learning, not simply a disseminator of information. Through cooperative learning, I engage you in developing biological literacy, hence applying what you are learning from your personal study guided by the *Study Guide*.
2. The educational literature is providing abundant evidence that students learn more effectively in a setting wherein cooperative learning is used – *i.e.* “the instructional use of small groups so that students work together to maximize their own and each other's learning” (Johnson, 1993. *Cooperative Learning and College Teaching Newsletter* 3(2): 6-9).
3. Finally, you will gain valuable experience in group work which will prepare you for most vocations where team efforts are so vital to success. Here is how we will proceed.

Group Formation: During one of our first meetings, I will assign each student to a cooperative learning group of three or four students. Groups will be formed at random but with both genders included.

Your Responsibility as a student will be to exercise commitment to God, to professor, and to your peers as outlined on pages 2-3 of this syllabus. Thus, even though you may not have chosen to be in this group, you will allow God to use you as an effective member of that team as you enhance your interpersonal skills and future career prospects. See “Quality Factors” below.

Group Activities: I am excited about using of cooperative learning in BIO 2500 again in the following ways:

1. Botany Laboratory Inquiry Projects (BLIP) have been utilized for twenty years. Your group will choose a research topic, design and conduct an experiment, analyze the data, and report results as described in *Laboratory Manual*, Exp. #15.
2. Cooperative Effort in Laboratory Learning: In some labs, division of responsibility within group will be followed by each member explaining/teaching other members.
3. Cooperative Learning in Class Discussion: We will sometimes use part of the class meeting time for cooperative group discussion and reporting.
4. Discussion on WebCT will provide a “room” for out-of-class group preparation

Quality Factors: You will be encouraged to develop skills in the following elements of cooperative learning:

1. Positive Interdependence: My responsibility is to give your group a clear task or group goal which demands cooperation to complete a task. Your success as a group will grow as you learn to cooperate and draw upon the strengths of each member. ASSESSMENT: *e.g.* your group will be asked to report results in writing or orally.
2. Individual Accountability means each member makes the effort to contribute. Commit yourself to making your group successful. ASSESSMENT: Learning effort measured by quality of your summary, or your contribution to a discussion thread, quiz, *etc.* Faithful attendance, prompt arrival in class, and active participation is essential.
3. Teamwork Skills: Leadership, decision-making, trust-building, communication, conflict-management– these skills must be learned just as science content is learned. Each member should be godly and gracious to accept and encourage fellow members. ASSESSMENT: Be honest and talk to each other about strengths, weaknesses, *etc.* I will be glad to meet with your group to help resolve any conflicts in a biblical manner. You may be asked as a group to report on how “group dynamics” are going. OBSERVED BEHAVIOR – active participation and encouragement by all members. Some who are gifted in “sparking discussion” will be complemented by others who can analyze and distill ideas toward a productive outcome. How will you contribute? ☺

SPECIAL PROVISIONS:

TECHNOLOGY: Use of calculators may be permitted during exams for computations, but must not contain related information which should instead be provided from memory. Wireless or remote electronic access technology may be used during class sessions (not during exams) as long as the usage enhances your interaction with the subject of the class meeting and does not distract the attention of others. Violation of this policy will constitute reason for denial of the privilege of using the technology in class in the future. Switch your cell phone to off or vibrate mode.

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 Enrichment 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, Orthopedic. We rely on Disability Services to verify the need for accommodation and to assist in developing appropriate accommodation strategies. Disability Services is in the Center for Biblical and Theological Studies, office #223 (Ph. 3843) or meyerm@cedarville.edu, or visit 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](#).

TEACHER EDUCATION PROGRAM UNIT AND PROGRAM ASSESSMENTS ASSIGNED TO COURSE

Unit Outcome	Program Outcome	Decision Points	Assessment
Competence	NSTA Std 1a.	4	#1 Content Knowledge
Competence	NSTA Std 1a.	1, 2, 3, 4	#2 Content Knowledge
Competence	NSTA Std 1d	3	#7 Content Knowledge – Research and Investigation
Competence	NSTA Std 1e	3	#7 Content Knowledge – Research and Investigation

