VALDOSTA STATE UNIVERSITY
Biology 3550/5550--Introduction to Phycology
Spring 2012

INSTRUCTOR: Dr. J. A. NIENOW
OFFICE: 2089 Biology/Chemistry Building; 249-4844
Office hours: Wednesdays—2:00-3:30, Thursdays—9:00-10:30, Fridays—12:00-1:00, or by appointment
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RECOMMENDED TEXT: Graham, LE, JM Graham, & LW Wilcox. 2009. *Algae.* 2nd Edition. Benjamin Cummings, New York

OTHER RESOURCES: *Freshwater Algae of North America* by JD Wehr and RG Sheath, a very useful book, is available in the reference section of Odum Library. A number of other taxonomic references have been placed on 3-day reserve in Odum Library. You might also want to check my web page (http://www.valdosta.edu/~jnienow) and BlazeView periodically.

PREREQUISITES: A passing grade in Biology 2230 and 2270, or Biology 1108, or the consent of the instructor. An interest in photosynthetic microorganisms (algae) is also helpful.

COURSE GOALS: The primary goal of this course is to introduce the students to the study of algae, with the emphasis on practical aspects related to the study of freshwater microalgae. Along the way the it is hoped that the students will develop an appreciation of the evolutionary diversity of photosynthetic microorganisms and the role they play in the environment.

ATTENDANCE: Students are responsible for attending class and for the material presented in all classes. Make-ups of missed lab exercises will be on a case by case basis and will depend both on the nature of the excuse the complexity of the lab. EXAMS MISSED WITHOUT PRIOR PERMISSION OF THE INSTRUCTOR MAY BE MADE UP, BUT THE FINAL SCORE WILL BE REDUCED BY 25%. Students who have missed 20% of regularly scheduled class meetings, especially labs, are subject to a failing grade for the course.

LECTURE GRADING (GEO 4, GEO 5, BEO2, BEO 3, BEO 4, BEO 5): There will be three unit exams, each worth 200 points. The exams will include a mixture of short answer and essay questions. The dates of these exams are included in the attached schedule of lectures. DO NOT MISS THESE EXAMS WITHOUT PRIOR PERMISSION. If you are caught cheating on an exam you will receive no points. Estimated total from exams—600 points.

IDENTIFICATION EXAMS (GEO 7, BEO 1, BEO 2): In addition to the lecture exams, there will be two identification exams, each worth 100 points. During this exam you will be asked to identify specimens from micrographs to a specified level, usually genus. The taxa potentially appearing on each exam will be provided well ahead of time. The rules on attendance and cheating hold for these exam as well. Estimated total for identification exams—200 points.

LABORATORY/HOMEWORK GRADING (GEO 3, GEO 4, GEO 5, BEO 1, BEO 3, BEO 5) : The laboratory grade will be based on the following types of graded assignments.

- Informal reports of lab experiments and activities as directed by the instructor. Estimated total for informal reports—100 points.

- 5 algal identifications (I suggest you focus on diatoms and desmids), each documented with a voucher specimen, photographs, descriptions, and a list of major literature (see separate handout). No species may be used by more than two students. Each identification, in the proper form, is worth 20 points. Up to 5 additional specimens can be submitted; these can earn extra points at a rate of 10 points for each identification in the proper form. The additional specimens are subject to the same two students per organism limit. Identifications can be submitted at any time before April 25, 2012. All identifications to be graded must be submitted by 3:30 pm April 25, 2012 Estimated total for identifications—100 points.
- Additional taxonomic exercises as assigned—100 points.

RESEARCH PROJECT (GEO 3, GEO 4, GEO 5, BEO 1): Each student must participate in an independent research project (either independently or as part of a group) related to the study of algae. The project will be conducted in four phases:

- Initial design and feasibility check—Due February 1, 2012; 50 points
    - Each individual or group must submit a brief (100-200 words) statement outlining the basic idea, the material requirements of the project, and an estimate of the number of man-hours required. (The project should require between 12 and 20 man-hours per participant.)
- Formal proposal—Due February 29, 2012; 100 points
    - The proposal must include background information, the basic objectives of the project, details on how those objectives will be met including a list of the major independent and dependent variables, the significance of the expected results, and a literature cited section in appropriate format. The body of the proposal should be 1000 and 1500 words long.
- Laboratory and/or field research—Time will be available during lab between March 20 and April 15 to work on the project.
- Report on research—April 25, 2012
    - Each group will prepare a 15-minute power-point presentation on their project. Project reports will be given in lab on April 25, 2012; 100 points.

Estimated total for the research project—250 points.

GRADUATE STUDENTS (GEO 3, GEO 4, GEO 7): Each graduate student will prepare a 40-50 minute power-point presentation on some aspect of applied phycology, selected in consultation with the instructor. Possible topics include (but are not limited to): algae as biofuels, algae as food for humans and/or animals, causes and consequences of harmful algal blooms, impacts of increasing CO_2 levels on the marine phytoplankton. Estimated total for a good report—100 points.

