



Fall, 2006

This course provides an introduction to freshwater biology, with an emphasis on the function of temperate-zone lakes and streams. In it, you will study freshwater species, populations, and communities to learn how organisms in freshwater systems interact with each other and with their physical and chemical environment. The course includes a semester-long laboratory project in which the class will do an in-depth analysis of local waterways. In this way, integration of information from lecture and laboratory will provide a comprehensive overview of the important processes that occur in freshwater lakes and streams and the positive and negative effects of humans on those systems.

INSTRUCTOR Dr. Ann Throckmorton, Associate Professor of Biology

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Office hours: 10:30-11:30 Monday, Friday

9:20-10:50 Tuesday

or by appointment

LECTURE 12:50 - 1:50, M W F

Hoyt 152

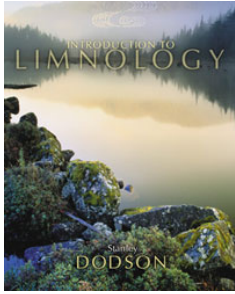
Attendance in lecture is expected. Because your success in this course is strongly dependent on your presence in class and your participation, you should make an effort to be present at all class sessions. Absence may be excused for personal emergencies or health-related problems. If you miss class, it is your responsibility to contact me and to obtain lecture notes and assignments that were given during your absence.

LABORATORY 2:00 - 5:00 Monday

319 Hoyt Science Center

Attendance in laboratory is required. You must notify me ahead of time if you know that you cannot be in lab. Almost all of our lab work will take place outside, so in most cases it won't be possible for you to make up a missed lab. Come prepared to go outside, no matter what the weather!

RESOURCES



Textbook: *Introduction to Limnology*, by Stanley Dodson (1st edition, 2005).

Laboratory: You will need a quad-ruled lab book. If there are lab handouts or materials for you to read before lab, I will post the them on the r-drive or place them on reserve in the library as soon as I can prior to the day of lab.

At the end of the semester, we will be discussing reports and articles about current issues in freshwater biology. The resources for those discussions may be found on the Internet, posted on the r-drive, or placed on reserve in the library. Because of copyright restrictions, I cannot make copies for everyone in the class. For that reason, you will be responsible for locating the materials and copying them yourself.

PURPOSE OF THIS COURSE

1. To explore the relationships between aquatic species and their environments, and to investigate the factors that determine the distributions, abundances, and behaviors of living organisms in aquatic environments. To discover general ecological principles that shape the aquatic world.
 2. To investigate the freshwater resources surrounding Westminster College and to determine what biotic, abiotic, and anthropogenic factors have the greatest effect on local water resources.
 3. To explore the many ways that humans affect the quality and quantity of water in the natural world and the effect that this has on the aquatic organisms that rely on it.
 4. To demonstrate how limnologists use the scientific method and what its capabilities and limitations are within the field.
 5. To present some of the methods used by limnologists in the laboratory and in the field, and to show how these methods are used to develop test and investigate theories. This includes:
 - a) development of a familiarity with some important techniques and equipment used by limnologists doing field studies;
 - b) collection of data;
 - c) analysis of data using appropriate techniques;
 - d) development of conclusions based on data analysis; and
 - e) the use of experimental methods of observation and measurement.
 6. To stimulate you to think critically and logically, by designing experiments and scientific studies, collecting data, and analyzing and interpreting data.
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METHODS OF INSTRUCTION

- Lectures and discussion:** This will follow the tentative schedule printed below. I expect you to attend class, pay attention, and participate actively in the discussion by answering questions, asking questions, and making appropriate comments. You will get more out of the lecture and discussion if you have read the material in the textbook ahead of time, as readings from the textbook will augment the lecture and provide material for discussion. Bring your textbook to class every day.
- Readings and assignments:** The textbook that I have chosen provides a good general introduction to the subject of freshwater biology. Many of the topics that we will approach in the class are covered by the book; additional material to be read for the lecture or laboratory will be placed on reserve in the library. Small class assignments will enhance particular lecture topics and highlight information or skills to be applied in lab.
- Laboratories:** This is a very important part of the course. All lab work during the semester will be focused on one goal – to perform an in-depth analysis of the waterways around New Wilmington, to determine how healthy they are and to identify possible sources of pollutants or stress. You will prepare for lab each week by researching and answering a series questions related to that week’s goals and the techniques we will be using. Any data that are collected should be initially recorded in your lab book, then saved in an Excel file on the r-drive. Once you have completed an analysis, the results and discussion will be turned in electronically. At the end of the semester, you will take all of the files that you have produced during the semester, revise them, add to them, and create one large lab report presenting a detailed analysis of a local freshwater environment.

GRADING

Grades will be based on exams, assignments, laboratory work (i.e., pre-lab write-ups, results, and discussion), and your final lab report, weighted as follows:

lecture exams (3)	= 50% of final grade
assignments	= 5% of final grade
laboratory work	= 25% of final grade
final lab report	= 20% of final grade

Your final grade will be based on the following scale:

Above 93%: A	87% - 90%: B+	77% - 80%: C+	67% - 70%: D+	below 60%: F
90% - 93%: A-	83% - 87%: B	73% - 77%: C	63% - 67%: D	
	80% - 83%: B-	70% - 73%: C-	60% - 63%: D-	

POLICY ON EXAMS AND ASSIGNMENTS

You must take the exams at the scheduled time unless you have talked to me prior to the exam and been excused. Valid excuses include such things as serious illness or injury and personal and family emergencies. I will give make-up exams *only* if you have notified me personally before the day of the test.

