AQUATIC ECOLOGY (ECOL 152)
CSU-FRESNO SPRING 2003

INSTRUCTOR:
Dr. Steve Blumenshine
Office: Science 316B
Email: sblumens@csufresno.edu
Phone: 278-8770
Office Hours: 1:30-3 M; 10:00-11:00 TR; (or by appt.)

COURSE DETAILS:
4 units including lab section
Lecture: S 322; 12:00-1:15p MW
Lab: S 322; 2-4:50 W
or by other prior arrangement

COURSE WEB SITE: http://zimmer.csufresno.edu/~sblumens/AquatEcol

CLASS EMAIL LIST: *Send me an email to make sure you get on the class email list*!

TEXT: Dodds, 2002, Freshwater Ecology: Concepts and Environmental Applications, Academic Press

This text is an exciting new text that fills a long void in the general area of aquatic ecology. The course will also draw from concepts and examples in recent and classic literature in this field.

COURSE CRITICALS: *Degree requirements:* ECOL 152 satisfies the Ecology component of the Ecology and Evolutionary Biology Option within the Biology Major. *Prerequisite:* BIOSC 130. *Catalog Description*: Physical-chemical features of inland waters as related to their biology; community structure and function, ecological interactions, adaptations, and identification of aquatic organisms.

PRIMARY LEARNING OUTCOMES:
1) Gain a theoretical and practical understanding of aquatic ecology
2) Familiarity with the ecological role and function of common freshwater aquatic biota
3) Ability to apply basic methods & equipment in studying aquatic ecosystems
4) Recognize and effectively apply general ecological concepts to aquatic ecosystems
5) Gain experience in presenting research to peers and colleagues
6) Participate in a service learning experience that will foster your career development through exposure to how aquatic ecology is practiced outside the academic realm

INTRODUCTION AND COURSE DESCRIPTION:
ECOL 152 is an introduction to an ecological discipline that has been a leader in the development of new general ecological theory. This course will assume you have a firm grounding in biology & math as well as exposure to basic chemistry and physics. We will closely examine theory and experimental studies that attempt to explain how aquatic organisms interact with each other and their physical and chemical environment. This will be achieved through lectures, readings, lab work, and writing. The goal is to develop a conceptual framework that may be used to pose and answer relevant questions in the discipline and to develop an appreciation for the special challenges involved in ecological studies.

The primary objective of this course is to allow you to become familiar with the scope of aquatic ecology and to master its basic facts, principles, and concepts. The approach will include a mix of theory (including a variety of mathematical, verbal, and graphical models of important ecological processes), and field and lab techniques. We will focus on the primary foundations and current concepts at major levels of organization, from individuals to ecosystems. You will also learn something about how the science is done by looking at examples of research in the textbooks, examples in lecture, and by reading published research.

Most of the material that I expect you to learn will be presented in lectures. Please feel free to stop by during office hours (or any other time you catch me when I'm not totally immersed in something else) to talk about the course. If you are having difficulty, whether it's with specific course content or with anything else I can help with, please don't hesitate to ask for help.

LECTURES: In general, topics will be covered in an engaging lecture format, but discussion (and even appropriate digression) is desirable. I will question you during lecture as much as I hope you'll question me. Preparation for lectures requires reading the assigned material BEFORE you come to lecture (how else can we discuss the information?). This is our time to address material that is still unclear to you, and I will try to allow time for you to ask questions. If you are still unclear on material, please make a point via a 'one-minute paper' (see section below) or visit with me during office hours or when we both have a free moment. Attendance policy for this course will follow the Student Handbook. Please make sure you understand its content.

DAILY ONE-MINUTE PAPERS: This is your opportunity for feedback and information exchange throughout the semester. At the end of each lecture period, provide me with a ½ sheet of paper with your name and a question or point from that day's material and / or a class reading. I will cover selected papers during the following class meeting.