GRADING: The final grade will be determined by the percentage of points earned out the total assigned (right now, it is anticipated that there will be 1350 points assigned (600 from lecture exams, 200 points from identification tests, and 550 from laboratory work, with an additional 100 assigned points for graduate students). The percentage earned will then be compared to usual scale and a letter grade assigned: percentages between 90 and 100 earn an A, between 80 and 90 earn a B, between 70 and 80 earn a C, between 60 and 70 earn a D, and below 60 earn an F.

DROPPING A COURSE WITHOUT PENALTY: In order to officially drop a course without penalty, a student must obtain and fill out a drop/add form from the Registrar's Office, acquire appropriate signatures, and return the completed form to the Registrar's Office before the designated date (published in the academic calendar). If you don't officially withdraw, and instead just stop coming to class, you will receive an F for the course. It will then take three A's in science classes cancel out that F and bring your GPA back up to 3.0 so you can maintain your scholarship.

SPECIAL NOTE 1: Grades will be neither posted nor given out over the telephone.

SPECIAL NOTE 2: Students requesting classroom accommodations or modifications due to a documented disability must contact the Access Office for Students with Disabilities located in the Farber Hall. The phone numbers are 245-2498 (V/VP) and 219-1348 (TTY).

VALDOSTA STATE UNIVERSITY GENERAL EDUCATIONAL OUTCOMES (GEO)

1. Students will demonstrate understanding of the society of the United States and its ideals. They will possess the requisite knowledge of the society of the United States, its ideals, and its functions to enable them to become informed and responsible citizens. They will understand the connections between the individual and society and the roles of social institutions. They will understand the structure and operational principles of the United States government and economic system. They will understand United States history and both the historical and present role of the United States in the world.
2. Students will demonstrate cross-cultural perspectives and knowledge of other societies. They will possess sufficient knowledge of various aspects of another culture, including the language, social and religious customs, aesthetic expression, geography, and intellectual and political history, to enable them to interact with individuals within that society from an informed perspective. They will possess an international viewpoint that will allow them to examine critically the culture of their own nation and to participate in global society.
3. Students will use computer and information technology when appropriate. They will demonstrate knowledge of computer concepts and terminology. They will possess basic working knowledge of a computer operating system. They will be able to use at least two software tools, such as word processors, spreadsheets, database management systems, or statistical packages. They will be able to find information using computer searching tools.
4. Students will express themselves clearly, logically and precisely in writing and in speaking, and they will demonstrate competence in reading and listening. They will display the ability to write coherently in standard English; to speak well; to read, to understand, and to interpret the content of written materials in various disciplines; and to listen effectively and to understand different modes of communication.
5. Students will demonstrate knowledge of scientific and mathematical principles and proficiency in laboratory practices. They will understand the basic concepts and principles underlying scientific methodology and be able to collect, analyze, and interpret data. They will learn a body of scientific knowledge and be able to judge the merits of arguments about scientific issues. They will be able to perform basic algebraic manipulations and to use fundamental algebraic concepts to solve word problems and equations. They will be able to use basic knowledge of statistics to interpret and to analyze data. They will be able to evaluate arguments based on quantitative data.

6. Students will demonstrate knowledge of diverse cultural heritages in the arts, the humanities, and the social sciences. They will develop understanding of the relationships among the visual and performing arts, literature and languages, and history and the social sciences. Students will be versed in approaches appropriate to the study of those disciplines; they will identify and respond to a variety of aesthetic experiences and engage in critical thinking about diverse issues. They will be able to identify the components of and respond to aesthetic experiences in the visual and performing arts. They will develop knowledge of world literature within its historical and cultural frameworks. They will understand modem issues within a historical context and the role of the individual in various forms of societies and governments.
7. Students will demonstrate the ability to analyze, to evaluate, and to make inferences from oral, written and visual materials. They will be skilled in inquiry, logical reasoning, and critical analysis. They will be able to acquire and evaluate relevant information, analyze arguments, synthesize facts and information, and offer logical arguments leading to creative solutions to problems.
8. Students will demonstrate knowledge of principles of ethics and their employment in the analysis and resolution of moral problems. They will recognize and understand issues in applied ethics. They will understand their own value systems in relation to other value systems. They will judge values and practices in a variety of disciplines.

DEPARTMENT OF BIOLOGY EDUCATIONAL OUTCOMES (BEO)

1. Develop and test hypotheses, collect and analyze data, and present the results and conclusions in both written and oral format used in peer-reviewed journals and at scientific meetings.
2. Describe the evolutionary process responsible for biological diversity, explain the phylogenetic relationships among the other taxa of life, and provide illustrative examples.
3. Demonstrate an understanding of the cellular basis of life.
4. Relate the structure and function of DNA/RNA to the development of form and function of the organism and to heredity
5. Interpret ecological data pertaining to the behavior of the individual organism in its natural environment; to the structure and function of populations, communities, and ecosystems; and to human impacts on these systems and the environment.

