

**INSTRUCTOR - Dr. Tom Langen:** [tlangen@clarkson.edu](mailto:tlangen@clarkson.edu), phone 268-7933, office/lab Science Center 163, 170G  
**T.A.: Hanna Prutzman:** [prutzmhm@clarkson.edu](mailto:prutzmhm@clarkson.edu), Science Center 138  
OFFICE HOURS (Langen): Mon, Wed 2:00 – 3:30 PM in Science Center 163, 170G; *or by appointment*  
OFFICE HOURS (Prutzman): **TBA** in Science Center 138  
TEXT: Cain et al. *Discover Biology, 2<sup>nd</sup> edition*  
MEETINGS: Mon – Wed - Fri @ 1:00 – 1:50 PM in Science Center 360

**COURSE OBJECTIVES:** Biology is the study of Life. In SC112, we will focus on how the diversity of life around us has come to be. We will review the fundamental reasons why there are so many organisms on earth, by examining the topics of genetics, natural selection, the history of our planet, and ecology. We will also investigate what may happen in the near future, given the changes on earth brought about by the dominant species on the planet – *Homo sapiens*.

I have two goals for this course: (1) You acquire a general understanding of genetics, evolution, and ecology, and thus increase your general scientific literacy. You also learn why an understanding of these topics is essential for improving human health and welfare, such as for fighting newly emerging diseases, wisely managing natural resources, and increasing food crop yields. (2) You learn how to use the media to keep informed about new developments in science - where to find information, and how to critically evaluate journalistic reports of scientific discoveries.

In SC112, I stress conceptual understanding of the material - you must try to understand why I discuss a particular example (what is the big picture?). To do well, lecture attendance is essential - you won't gain a full understanding of the material just by reading the course notes. You must keep up with the chapter readings as well. Finally, you can improve your performance by (1) coming to office hours or making an appointment with myself or the TA to go-over confusing material and (2) forming a study group with other class members to review material.

**OUTCOMES:** Upon successful completion of this course, you will minimally be able to do the following: (1) Accurately explain Darwin's Theory of Evolution by Natural Selection, and provide examples of how scientists use Darwin's theory to understand biological phenomena. (2) Explain how genetic inheritance both causes offspring to resemble parents, and causes new biological variation to appear. Also explain the positive and negative consequences of genetic mutation, and how biotechnology is developing ways to alter genetic inheritance to improve human health and welfare. (3) Provide a general outline of the history of life on earth. (4) List the main forms of global environmental change caused by the activities of humans, and provide concrete examples of each. (5) Locate, understand, and evaluate news articles about issues in biology and biotechnology.

**LECTURES:** Lectures will be illustrated (usually) by PowerPoint presentations. These pages will be made available by the morning of the lecture for printing before class. However, THE NOTES ARE NO SUBSTITUTE FOR ATTENDING LECTURE. Attendance is expected, and I will take attendance occasionally and give points to students who are present. If you must miss class, please submit a note with the date and excuse for my records.

Lecture notes will be placed on the web at <http://www.clarkson.edu/~tlangen/SC112/Sc112Notes&News.htm>. Click on the file you want. This file will then transfer to your disk or folder. The notes can be opened with PowerPoint (available on university computers). You can then print single overheads, three per page, or six per page - look at the page setup and print preferences.

**TEXTBOOK READINGS:** It is essential to read the assigned material to do well in this course. The textbook readings complement the lectures, often providing essential background. The textbook also provides a source for looking up biological terms and concepts that I mention in lecture which are unfamiliar to you. Exam questions will stress the material I have explicitly discussed in lecture, but may also include some material that is only found in the text.

**QUIZZES:** There will be a short quiz approximately every week. These quizzes will prepare you for some of the kinds of questions you might face on an exam, and should also motivate you to keep up with the material. Quizzes cannot be made up. I will post the answers on the web.

**EXAMS:** All exams are 'closed book' and include material from the lectures, the readings, and the videos. Exams will mostly consist of machine-graded multiple choice, but will also contain a small number of short answer or essay questions. The quizzes will give you some idea of the kinds of questions to expect.