LABS: Unless stated otherwise, lab assignments are due at the start of the next lab period, and cannot be made-up in the case of absences. If a prior, valid excuse prevents you from making the lab, special arrangements for make-up assignments (most likely a paper) will have to be made with me. Otherwise, credit for that lab will be lost. In the case of missing one portion of a two-week lab exercise, you may only earn half credit (at most). Many of the labs require interactive participation; it's not fair for people to get credit (i.e. turning in the assignment) without having contributed. Late lab assignments will be reduced 5% per day. Many of the lab exercises require time outside at various lentic (standing water) or lotic (flowing water) sites. This means we are vulnerable to weather conditions. Apart from dangerous conditions (e.g., lightening, strong winds, rabid mammals, irate landowners, etc.), we WILL get outside on these days so dress accordingly. The schedule indicates lab days that will be outdoors.

COURSE GRADE: Your grade for this course will be based on the following:

		% of Total Grade
Midterm Exams	(2 @ 15% ea.)	30%
Final Exam (Recent + Comp.)	(Wed, May 14 1:15-3:15p)	20%
Presentation of journal paper	(Apr 16&21, Approval by Apr 2)	5%
Service Learning assignment	(see description below)	15%
Lab	(8 brief assignments)	25%
Participation	(Lab & Lecture)	5%

- Grading scale: A=100-90%, B=89-80%, C=79-70%, D=69-60%, F=<60%
  I reserve the right to adjust this scale based on the progression of assessment outcomes.
- If at the end of the semester, your grade falls on a "borderline", I reserve the right to take improvement and effort into account in determining your final grade.

MIDTERM EXAMS:

- Midterm exams will be comprised of definitions & functional terms, problem solving, short answer, and longer (~1page) essay questions. Calculators will be allowed in exams.
- All material included in the course schedule prior to the exam is your responsibility.
- Two weeks before each exam, and up to two calendar days prior, you may submit short answer questions to me that could be used on the exam. 'Questions for Thought' at the end of the text

chapters are not eligible! Your original questions may be handed in after class or sent via email. When you email questions, please put "Aquat Ecol exam question" in the subject line. For each question of yours *that I select* to use on the exam, you will receive 2 extra points. You may receive up to 12 bonus points during the semester. Studying with this objective in mind is an excellent way to prepare for exams.

- No make up exams except in cases of medical emergency or university commitment with documentation.
- You will be given at least one week's notice in the event of a rescheduled exam.

FINAL EXAM:

- Will include material covered since the second mid-term exam plus comprehensive (expect synthesis of course material)
- The date and time is given above in the grade breakdown. It is not possible to take the final exam before this time. Plan accordingly.

PRESENTATION OF JOURNAL PAPER:

Almost any professional pursuit will require that you be able to get up in front of an audience and present information clearly and concisely. You will be given the opportunity to get some practice at this in the course. This exercise is also intended to practice critical evaluation of the scientific literature as it pertains to the biology and ecology of freshwater systems. Each student is to choose a paper (>5pp) under the broad topic of limnology or freshwater ecology from a peer-reviewed scientific journal. You must submit a paper for approval by April 2. I will be glad to help in your first attempts at reading and criticizing these papers. Hopefully, by the end of the course you will have gained a feel for the quality and kinds of research being done in aquatic systems. You will also have learned something about how good research is conducted and how to discern good from poor research. You will find well reviewed, quality research and writing in the following journals: *Ecology, Ecological Applications, Limnology and Oceanography, Freshwater Ecology, Canadian Journal of Fisheries and Aquatic Sciences, Aquatic Botany, Trends in Ecology and Evoluation, Journal of Fish Biology, Transactions of the American Fisheries Society, Journal of Aquatic Animal Health, Science, Nature.*

INSTRUCTIONS: Prepare and turn in a ≤ 1 page outline for the instructor on the day of your presentation. On this day, each student will use this outline as a basis for a 10-15 min. presentation to the class, which explains the research described in the paper. This time limitation will be strictly enforced to ensure time for all. Transparencies will be made available upon request or you may use a PowerPoint or Corel Presentations format (alert me to your format well ahead of time). You are encouraged to expand on the outline by using tables and / or figures from the paper, as well as your critical review of the paper.

