Biology 486 Lab, Fall 2014

Aquatic Ecology Laboratory

Required Text: Downing, J.A. 2014. *Field and laboratory exercises in aquatic ecology.* Laboratory Manual, Iowa State University. Supplemental materials will be provided on Blackboard.

Course Description: Field trips and laboratory exercises to accompany Biol 486; hands-on experience with aquatic research, monitoring techniques, and concepts.

Blackboard: Grades and course instructions will be posted on Blackboard. The login page is as follows: https://bb.its.iastate.edu/webapps/portal/frameset.jsp

Special needs: Please address any special needs or special accommodations with the instructor at the beginning of the semester or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from Disability Resources (DR). DR is located on the main floor of the Student Services Building, Room 1076. Their phone number is 515-294-6624, TDD 515-294-6335, or email Steven Moats at smoats@iastate.edu.

Intended learning outcomes:

- Learn to quantify, model, and predict the physical aspects of aquatic environments (e.g. movement, heat, light).
- Understand the importance, measurement, dynamics, and cycling of major chemical species in aquatic environments (e.g. inorganic carbon, phosphorus, nitrogen, oxygen).
- Learn to quantify, model, and predict the biological cycling of energy in aquatic environments and the relationship of biological production to management goals.
- Recognize the factors responsible for the zonation of aquatic environments and organisms.
- Understand the major aquatic ecosystem management methods and models.
- Learn to recognize the principal tools of aquatic ecology and how they are applied, including field and laboratory methods.
- Obtain practical experience in solving complex ecological problems.

Grading:

Hypotheses and references (3 @ 25 pts each)	75 pts
Report 1	100 pts
Report 2	50 pts
Report 3	50 pts
Report 4	50 pts
Report 5	100 pts
Report 6	50 pts
Final Report	200 pts
Lab Practical Examination	90 pts
Weekly Quizzes (10 @ 10 pts each)	100 pts
Participation (13 labs @ 5 pts each)	65 pts
Total	930 pts

Percentage	Grade
90-100	A
80-89	B
70-79	C
60-69	D
<60	F

Additional Information:

- Lab reports must be clear, concise, and prepared in the format specified by the lab instructor. Detailed report format instructions and suggestions for effective writing are provided in your lab manual. This course helps fulfill the communication intensive requirement of ISU degree programs.
- Do not be late. If you're not here when the van leaves, you are out of luck.

- Come to lab dressed appropriately. We will go out in the field even if it is raining. On days when we will be handling chemicals in the lab, long pants and closed shoes are required.
- Instructors may curve grades if appropriate.
- Plus/ minus grades will be used.
- Please inform the TA of an absence prior to missing class when possible. If you miss a lab or quiz without a valid excuse, you will receive a zero. If you do not have an excused absence, you may not get data from someone else to use in your lab report.
- Lab reports must be submitted at the beginning of the lab period they are due. Each day a report is late, the grade will be reduced 25%. Reports may not be turned in later than 2 days after the due date.
- Data will be collected in groups and shared, but each individual must write and submit his/ her own unique report.
- Plagiarism or cheating of any kind will not be tolerated. If it is determined that you have submitted unoriginal work (i.e., written by students from previous semesters or other sections of this course), you will *at minimum* receive no points for the assignment in question. Further disciplinary action will proceed as per Iowa State University's academic dishonesty policies: http://www.public.iastate.edu/~catalog/2009-2011/geninfo/dishonesty.html

