BIOLOGY OF PLANTS, 2003 (BIOLOGY 213.01)

Textbooks: Raven, Peter H. et al. (1999) *Biology of Plants.* W.H. Freeman and Company, Worth Publishers, New York, 944 pp.

Lab Reference: Dale, Nancy (2000) *Flowering Plants:of the Santa Monica Mountains, Coastal & Chaparral Regions of Southern California*. California Native Plant Society, Sacramento, CA. 240 p.

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Location & Schedule: Class period-9:00 a.m. to 9:50 a.m. MTR, KSC 300; Biol. 213.51 (Lab 1), 200 –4:50 p.m. W, KSC 300; Biol. 213.52 (Lab 2), 2:00 – 4:50 p.m. R

DATE	LECTURE TOPIC	TEXT READING OUTSIDE READING
Jan. 6	Introduction to plants	Ch. 1, Cox, PA (Sci. Am., June 1994) Ethnobotany & Drugs; Langridge, W. H. R. (SciAm, Sept. 2000) Edible Vaccines; Powledge, T. M.(SciAm, Oct. 2001) Tobacco Pharming
Jan 7-9	Why study plants?	Ch. 2, Film: Power of Plants
Jan 14-17	Plant cells	Ch. 3
Jan 20	**Martin Luther King Day, No Classes Meet**	
Jan 21-23	Plant seeds & 1° tissue	Ch. 23-24, Bazzaz, FA (Sci. Am. Jan1992): Plants & CO2 Rich World Sage, R.F. and J.R. Coleman (Trends Plant Sci., Jan 2000) Effects of Low Atmospheric CO2 on Plants.
Jan 27-30	Leaves	Ch. 26
Jan 29	**Special Seminar: 12 noon, KSC 130, Dr. Rowan Sage (University of Toronto) "Evolution of C4 Plants"**	
Feb. 3	**Major Exam**	
Feb. 4-6	Woody Plants (2° growth)	Ch. 27. Jarbeau J.A. et al. (P,C & E-1995) The Mechanism of Water-stress-induced Embolism in Two Species of Chaparral Shrubs Langan, S.J. et al. (P,C & E-1997) Xylem Dysfunction Caused by Water Stress and Freezing in Two Species of Co-occurring Chaparral Shrubs.
Feb 10-13	Roots	Ch. 25, Pratt, S.D. et al. (Physiol. Plant., 1997) Influence of Soil Moisture on the Nodulation of Post Fire Seedlings of *Ceanothus* spp. Growing in the Santa Monica Mountains of Southern California
Feb 17-20	Plant nutrition and water movement	Ch. 30-31
Feb 19	**Special Seminar, 12 noon, KSC 130, T.J. Bowen (U. of Calif. San Diego)** "Cancer Research".	
Feb 24-28	**Spring Break, (no classes meet)**	
Mar 3-6	Photosynthesis	Ch. 7 Demmig-Adams, B. & W. W. Adams III (Science, 2002; 298:2149-2153) Antioxidants in Photosynthesis and Human Nutrition
Mar 10-13	Photosynthesis II	

March 15-16	**Weekend Field Trip to the San Jacinto Mountains;** Depart 7 am March 15, Return 4 p.m. March 16 (sleeping bags, coat, long pants, hiking shoes, sunscreen, field notebook, camera)	
March 17-20	Flowers	Ch. 21-22
March 20	**Lab Practical** (3:30 pm)	
March 24	**Major Exam**	Hacke et al. (Oecologia, 2001) Trends in Wood Density and Structure are Linked to Prevention of Xylem Implosion by Negative Pressure
March 25-27	Algae, Liverworts, Mosses	Ch. 16-18 Anderson, DM (Sci Am Aug. 1994) Red Tides
March 31-Apr3	Ferns	Ch. 19
April 2	Special Seminar – Brandon Pratt "Are Invasive Trees Competitively Superior to Native trees?".	
April 7-10	Gymnosperms	Ch. 20.
April 9	**Special Seminar, 12 noon, KSC 130**, Anna Jacobsen, "Xylem Structure & Function in California Chaparral"	
April 11	**Poster Presentations**	
April 14	**Major Exam**	
April 15-17	Global Ecology	Ch. 33-34
April 23	**FINAL EXAM, Wednesday, 7:30 a.m. - 10:00 a.m..**	