SERVICE LEARNING ASSIGNMENT DESCRIPTION:

This portion of the course accounts for 15% of your grade (as much as a mid-term exam), but will be broken down into subcomponents to facilitate assessment and your understanding of the expectations of this important activity. *Consider the service learning component as a replacement of a traditional student project and term paper*. The service learning assignment centers around your interactions with a local professional on work relevant to aquatic ecology. A *minimum* of 10 hours is required which will be comprised by your participation on a research or monitoring project spearheaded by the professional sponsor.

Why service learning? I know from my own hiring and selection of students for research positions that nothing stands out in an application like prior experience. However, the obvious "Catch-22" of this situation is frustrating for people without experience outside the classroom. The service learning experience in this course should: 1) provide you with at least some experience in and exposure to a

professional setting in the aquatic sciences, 2) allow you to make the very important links between course material and it's implementation by professionals outside an academic setting, an opportunity which is all too absent from traditional teaching, and 3) establish important contacts with professionals in the community, which could greatly improve your placement prospects following graduation. An additional indirect benefit is to increase community awareness of the resources represented by CSU-Fresno students. This course emphasizes methodologies and approaches which will largely be delivered through a lecture and laboratory component. Although I will attempt to relate course material to 'applied' aspects of the discipline, a service learning component will more effectively link course exercises and goals with application to professional settings.

SERVICE LEARNING (SL) ASSIGNMENTS: Tasks, Date, Percent of Service Learning grade

Select and Contact Service Learning Sponsor; Jan 29 (ASAP encouraged); no credit

Early in the semester you will be provided with a list of service learning sponsors including contact information, agency name and level (e.g. private, local, state, federal), and brief description of the nature of potential activities. Early in this SL process, you should gather information on the mission of the agency, who is served, what are the immediate goals, and how (generally) are these executed.

Coordination of Service Learning activity with sponsor; Feb 12 (w/ exception); 15% of SL grade

I will mediate student-sponsor interactions, but it is your responsibility to contact your selected service learning sponsor to establish the nature and schedule of your activities. Write and submit a ½ page, single-spaced summary of your planned activities following consultation with your chosen sponsor. Also include a few statements on what hope to learn and achieve from your service learning activity. Provide the sponsor with your contact information either in person or via email. Regard this activity as part of your professional development, and act accordingly. For now, you are representing the university. This is good practice for self-representation in the near future!

Status Report; Mar-Apr; No Credit

Provide me with a ½ page summary update (email ok) of your SL experience. This 'check-up' will facilitate the success of the project and get you on track for your report and presentation.

Report paper; Apr 30; 50% of SL grade

Write a 5-6 page 1.5 line spaced paper which includes: a) the who, what, and where of your activity, and the agency background as discussed above, b) how your SL project related to at least three concepts from course material; c) the strengths and weaknesses of the experience (esp. vs. traditional ways of learning), d) the influence of your activity on your professional trajectory.

Exit interview with instructor; May 5 (Apr 30: sign up for 10 minute interview slots); 5% of SL grade

Presentation of service learning project/experience; May 5 & 7; 15% of SL grade

This is your opportunity to share and explain your activity with the class. You are encouraged to use multimedia, and expand on the broader mission of the agency and scientists with whom you worked. Suggestions for presentation outlines will be discussed in class at least two weeks prior.

Service learning sponsor evaluation; (upon completion of assignment); 10% of SL grade

This portion is an assessment of your activity by your service learning sponsor.

Thank you letter to service learning sponsor; sent by May 12; 5% of SL grade

Provide me with an email or hard copy.

COURSE POLICIES:

My primary policy for this course is based on the principle of mutual respect among students and instructors. Everyone in class has expended time and money to take this course, and deserves a quality learning environment. Thus, talking in class (beyond whispering with your neighbor about a point made in class), active cell phones and pagers etc., use of tobacco products, reading newspapers in class or other distracting behavior will earn the scorn of your peers.

Attendance is expected at all class periods. If you must miss a class (and there must be a compelling reason to do so) get notes from a classmate as soon as possible, and make arrangements with me for alternative assignments to missed laboratory exercises. Since you are here on your own accord, attendance is not an explicit part of your grade, but there is overwhelming evidence that poor attendance will definitely be reflected in your grade.