**BIO 2500 LECTURE AND LABORATORY SCHEDULE -- FALL, 2008 *
STUDY ASSIGNMENT (SA)**

Date	Number	Topic
Part I – Field Botany and Ecology		
August 20	SA #1	“People Matters” – Because People Do Matter
August 22	SA #2	Course Introduction
August 25	SA #3	Botany and Stewardship of “The Green World”
Aug. 26,27,28	LAB #1:	Field Botany – Introduction [<i>Manual</i> , Exp. #1]
August 27	SA #4	Botany and Stewardship – Tapping the Botanical Knowledge Base
August 29	SA #5	Botany / Ecology and Human Culture – Roundup-Ready Soybeans
September 1		<i>Labor Day</i> (No Classes)
Sept. 2, 3, 4	LAB #2:	Woody Plants and Sampling Plant Populations [<i>Manual</i> , Exp. #2]
September 3	SA #6	Ecology – Investigating Life in Context
Sept. 5, 8	SA #7-8	Characterizing Biotic Communities
Sept. 9,10,11	LAB #3:	Prairie Community Structure and Diversity [<i>Manual</i> , Exp. #3]
Sept. 10, 12	SA #9-10	Scientific Investigations and Data Analysis
September 15	SA #11	Prairie Community Data Analysis and Discussion
Sept. 16,17,18	LAB #4:	Autotrophic Prokaryotes & Protists [<i>Manual</i> , Exp. #7, A to B.2.]
September 17		<i>Day of Prayer</i> (No Lecture)

September 19	SA #12	Concluding Discussion / Review
September 22	Exam I –	[SA #1 to SA #12 and Labs #1–#3]
		Part II – Survey of “Simpler Autotrophs”
Sept. 23,24,25	LAB #5:	Autotrophic Protists [<i>Manual</i> , Exp. #7]
Sept. 24,26	SA #14-15	Plant Origins and Classification
Sep. 29,Oct 1	SA #16-17	Autotrophic Prokaryotes: Cyanobacteria and Chloroxybacteria
Sep 30,Oct 1,2	LAB #6:	Bryophytes [<i>Manual</i> , Exp. #8 parts A, B.]
October 3, 6	SA #18-19	Autotrophic Protists: Algae
Oct. 7, 8, 9	LAB #7:	Seedless Vascular Plants and Gymnosperms [<i>Manual</i> , Exp. #8-C, D and #9]
October 8	SA #20	Plant Cells, Cell Walls, and Cytokinesis
October 10	SA #21	Bryophytes and Origin of Land Plants
October 13	SA #22	Botany, Agriculture, and Missions
October 14	Special Review Session [No Lab October 16, 17, 18]	
October 15	Exam II –	[SA #14 to SA #21 and Labs #4, 5, and 6]
October 16-19	<i>No Classes – Fall Break</i>	
		Part III – Vascular Plant Phyla
October 20	SA #24	Fern and Seedless Vascular Plant Reproduction (cont’d)
Oct. 21,22,23	LAB #8:	Angiosperms [<i>Manual</i> , Exp. #10]
October 22	SA #25	Gymnosperms: Origin of Seeds
October 24	SA #26	Angiosperms: Flower to Fruit and Seeds
October 27	SA #27	Plant Tissue Types
Oct. 28,29,30	LAB #9:	Plant Cells, Roots and Water Relations [<i>Manual</i> , Exp. #11, 12]
October 29	SA #28	Plant Growth: Apical and Lateral Meristems
October 31	Exam III	[SA#14– #26, Exp. #4 through #8]
		Part IV – Plant Anatomy and Physiology
November 3, 5	SA #30	Introduction to Plant Water Relations
November 4,5,6	LAB #10:	Stems and Histology [<i>Laboratory Manual</i> , Exp. #13]
Nov. 7, 10	#SA 31-32	Movement of Water in Plants – “SPAC” [including “Stems”]
Nov. 11,12,13	LAB #11:	Leaves and Leaf Adaptations to Environment [<i>Manual</i> , Exp. #14]
Nov. 12, 14	SA #33-34	Photosynthesis I – Photochemical Reactions
November 17	SA #35	Photosynthesis II – Biochemical Reactions
Nov. 18,19,20	LAB #12:	BLIP Completion – Consult w. Nov. 21, 24, Dec. 3 groups [<i>Manual</i> , Exp. #15]
November 19	SA #36	Photosynthesis II – Biochemical Reactions (continued)
November 21	Transition	Lecture Conclusion; BLIP Oral Presentations [<i>Manual</i> , Exp. #15, p. 15.3 ff]
November 24	Oral Reports:	BLIP Presentations [<i>Manual</i> , Exp. #15, p. 15.3 ff]
November 26	Lecture	BLIP Consultations (Meeting as Necessary)
Nov. 26 (1 pm)–Dec 1	<i>No Classes Thanksgiving Break</i>	
December 3	Oral Reports:	BLIP Presentations [<i>Manual</i> , Exp. #15, p. 15.3 ff]
December 2, 3, 4	LAB #13:	BLIP Completion – Consultations with Dec. 5, 8 groups [<i>Manual</i> , Exp. #15]
December 5, 8	Oral Reports	BLIP Presentations [<i>Manual</i> , Exp. #15, p. 15.3 ff]
Dec. 12, 8:00 am	Exam IV	[SA#27– #36, Lab Ex. #9 – 12]

* Subject to change in the event of unforeseen circumstances.