Requests for regrades must be submitted *in writing* within one week of receiving the graded exam. A grading key will be posted, please refer to it before making a regrade request that is not due to clerical error (i.e. I added the points incorrectly). Exams cannot be made up except under extraordinary circumstances. Discuss any conflict with me ASAP.

**SCIENCE IN THE NEWS REPORTS:** During the week, you must find one recent news article (*no more than six months old*) about a subject related to the material in this course from a newspaper (*Tuesday New York Times: Science Times Section is an excellent source*), magazine (e.g. *Discover, Scientific American, Natural History, Time, Newsweek*), or web news source (e.g. *CNN.com or Discover.com*). The article must be at least 250 words (two full paragraphs) long. The article must cover a topic that is related to the subject matter of SC112. If you are not sure about an article, ask me. Using a search engine such as **Google** to search for articles using key vocabulary from the class lectures and readings can be an effective way to find an appropriate article.

**Each Friday**, you must turn in a copy of the article along with a *type-written* three paragraph summary of it. I will not accept copies submitted by email. At the top of the Report, give (1) the title of the article, (2) the source and author, and (3) the date published. The first paragraph should thoroughly summarize the article. The second paragraph should cover how the article is relevant to the topics we are studying in SC112. The third paragraph should be a critique of the article, e.g. *Is the article comprehensible and informative to read? Does the article clearly distinguish between the actual results of the study and the 'spin' or interpretation of what the results might mean? Does the article put the results in the proper general context? Does the article suggest what the next-step may be to the research?* See the handouts on reading scientific papers for some tips on what to look for.

The report will be graded on the appropriateness of the topic, and the clarity, thoughtfulness, and completeness of the report. The grading scale is: Excellent = 4 (exceptionally interesting article, outstanding summary and critique), Good = 3 (appropriate article, well written summary and critique), Fair = 2 (generally good, but some noticeable deficiencies in the subject or summary), Unsatisfactory = 1 (inappropriate article, summary poorly written and too short), Incomplete = 0. I will set deadlines, after which no late report will be accepted.

**Course Extra Credit:** You can submit up to **three additional** reports for extra credit. This will be added to *Science in the News* category of your final grade.

**VIDEO OF THE WEEK:** Most weeks, I will assign one video that provides supplementary material on a course topic. The video can be seen on **Clarkson Closed-circuit Television Channel 68**, and will run Tue – Thu 8:00 PM. Each video runs one hour, except the first, which is 2 hours. Get together with some friends, pop some popcorn, open a can of your favorite beverage, and enjoy! Viewing the video is mandatory – I may quiz or test you on its general contents. If you do not have access to the video because you live off campus or other reasons you have two options: (1) Bring a blank video to class and have a classmate record it on his/her VCR or (2) Watch the video in the Clarkson Library. All videos will be placed on reserve in the library after they have been shown.

**Course Extra Credit:** You will receive 5 points extra credit (equal to half a quiz score) if you write a two paragraph (typewritten) review of the video. This will be added to your Quiz/Attendance category of your grade.

**GRADES:** The grades will be based on (1) two midterm exams (15% grade per exam); (2) *Science in the News* Reports (25% of grade); (3) Quizzes & Attendance (10% of grade); and (4) one final exam (35% grade). There are no 'A' exemptions for the final exam. Course grades are calculated by converting the points earned within each category to the proportion of possible points, then multiplying that proportion by its weighting. For example, if the first midterm is worth 150 points, and you receive 125 points on it, when figuring your final course grade I will calculate:  $(125/150) * 0.15$ . It is possible, if you do extra-credit, to get credit for more than 100% of the possible points of a category. Grades will be based on a percentage of the total points, scaled to meet the above breakdowns: 90% or greater = A, 86-89% = B+, 80-85% = B, 76-79% = C+, 70%-75% = C, 66-69% = D+, 60-65% = D, 59% or less = F. However, I reserve the right to curve down (lower the grade cutoffs) if I judge it warranted. In the past, I have gone as low as 85% for an A.