LAB MATERIALS:

1) Field notebook (small durable, ask instructor about professional field notebook)
2) Laboratory notebook (large, loose-leaf, three-ring binder, for inserts)

GRADES:

1) Three lecture exams		300 points
2) One final exam (accumulative).....		200
3) Three position papers		30
3) One lab practical		100
4) Eight lab quizzes		40
5) One lab notebook and field book ……		30
6) One poster presentation (oral and written).....		100
	total	800

GRADING SYSTEM

Letter Grade		**GPA**		**Percentage**		**Total Points**
"A"	=	4.0	=	≥93 %	=	≥744 points
"A-"	=	3.7	=	≥90	=	≥720
"B+"	=	3.3	=	≥87	=	≥696
"B"	=	3.0	=	≥83	=	≥664
"B-"	=	2.7	=	≥80	=	≥640
"C+"	=	2.3	=	≥77	=	≥616
"C"	=	2.0	=	≥73	=	≥584
"C-"	=	1.7	=	≥70	=	≥560
"D+"	=	1.3	=	≥67	=	≥536
"D"	=	1.0	=	≥63	=	≥504
"D-"	=	0.7	=	≥60	=	≥480
"F"	=	0.0	=	<60	=	<480

BOTANY 213: Poster Presentation & Scientific Paper

(reports must be presented on a standard 3' X 5' poster board as well as submitted in the form of a typical research article in science)

One laboratory report is required for the successful completion of Biology 213. This report should be viewed as equivalent to a "term paper" as required in most other courses at Seaver College. However, the laboratory report in Botany is not just another "term paper." It is more analogous to a technical poster presentation that is designed to communicate findings from an original research project - your research project. Furthermore, students will also submit a paper describing their research findings following the format of a refereed journal in science. Scientific discoveries must be documented and communicated in both oral (poster presentation) and written (journal article) formats to advance scientific knowledge and contribute to the evolving needs of society. Your lab report should be viewed as this type of oral and written communication and must follow the standard scientific format as given below.

I. TITLE

a) The fewest possible words that adequately describe the contents of your paper

b) Be specific

II. ABSTRACT

a) A succinct summary of your paper

b) An abstract should

-state the principle objectives and scope of the investigation

-describe the methodology employed

-summarize the results

-state the principle conclusions

III. INTRODUCTION

a) Its purpose is to introduce the paper

b) It should

-define the problem

-review the literature

-state the question asked or the hypothesis tested

-state the method of the investigation, e.g. a general statement as to how you attempted to answer the question or test the hypothesis

IV. MATERIALS AND METHODS

a) Provide enough details that a competent worker could repeat your experiment

b) Give full details of how you attempted to answer your question or test your hypothesis

V. RESULTS (see Day 1994)

a) Present your findings (data) in graphs, figures, and tables

b) Give a complete, detailed word description of your findings, frequently referring to your figures and tables

c) Do not give any interpretations of the meaning of your data, reserve this for the next section (Discussion section)

VI. DISCUSSION

a) Give your interpretation of your results

-present principles, relationships, and generalizations shown by your results

-point out any exceptions or any lack of correlation

-compare your results to those found in the literature

VII. CONCLUSION

a) Summary statement as to "what it all means"

b) State the significance of your findings as clearly as possible

VIII. LITERATURE CITED

a) List only significant published references (**you must reference at least three primary sources**)

b) Place in alphabetical order by author

c) When referring to the "Literature Cited" in the text, use the "name and year system." e.g. My results for bean plants are consistent with those reported for corn plants (Jones and Smith 1989).

Literature Cited

Abrams F. F. and J. L. Smith (1982) The effects of blue light on plant growth and development. Science 76:225-227.

Day, R. A. (1994) How to write and publish a scientific paper. Oryx Press, Phoenix, AZ. 223 p.

Walsh C.C. and G. L. Pepperdine (1981) Discovery of voracious, man eating plants in the Amazon of South America. Science Fiction 12:355-390.

NOTE, THE FORMAT FOR THE LITERATURE CITED IS:

Author, (Date), Title of Paper, Journal Name, Volume Number, Page Numbers.