All assignments must be turned in by 5:00 p.m. on the day that they are due unless you are absent the day that the assignment was due and had a valid excuse. Points will be subtracted from assignments turned in late. Occasionally, assignments will be due in class but I will let you know ahead of time if this happens.

You may turn in assignments, labs books, and lab write-ups in three ways:

1. hard copy: the least desirable method, except for lab books. Hand the paper to me, slide it under my office door, or give it to someone to deliver to me. *Do not use campus mail.*
2. in the Assignments folder on the course r-drive: if you save a file to the r-drive, the name of the file must contain your name and some indication of what it contains (e.g., the name of the file could be "Smith, Assignment 5"). You must save the file to another drive, then save it to the r-drive. If you try to save directly to the r-drive, the network will only write a blank temporary file and you will lose all of your work. Once you have saved something to the Assignments folder you will be unable to retrieve it, open it, or delete it.
3. as an e-mail attachment. Again, the name of the file must contain your name and some indication of what it contains. You can find out if I have received your messages by looking in the Sent Items folder in your mailbox.

ACADEMIC INTEGRITY

Academic integrity is central to the purpose and pursuit of any academic community. In this class, I expect you to adhere to the principles of academic integrity stated in the [Westminster College handbook](#) and to maintain the highest standards of academic honesty and integrity, in keeping with the philosophy and purposes of the College.

“Academic dishonesty is a profound violation of this expected code of behavior. It can take several forms, including, but not limited to, plagiarism, cheating, purposely altering the work of another (without that person’s permission), misrepresentation of attendance in class or at a College event, misrepresentation of work, facts or experimental results, unauthorized use of or intentional intrusion into another's computer files and/or programs, intentional damage to a computer system, unauthorized use of library materials and privileges, or engaging in any activity which attempts to alter or harm another’s academic standing.”

TENTATIVE SCHEDULE OF LECTURE TOPICS AND READINGS

DATE	TOPIC	READING (DODSON, 2005)
August 30	Introduction to the course What is limnology? Naming water bodies	Chapter 1, pp. 1-4 Chapter 1, pp. 12-13
September 01	Properties of water	Chapter 2, pp. 29-39
September 04 September 06	Properties of water (continued) Temporal and spatial patterns in lakes: Temperature	Chapter 2, pp. 40-44
September 08	Light	Chapter 2, pp. 40-44
September 11 September 13 September 15	Oxygen Producers and productivity Diversity of aquatic organisms Prokaryotes	Chapter 2, pp. 44-47 Chapter 2, pp. 47-49 Chapter 3, pp. 65-72
September 18 September 20 September 22	Protista and fungi Rotifers and annelids Arthropods	Chapter 3, pp. 72-80 Chapter 4, pp. 85-92 Chapter 4, 92-108
September 25 September 27 September 29	Insects Mollusks Vertebrates	Chapter 4, pp. 109-114 Chapter 4, pp. 121-124 Chapter 4, pp. 124-131
October 02 October 04	Plants Dynamics of freshwater populations Population size	Chapter 4, pp. 131-138 Chapter 6, pp. 143- 149
October 06	Exam #1	
October 09 October 11 October 13	Dynamics of freshwater populations Exponential population growth Life histories Freshwater communities Introduction	Chapter 6, pp. 149-154 Chapter 6, pp. 154-157 Chapter 7, pp. 161-165
October 14 – 17	Mid-semester break	
October 18 October 20	Freshwater communities Competition Predation	Chapter 7, pp. 165-168 Chapter 7, pp. 168-177
October 23	Mutualism and symbiosis Biodiversity	Chapter 7, p. 178 Chapter 7, pp. 178-181
October 25 October 27	Community composition Community dynamics	Chapter 7, pp. 181-183 Chapter 8, pp. 189-194

DATE	TOPIC	READING (DODSON, 2005)
October 30	Freshwater communities Long-term change in communities	Chapter 8, pp. 194-205
November 01	Aquatic ecosystems Models and space-time diagrams	Chapter 9, pp. 209-212
November 03	Exam #2	
November 06	Aquatic ecosystems Primary and secondary productivity	Chapter 9, pp. 212-219
November 08	Physiological ecology	Chapter 9, pp. 217-225
November 10	Physiological ecology (continued)	
November 13	Chemical cycles in freshwater ecosystems Carbon	Chapter 10, pp. 231-237
November 15	Oxygen and silicon	Chapter 10, pp. 237-239
November 17	Phosphorus	Chapter 10, p. 250
November 20	Nitrogen	Chapter 10, pp. 239-245
November 22 - 26	Thanksgiving break	
November 27	Human effects on freshwater ecosystems Toxic chemicals	Chapter 10, pp. 252-258
November 29	Human effects on freshwater ecosystems	Assigned reading
December 01	Human effects on freshwater ecosystems	Assigned reading
December 04	Human effects on freshwater ecosystems	Assigned reading
December 06	Human effects on freshwater ecosystems	Assigned reading
December 08	Human effects on freshwater ecosystems	Assigned reading
December 11	Conclusions	
December 12	Reading Day	
December 14, 3:00 – 5:30	Final exam	