SCHEDULE OF LECTURES AND LABS
BIOLOGY 3550/5550—SPRING 2012

Note: Pacing and testing dates may be changed if the need arises. Attend class regularly.

1/11	Introduction	pp. 1-16
-	LAB—Algal habitats	----
1/13	An overview of the algae and algal diversity	pp. 1-16
-	LAB—Observing microalgae	----
1/18	Algae and biochemical cycles; review of photoautotrophy	pp, 18-37
-	LAB—Working with microalgae: cultures, size, and numbers	----
1/20	More on photosynthesis	pp. 18-37
-	LAB—More work with cultures; preparation of semi-permanent slides	----
1/25	Ecological and technological applications	pp. 38-78
-	LAB--Qualitative pigment analysis	----
1/27	Phylogenic relationships and the origins of photosynthesis	pp. 78-94
-	LAB--Quantitative pigment analysis	----
2/01	Cyanobacteria	pp. 94-121
-	LAB--Measuring photosynthesis	----
2/03	Cyanobacteria (continued)	pp. 94-121
-	LAB—Environmental control of structure—heterocyst formation and chromatic adaptation	----
2/08	Origins of eukaryotic algae	pp. 122-144
-	LAB-- Observing eukaryote algae--cell size, cell number, cell shape; zoosporogenesis, mating	----
2/10	Origins of eukaryotic algae	pp. 122-144
-	LAB—Genetic analysis—DNA extraction; set up PCR	----
2/15	FIRST UNIT EXAM	----
-	LAB—Genetic analysis—Gel electrophoresis; DNA purification	----
2/17	Introduction to the green algae, Prasinophyceans, Ulvophyceans	pp. 353-404
-	LAB—Complete environmental control labs, genetic analysis	----
2/22	Chlorophytes--Trebouxiophyceans, Chlorophyceans	pp. 404-443
-	LAB—Microscopic observation of macroscopic algae	----
2/24	Chlorophytes—Charophyceans	pp. 443-486
-	LAB—Microscopic observation of macroscopic algae (continued)	----
2/29	Red algae	pp. 309-345
-	LAB—Preparation of diatom samples; observations of living diatoms	----

3/02	Introduction to the ochrophyte (chromophyte; stramenopile) algae	pp. 212-243
-	LAB—Theory and practice of scanning electron microscopy	----
3/07	Diatoms	pp. 223-243
-	LAB--FIRST IDENTIFICATION TEST	----
3/09	Diatoms	pp. 223-243
-	LAB—Observations of cleaned diatoms in LM and SEM	----
3/14	SPRING BREAK--NO CLASS	----
-	LAB--SPRING BREAK	----
3/16	SPRING BREAK--NO CLASS	----
-	LAB--SPRING BREAK	----
3/21	Diversity of ochrophytes: raphidophytes, chrysophytes, etc	pp. 247-272
-	LAB—work on projects and identifications	----
3/23	Diversity of ochrophytes: xanthophytes, phaeophytes	pp. 272-309
-	LAB—work on projects and identifications	----
3/28	SECOND UNIT EXAM	----
-	LAB—work on projects and identifications	----
3/30	Cryptomonads and haptophytes	pp. 159-186
-	LAB—work on projects and identifications	----
4/04	Dinoflagellates	pp. 186-212
-	LAB—work on projects and identifications	----
4/06	Euglenoids	pp. 146-159
-	LAB—work projects and identifications	----
4/11	Aspects of phytoplankton ecology	pp. 486-543
-	LAB—work projects and identifications	----
4/13	Aspects of phytoplankton ecology	pp. 486-543
-	LAB—work on projects and identifications	----
4/18	Aspects of phytoplankton ecology	pp. 486-543
-	LAB—Observing microalgae--identifications	----
4/20	Aspects of periphyton ecology	pp. 547-587
-	LAB—Observing microalgae--identifications	----
4/25	Seaweed ecology	pp. 547-587
-	LAB—project reports	----
4/27	Aspects of terrestrial ecology	pp. 587-616
-	LAB--SECOND LABORATORY EXAM	----
5/01	READING DAY	----
5/02	EXAM 3 during final exam period (8:00-10:00)	----

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Dates to remember:

February 1: Project idea and feasibility check.

February 15: First lecture exam.

February 29: Formal project proposal due.

March 7: First identification test.

March 28: Second lecture exam.

April 25: Project reports due.

April 25: All algal identifications due.

April 27: Second identification test.

May 2: Third lecture exam (during final exam period).