For further information, see a description of a "Scientific Poster" given by Day, 1994. Also, see the posters on display in the hallway of the Natural Science Division. Ask your instructor for a handout on how to prepare a scientific poster. Also, make two photocopies of your poster to be submitted to the instructor for grading. The photocopies should be reduced to fit on a standard 81/2" X 11" paper.

Plagiarism: Plagiarism is a violation of the Seaver College Code of Academic Ethics and one of the most serious forms of fraud that a scholar can commit. Plagiarism occurs when a writer appropriates another's ideas without proper acknowledgment of the source or uses another's words without indicating that fact through the use of quotation marks. The use of another's distinctive syntax may also be considered plagiarism.

The following are among the forms that plagiarism may take: 1) Submitting, as one's own, work produced by another (e.g., a paper purchased from a company, one downloaded from the Internet, or one "borrowed" from another student). 2) Failing to cite sources for ideas that are not one's own or for facts that are not common knowledge within the discipline in which the research is being conducted. 3) Borrowing another's words, whether in complete sentences or not, without the use of quotation marks or indented quotations, even when a proper citation is provided. 4) Following closely another's means of expressing an idea by, for example, inserting synonyms for key words in an otherwise unchanged passage. 5) One of the scholar's first responsibilities is to understand the nature of research and the ethical imperative of giving credit where it is due.

Ignorance of these matters, or of the definition of plagiarism, is no defense against a charge of plagiarism. (Source: Seaver Academic Ethics Committee, October 1999).

SOME JOURNALS CONTAINING SCEINTIFIC REPORTS ON TOPICS IN BOTANY

American Scientist	Science	Nature
American Journal of Botany	Plant, Cell and Environment	Plant Physiology
American Midland Naturalist	International Journal Plant Science	Madrono
American Naturalist	Physiologia Plantarum	Crop Science
Ecology	Plant Cell	Oecologia
Annals of Botany	Australian J. Plant Physiology	Botanical Review
Canadian J. of Botany	Cell	Economic Botany
Ecoscience	Evolution	Genetics
Journal of Ecology	Journal Wildlife Management	Natural History
Oikos	Trends in Ecology & Evolution	Planta

A Personal Perspective: Green plants provide humans food, fiber, fuel and medicine. They enable animal life through oxygen production, nutrient transformations and solar energy capture. Native plants deter global warming, desertification and soil erosion. In short -- plants sustain our life support system on earth. Since plants are critically important to environmental health, the relationship of Christian stewardship to environmental conservation is an appropriate theme for this class. Is the cause of environmental decline partially a result of our Judeo-Christian heritage that calls us to "have dominion over" God's creation? Is this viewpoint a factor in our excessive exploitation of nature's resources? Alternatively, is the Judeo-Christian heritage one that calls us to "care for the earth" and acknowledge that it is nature's goods and services (God's creation) that sustain our lives? I believe that the primary lesson in the Biblical account of the creation is not to reveal <u>how</u> the earth was created but <u>who</u> created the earth and that God has great love for all of His creation, not just humans. Thus we are called to follow His model of love by "caring for" and "tending" the garden we call earth. It is hoped that through a study of plants we all will become more knowledgeable on better ways to "care-for our garden" and reflect the image in which we were created.

Methods of Instruction: This class will use a wide variety of instructional methods. Lecture will dominate the class period but field trips, experiments, observations and documentation will dominate the lab. Most lecture sessions will have an "active learning" component where students will be asked a pointed question and work in teams to address the question followed by an open dialogue among the entire class. Students will get to know and trust one another and realize the benefits of utilizing the collective wisdom of the group to refine, crystallize and improve creative ideas – the essence of <u>good science</u>. That is, ideas that have true scientific merit and which the student can become enthused in and even passionate about. Since both the lecture and lab component are in the new Keck Science Center laboratory for Plant Biology (KSC 300), visual aids will be used most class periods. Students will be surrounded in the classroom with the subject of the course – plants. Also, immediately adjacent KSC 300 is the "Student Projects Lab (KSC 310)" where students can chose to set up and monitor their term projects. Alternatively, if appropriate, they can use the greenhouse facility immediately adjacent the Keck Science Center or one of our many field study sites on campus.