**MISC. POLICY:** I teach on all days that classes are in session – in other words, I do not cancel classes before or after midterm breaks, nor do I schedule makeup exams to accommodate students' travel plans. You are responsible for the consequences of missing class.

I request that you not carry on conversations or read the newspaper during my lectures. It disrupts my train of thought, and disturbs other students. When students are chatting during class, I will stop lecturing and wait until the classroom becomes silent before resuming a lecture.

I will **NOT** tolerate students walking in & out merely to turn in assignments or take the quiz - it is highly disruptive to students who want to learn and is disrespectful toward me. If this happens frequently, I will take attendance and give those students who have left early zeroes.

***I take a serious view of cheating on quizzes & exams and plagiarism on assignments. It is very difficult to monitor activities in a large, over-crowded class such as SC112. However, if I do detect cheating by you, you will receive a zero on the exam or assignment, and your name will be submitted to the committee on academic integrity. Please try to behave in a way that does not create suspicion of cheating. I may ask you or someone near you to move seats. This is not because I am sure that one of you is cheating; it may simply be a means of preventing suspicion.***

<b>WEEK</b>	<b>DATE</b>	<b>TOPIC</b>	<b>CHAPTER</b>	<b>VIDEO</b>
1	1/10	Introduction to the Course, How Biologists Reason	1	
2	1/13	The Tree of Life	2	Darwin's Dangerous Idea
	1/15	The Tree of Life	3	
	1/17	Evolution by Natural Selection	19	
3	1/20	Evolution by Natural Selection		Darwin's Dangerous Idea (repeat)
	1/22	Heredity	12	
	1/24	Heredity	13	
4	1/27	Mutation	14, 15 (pp 261-264)	Evolutionary Arms Race
	1/29	What to Genes Do?	18	
	1/31	Natural Selection in Action	20	
5	2/3	Gene Therapy & Genetically Modified Crops	17	Evolutionary Arms Race (repeat)
	2/5	Gene Therapy & Genetically Modified Crops		
	2/7	<b>First Midterm</b> <i>lectures 1/10 – 2/5, 15% of grade</i>		
6	2/10	<b>Break!</b>		The Eternal Arms Race
	2/12	Speciation	21	
	2/14	Speciation		
7	2/17	Adaptation , Evolution & Escalation	25	The Eternal Arms Race (repeat)
	2/19	Adaptation , Evolution & Escalation		
	2/21	Life: The First 3.5 Billion Years	22	
8	2/24	Life: The First 3.5 Billion Years		4 Billion Year War
	2/26	The Paleozoic & Mesozoic		
	2/28	The Cenozoic: The <b>Real</b> Making of the Modern World		
9	3/3	The Cenozoic: The <b>Real</b> Making of the Modern World		The Mind's Big Bang
	3/5	The Naked Ape & Kin	23	
	3/7	Darwinian Medicine	38	
10	3/10	Darwinian Medicine		The Mind's Big Bang (repeat)
	3/12	Why Do We Grow Old?		
	3/14	<b>Second Midterm</b> <i>lectures 2/12 – 3/12, 15% of grade</i>		
11		<b>Spring Break!</b>		
12	3/24	The Niche	40	The Rain Forest
	3/26	The Niche		
	3/28	Population Growth	41	
13	3/31	Population Growth		Winning Teams
	4/2	Competition & Coexistence	42	
	4/4	Mutualism & Exploitation		
14	4/7	Mutualism & Exploitation		Great Lakes Alive I
	4/9	Global Environmental Change	45	
	4/11	Changes in the Landscape	43	
15	4/14	Biogeochemical Cycles	44	Great Lakes Alive II
	4/16	Food Webs: Overexploitation & Invasive Species		
	4/18	Food Webs: Overexploitation & Invasive Species		
16	4/21	Atmospheric Alterations & Climate Change		Extinction!
	4/23	Atmospheric Alterations & Climate Change		
	4/25	Biodiversity Loss & the Future	4	
17		<b>Final:</b> <i>approximately half cumulative &amp; half 3/24-4/25, 35 % of grade</i>		