Important announcements will be made during class regarding exams, reading assignments, etc. and it is your responsibility to be aware of them, as well as learning from the lectures. Also check your email as I will disseminate information to the class email list. If you are absent from class, it is your responsibility to obtain notes from a classmate and check on announcements made while you were away.

DROP OR WITHDRAW:
Last day to drop the course is Jan 22; (Apr. 15 "for SERIOUS and COMPELLING REASONS"). Please see me or your academic advisor to work out solutions to avoid this. *The dean may require that the student provide written substantiation as deemed necessary.*

UNIVERSITY POLICIES:
"For information on the University's policy regarding cheating and plagiarism, refer to the *Schedule of Courses* (Legal Notices on Cheating and Plagiarism) or the *University Catalog* (Policies and Regulations)." Below are some sample statements that provide more than just the reference.

STUDENTS WITH DISABILITIES: Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Services to Students with Disabilities in Madden Library 1049 (278-2811).

CHEATING AND PLAGIARISM: "Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work." Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the university. For more information on the University's policy regarding cheating and plagiarism, refer to the Schedule of Courses (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations)

COMPUTERS: "At California State University, Fresno, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services (http://www/csufresno.edu/ITS/) or the University Bookstore. In the curriculum and class assignments, students are presumed to have 24-hour access to a computer workstation and the necessary communication links to the University's information resources."

Class Schedule: (*subject to modification*)

Day:	Lecture # & Topic	Readings	Lab Topic
Jan 13	Class Introduction and Overview	Ch 1	
15	1-Life in Water: Properties and Adaptations	Ch 7; Ch2 B&H	*Survey of Biota
20	*HOLIDAY*		
22	1-Life in Water: Properties and Adaptations	"	*Properties of water
27	2-Lake Types; Morphology & Zonation	Ch 6	
29	*Field Trip-Hensley Reservoir (Winter)(See data set)*		
Feb 3	3-Physical Factors: Light, Heat, Circulation	Ch 3; Snucins& Gunn	
5	4-Oxygen & Gases; pH & Alkalinity	Ch 11	*Process
10	5-Nutrients & Biogeochemistry	Ch 12-13; Cole et al.	
12	6-Primary Producers and Production	Ch 17; Schindler et al.	**Pond PP & Metabolism*
17	*HOLIDAY*		
19	Wetlands and Temporary Habitats	Ch 15: Temporary waters and small ponds	*Vernal Ponds*
24	**EXAM 1**		
26	7-Invertebrates: Zooplankton and Benthos	Ch 9; Blumenshine et al.	Comp Time
Mar 3	7-Invertebrates: Zooplankton and Benthos		
5	8-Fishes	Brooks & Dodson	Predation Expt.
10	8-Fishes	Ch 21; Moyle CA IBI	
12	9-Stream Ecology – Geol, Phys, Chem	Ch 5	*Process Pred Expt.
17	9-Stream Ecology – Geol, Phys, Chem	"	
19	10-Rapid Bioassessement Protocols (RBP)	RBP Manual	**Stream Environments*
24-26	*SPRING BREAK*		
31	*HOLIDAY*		
Apr 2	11-Stream Ecology – Biota	Hauer & Lamberti (parts of Ch 13,14,16,17)	*Stream Biota*
7	11-Stream Ecology – Biota		
9	**EXAM 2**		*Process Stream Biota
14	12-Stream Ecology – Ecosystems	Ch 22 (to p469) Vannote et al. 1980	
16	13-Reservoirs & water in the west	Cadillac Desert video	Journal Paper Pres.
21	Journal Paper Presentations		
23	*Field Trip – Hensley Reservoir (Spring)*		
28	14-Food Web Interactions in Fresh Water	Ch 19	
30	15-Food Web Interactions in Fresh Water	Hambright et al.	*Process
May 5	SL Presentations		
7	SL Presentations		x

FINAL EXAM: W May 14, 1:15-3:15

Lab exercise in italics = outdoors, dress accordingly

* = Brief assignment to be turned in at next lab meeting (8 for 20% of class grade)

Readings: You are expected to read chapters and papers in preparation for the corresponding lecture. Please feel free to bring questions about the readings for class discussion. I will also give you directed questions for the readings to facilitate class discussion. Readings will be available from the bulletin board outside my office (S316).