

# Biology Capstone

Bio 601



Spring, 2006

## INSTRUCTORS

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Office hours: 9:20 – 10:50 Tuesday  
10:30 – 11:30 Wednesday and Friday  
*or by appointment*

11:00 – 12:30 Tuesday, Thursday  
*or by appointment*

## LECTURE

8:10 – 9:10 Tuesday, Thursday

152 Hoyt Science Center

Attendance in lecture is expected. Because 25% of your grade in the course will be based on participation, your success is strongly dependent on your presence in class. Therefore, 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 us and to obtain information and assignments that were given during your absence. Any missed group work must be made up on an individual basis and will be graded on an individual basis.

## REQUIRED

### MATERIAL

Textbook: *How Science Works: Evaluating Evidence in Biology and Medicine*, by Stephen H. Jenkins (Oxford University Press, 2004)

Additional materials will be placed on reserve in the library

## PURPOSE OF THIS COURSE

1. To provide an opportunity for students to evaluate and assess the strengths and limitations of biology and to reflect on the value of education in and beyond biology.
2. To demonstrate how biologists use the scientific method and what its abilities and limitations are.
3. To demonstrate the excitement and possibilities inherent in the study of the natural world and to show how curiosity can be focused to make novel contributions to the field of biology.
4. To prepare students to participate in individual research during their senior year. This includes:
  - a) selecting a research topic dealing with some aspect of the biology of a model organism;
  - b) developing a detailed research proposal;
  - c) presenting their proposals to other students and receiving suggestions and critiques;
  - d) selecting a faculty research advisor; and
  - e) completing a pilot project to assess the feasibility of their research.
5. To continue to develop the qualitative and quantitative reasoning skills required for scientific inquiry, experimental design, and problem solving;
6. To increase information literacy, including facility in locating, reading, and interpreting scientific articles.
7. To strengthen communication and problem solving skills.

## METHODS OF INSTRUCTION

- Classroom discussion:** This will follow the tentative schedule printed below. The textbook we have chosen provides an excellent overview of the scientific process and how it is used to address practical questions in the field of biology. Additional reading material will focus on the craft of research. We 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 assigned material ahead of time. Ten percent of your grade in the course will be based on the quality of your participation. Simply attending class is not sufficient to earn points for participation.
- Assignments:** These will include exercises in data analysis and graphical presentation, in-class essays, and information literacy. They will be assigned on a weekly basis. Please refer to *Policies on Exams and Assignments* shown below for instructions on submitting assignments. Data analysis assignments will require assessment and interpretation of data as well as processing of raw data for further analysis or graphical representation. We will be using Microsoft Excel to complete these assignments. Graphing assignments will provide you with opportunities to hone your skills at selecting the most appropriate graphical format for presenting processed results. In-class essays will serve as an assessment tool for student comprehension of material discussed in class. Information literacy assignments will help you develop skills necessary for locating scientific articles, as well as reading, analyzing, and summarizing scientific literature, especially primary and secondary sources. They will provide you with opportunities to initiate and explore potential projects in your field of interest.
- Individual research project:** The major focus of this course is the production of a formal research proposal which you will implement next semester. At the beginning of the semester you will be introduced to the model organism which everyone in the class will use. You will then do a literature review to discover information about the basic biology of the organism and to learn what previous researchers have discovered about it. This will help focus your interest on a specific research topic. You will then complete a simple pilot study designed to assess the viability of your plan. You will then write a formal proposal that will include relevant background information, hypotheses, detailed methods and materials, costs, and a literature cited section. At the end of the semester you will present your proposal to others in the class and receive their suggestions and critiques. Finally, you must select a faculty advisor who will supervise your progress throughout next semester.

## GRADING

Grades will be based on participation, assignments, a research proposal, and a proposal presentation, weighted as follows:

participation	= 10% of final grade
assignments	= 20% of final grade
research proposal	= 60% of final grade
proposal presentation	= 10% 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

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. Valid excuses include such things as serious illness or injury and personal and family emergencies. Points will be subtracted from assignments turned in late. Occasionally, assignments may be due in class but we will let you know ahead of time if this happens.

You may turn in assignments in three ways:

1. hard copy: the least desirable method. Hand the paper to one of us, slide it under our office door, or give it to someone to deliver. *Do not use campus mail.* If you turn in a hard copy, you must submit an electronic copy within one week.
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 we have received your messages by looking in the Sent Items folder in your mailbox.

## ELECTRONIC DEVICES

Electronic devices such as cell phones, MP3 players, and blackberries are not allowed in the classroom. If a student's cell phone rings or buzzes during class or a student answers their cell phone during class, points will be deducted from their *total* grade (one point for the first occurrence, two points for the second, etc.). Exceptions to this rule will only be made if the student informs the instructor that they are waiting for an important call which pertains to a medical or family emergency.