Field and Laboratory Schedule

Dates	Subject Matter	Specific Objectives	Assignments Due	Location	Pre-labQuiz
Week 1 **Aug. 26**	**Chapters 1-2:** Lab orientation, safety, basic field and chemical methods	Introduction; Lab and field methodology and safety.	None	Lab	No
Week 2 **Sept. 2**	**Chapter 3 part 1:** Data organization and analysis **Chapter 4:** Heat and stratification	Examine energy content and thermal structure of a lake. Calculate thermal stability. Collect water for future analyses Introduction to MS Excel and R software: organize and analyze field data	Hypotheses and three references (25 pts.)	Lab & Field (Ada Hayden)	Yes
Week 3 **Sept. 9**	**Chapter 3 part 2:** Writing lab reports **Chapter 5**: Light, transparency, turbidity, and light climate	Measure Secchi depth. Examine light extinction profile. Collect GPS waypoints for future spatial analyses Overview of lab report format and rubric.	Hypotheses and three references (25 pts.)	Lab & Field (Ada Hayden)	Yes
Week 4 **Sept. 16**	**Chapter 6**: The littoral zone: Structure and function: macrophytes and epifauna.	Collect and identify aquatic macrophytes. Determine species composition and biomass of macrophytes. Collect and identify epiphytic community. **Bring waders, boots, or quick-dry clothing.**	**Lab Report 1:** Heat, stratification, and light climate (100 pts.)	Lab & Field (Ada Hayden)	Yes
Week 5 **Sept. 23**	**Ch. 7, 8**: Water in motion: waves and currents; Benthic invertebrates in standing and running water; Particulate organic matter transport	Measure current profile and transport of water and particulate organic matter in a river. Collect, sort, and identify stream benthos samples. **Bring waders, boots, or quick dry clothing.**	Hypotheses, experimental design, and three references (25 pts.)	Field (Skunk River)	Yes
Week 6 **Sept. 30**	**Chapter 9**: Oxygen, alkalinity, and inorganic carbon	Measure oxygen profile using electronic probes. Measure alkalinity by titration and calculate inorganic C fractions.	**Lab Report 2:** Stream flow and POM transport (50 pts.)	Lab & Field (Ada Hayden)	Yes
Week 7 **Oct. 7**	**Weather make up day (if necessary)**	TBA	None	TBA	No

Week 8 **Oct. 14**	**Ch. 10:** Aquatic microbial ecology *October 17: Midterm grades submitted*	Collect and incubate water for detection of coliform bacteria	**Lab Report 3:** Oxygen, alkalinity, and inorganic carbon (50 pts.)	Lab & Field (Lake Laverne)	Yes
Week 9 **Oct. 21**	**Ch. 11**: Primary production in the pelagic zone	Primary production, chlorophyll *a* analysis, ***Previously collected*** Discuss Lake Laverne coliform results	**Lab Report 4:** Aquatic microbial ecology (50 pts.)	Lab	Yes
Week 10 **Oct. 28**	**Ch 11:** Phytoplankton ecology and taxonomy *October 31: Last day to drop full-term courses*	Identify, measure, and count phytoplankton Determine biovolume ***Previously collected***	None	Lab	No
Week 11 **Nov. 4**	**Ch. 12**: Secondary Production: Zooplankton	Identify, measure, and count zooplankton ***Previously collected***	**Lab Report 5:** Primary production, including chlorophyll and taxonomic analyses (100 pts.)	Lab	Yes
Week 12 **Nov. 11**	**Ch. 13**: Phosphorus and nitrogen: lab analyses	Analyze total phosphorus and nitrogen in previously collected water samples. ***Previously collected.***	None	Lab	Yes
Week 13 **Nov. 18**	**Ch. 14**: Spatial analyses of aquatic systems	Analyze previously collected morphometric data and produce accurate morphometric maps	**Lab Report 6:** Nitrogen and phosphorus (50 pts.)	Lab	Yes
Week 14 **Nov. 25**	**Thanksgiving Break**				
Week 15 **Dec. 2**	**Ch. 15**: Lake management methods and models	Use Wisconsin Lake Modeling Suite (WiLMS) to predict the response of lakes to eutrophication and management strategies.	**Final Synthesis Report of analyses in Ada Hayden** (200 pts., Covering material throughout the semester)	Lab	No
Week 16 **Dec. 9**	Lab Practical Examination	Covers equipment, materials, and calculations performed and used throughout semester.	None	Lab	No