## 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
01/19	Introduction to the course	
01/24	Reading/Discussion – <i>Introduction</i>	<i>How Science Works</i> , chapter 1
01/26	Reading/Discussion – <i>Precision and the power of statistical tests</i> (Data Analysis Assignment #1)	<i>How Science Works</i> , Appendix 2
01/31	Reading/Discussion – <i>From topics to questions; from questions to problems</i>	Booth , et al., ** chapters 3 & 4
02/02	Reading/Discussion – <i>From Questions to Sources; Using Sources</i> (Information Literacy Assignment #1)	Booth , et al., chapter 5 & 6
02/07	Model organism	Handouts
02/09	Model organism (Information Literacy Assignment #2)	Handouts
02/14	Reading/Discussion – <i>Do antioxidants benefit health?</i> (In-Class Essay #1)	<i>How Science Works</i> , chapter 2
02/16	Reading/Discussion – <i>Do antioxidants benefit health?</i>	<i>How Science Works</i> , chapter 2
02/21	Reading/Discussion – <i>Can dogs identify suspects by smell?</i> (Plan Pilot Study for feasibility)	<i>How Science Works</i> , chapter 3
02/23	Reading/Discussion – <i>Can dogs identify suspects by smell?</i> (Data analysis Assignment #2)	<i>How Science Works</i> , chapter 3
02/28	Reading/Discussion – <i>Why are frogs in trouble?</i> (Begin Pilot Study)	<i>How Science Works</i> , chapter 4
03/02	Reading/Discussion – <i>Why are frogs in trouble?</i> (Graphical Presentation Assignment #1)	<i>How Science Works</i> , chapter 4
03/07	Reading/Discussion – <i>How do animals find stored food</i>	<i>How Science Works</i> , chapter 5
03/09	Reading/Discussion – <i>How do animals find stored food?</i> (In-Class Essay #2)	<i>How Science Works</i> , chapter 5
03/11 – 03/21	Spring break	
03/23	Reading/Discussion – <i>Thinking in Print, Connecting with Your Reader</i>	Booth , et al., chapters 1 & 2
03/24	(*Outline of Proposal Due*)	
03/28	Reading/Discussion – <i>Pre-Drafting and drafting</i> (Graphical Presentation Assignment #2)	Booth , et al., chapters 11
03/30	Reading/Discussion – <i>What causes cancer?</i>	<i>How Science Works</i> , chapter 6
04/04	Reading/Discussion – <i>What causes cancer?</i> (Data Analysis Assign. #3 & Graphical Presentation Assign. #3)	<i>How Science Works</i> , chapter 6
04/06	Reading/Discussion – <i>Why do we age?</i>	<i>How Science Works</i> , chapter 7
04/10	Reading/Discussion – <i>Why do we age?</i>	<i>How Science Works</i> , chapter 7
4/13	Reading/Discussion – <i>Why do we age?</i> (In-Class Essay #3) (*Draft of Proposal Due*)	<i>How Science Works</i> , chapter 7
04/14 – 04/17	Easter break	

DATE	TOPIC	READING
4/18	Reading/Discussion – <i>Revising your organization and argument</i>	Booth, et al., chapter 13
4/20	Reading/Discussion – <i>How does coffee affect health?</i>	<i>How Science Works</i> , chapter 8
4/25	Reading/Discussion – <i>How does coffee affect health?</i>	<i>How Science Works</i> , chapter 8
04/27	Reading/Discussion – <i>How does coffee affect health?</i> Reading/Discussion – <i>Chapter How science works and its role in society</i>	<i>How Science Works</i> , chapter 8& 10
04/28	(*Final Version of Proposal Due*)	
05/02	Presentations	
05/04	Presentations	
05/12, Fri. 8:00 – 10:30	Presentations (Final exam period)	

\*\* Booth, et al., *The Craft of Research*, on reserve in Mack library.

# Biology Capstone

Bio 602

Fall, 2007

## CLASS

### MEETINGS

6:30 – 9:00 p.m. Thursday

152 Hoyt Science Center

We will meet occasionally throughout the semester, whenever we have important information that everyone needs to hear. If you miss class, it is your responsibility to contact us and to obtain information that you missed. But most of the work that you do this semester will be done independently, with assistance from your research advisor. If you have problems, questions, concerns, or needs, you should talk to your advisor first. Even if you don't need anything, you should contact your advisor periodically just to let them know what progress you've made, what problems you've overcome, what you have yet to accomplish, and how you plan to do it. The more contact you have with your advisor, the more they can help you!

At the end of the semester, everyone in Capstone will produce a poster presenting the results of their research. Those posters will be placed in the hallways in Hoyt Science Center and faculty and students will be invited to a special poster session which will take place at the end of the semester. Those attending the poster session will look at your poster, ask questions, and engage you in a discussion of your research and your results. This will be your chance to show off what you've accomplished during the semester, and the biology faculty's chance to celebrate the achievements of our students and to evaluate the success of our biology curriculum.

## GRADING

Your grade in this portion of the biology Capstone will be based on the quality of your research and your poster presentation. This will be primarily determined by your research advisor in consultation with several biology faculty who will rate your presentation. Your advisor may consider things such as how difficult your project was, how hard you worked, your ability to work independently and produce credible results, your persistence and patience, and whether you were able to troubleshoot and overcome problems. Although we hope that everyone obtains positive results, your grade in Capstone does not hinge on that. What's important is that you do your best, gain research experience, and are able to accurately convey your results to others.

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-	