Lecture Instructor: Dr. Melanie L. Styers  
  
  
  mstyers@bsc.edu  
  SSC 245, 226-4882  

Lectures: MWF 12:30–1:00 pm, SSC 138  
Laboratory: T 12:30–3:20 pm, W 2:00–4:50 pm, or Th 12:30–3:20 pm, SSC 215.  
Office Hours: M 3:00–4:00 pm, T 10:00–11:30 am, W 10:30–11:30 am and 2:00–4:00 pm, or by appointment.  

Lab Instructors: Dr. Melanie Styers (mstyers@bsc.edu)  
Dr. Jessica Grunda (jmgrunda@bsc.edu)  

Required materials:  
1.  
   Symbiosis: The Pearson Custom Library for the Biological Sciences (ISBN10: 1256194468; ISBN13: 9781256194460), comprised of selected chapters from Campbell Biology, Ninth Edition, 2011, J.B. Reece, et al. Pearson Benjamin Cummings, San Francisco, CA. (ISBN10: 0321558235; ISBN13: 9780321558237).  
2.  
   Cell and Molecular Biology Laboratory Manual, Fall 2015, Styers and Pezzementi, Birmingham-Southern College: Birmingham, AL  
3.  
   Clicker, Turning Technologies (available in the bookstore)  
4.  
   Student Lab Notebook (with spiral binding; 50 carbonless duplicate sets) by Hayden McNeil  
5.  
   Scientific calculator  

Course Description: Welcome to Cell and Molecular Biology! This classroom and laboratory course seeks to challenge you and stimulate your interests in cell and molecular biology. Success in this course requires the synthesis and application of knowledge of the molecular and cellular nature of biological processes. Throughout the lecture and laboratory, you will learn to apply the scientific method to important questions relevant to the field of cell and molecular biology. We will build from and understanding of the basic molecular nature of cells to an exploration of various cellular processes. Our studies will begin with a treatment of the chemical nature of cells and the major molecules and macromolecules that permit cell function. From there we will explore in some depth each of the four classes of biomacromolecules — proteins, lipids, carbohydrates, and nucleic acids. Once we have built this foundation, we'll look at how these macromolecules work together to control cellular processes such as DNA replication, gene expression, cell division, energy production and utilization, intracellular compartmentalization, vesicular trafficking, cell signaling, and cell movement. Throughout the semester, we will also focus on how these processes are linked to human disease.  

Course Goals: By the end of this course you should be able to:  
  
  • define and use the vocabulary of cell and molecular biology  
  • articulate and apply the fundamental concepts of cell and molecular biology  
  • examine and interpret the experimental basis supporting generalizations about cells and biomacromolecules
In addition, this course is a designated Scientific Methodologies course in the Explorations curriculum. Therefore, by the end of this course, you should be able to

- use the scientific method to address fundamental questions in cell and molecular biology
- define a problem and clearly communicate an appropriate rationale for investigation
- develop testable hypotheses and design experiments to test these hypotheses by employing laboratory techniques common in cell and molecular biology
- collect and analyze quantitative and qualitative data and draw appropriate conclusions
- communicate effectively with the scientific community by writing a scientific research paper, based on research in the library integrated with research in the laboratory.

These outcomes should greatly enhance your critical thinking and quantitative analysis skills.

Expectations: To achieve the goals described above, each student is expected to

- abide by the Birmingham-Southern College Honor Code (see below) and all other College policies
- be dedicated to and accept the challenges presented
- read assigned text and watch assigned videos in advance; prepare for, and actively participate in class and lab activities
- be an active participant in your education – ask lots of questions
- be honest, responsible, reliable, and hard-working
- complete, with outstanding work, exams, quizzes, assignments, and laboratory activities
- present, in written form, the laboratory projects, and
- respect all peers and instructors involved with this course.

Course Policies:

1. **The Birmingham-Southern College Honor Code**: All students in this course are expected to maintain academic integrity and uphold the Honor Code at all times. Specifically in this course, the following are considered violations of the Honor Code: collaborating on work assigned for individual completion; using unauthorized resources in the completion of exams, quizzes, and assignments; failure to report the Honor Code violations of other students; plagiarism; turning in work that is not your own; lying, stealing, and lack of adherence to the instructions on any examination, quiz, assignment, or course policies listed below. For laboratory, it will be considered a violation of the Honor Code to look at a previous student’s BI 125 lab report. Both the current BI 125 student and the student who shared his or her paper will be considered to be in violation of the Honor Code. Therefore, you are expected to keep these papers to yourselves and not share them or place them in any test files. Any violation of the Honor Code will be reported to the Honor Council and will result in a zero on that assignment. Penalties imposed by the Honor Council are frequently academic probation, suspension, or expulsion.

2. **Attendance & Participation**: Successful completion of this course requires active participation. Therefore, attendance in the classroom is strongly encouraged. Attendance and participation in lecture will be scored by answering clicker questions during lecture (see below). Attendance and participation in the laboratory portion of the course are mandatory and will also contribute to your final grade. You are expected to be on time and
to stay for the duration. If schedule conflicts arise, please discuss them with your instructor in advance of the conflict so alternate arrangements can be made.

3. **Learning Accommodations:** Under the directives and guidance of the Americans with Disabilities Act (ADA) and Rehabilitation Act of 1973, we are committed to providing appropriate accommodations to meet the learning needs of all students. If you are registered for accommodations, please make an appointment with me as soon as possible to discuss accommodations that may be necessary. During this discussion, you are not expected to disclose any details concerning your disability, although you may discuss these details at your discretion. If you have a disability but have not contacted Jason Peevy, the Disability Accommodations Coordinator at BSC, please call 226-4717 or visit Counseling & Health Services on the second floor of Norton Center, next door to Student Development. You may also contact the Coordinator at jpeevy@bsc.edu if you have any questions or need more information.

4. **Communication:** Your class instructor’s office hours are M 3:00–4:00 pm, T 10:00–11:30 am, W 10:30–11:30 am and 2:00–4:00 pm, but please feel free to set up an appointment if you have class during those times. Both email and Moodle will be used to communicate important information about the class, so you are expected to check your BSC email frequently.

5. **Cancellations & Time/Location Changes:** If class is cancelled or if there is a change in time or location of class for any reason, an email announcement will be sent and posted on Moodle and a sign posted on the classroom/laboratory door as soon as possible. In the event that class is cancelled, you will be expected to complete any assignments due.

6. **Cell Phones:** Use of cell phones and/or related devices (to send or receive calls, text message, surf the internet, etc.) is not allowed in the classroom or the laboratory. Such electronic devices should be turned off at the beginning of each class and lab meeting (including exams!), so that they will not ring, vibrate, or otherwise disturb you, your fellow students, or your instructor.

**Course Work & Evaluation**

Letter grades, as defined in the BSC Catalog, will be assigned at the end of the course based on the number of possible points that you can earn, where 93-100% = A, 90-92% = A-, 87-89% = B+, 83-86% = B, 80-82% = B-, 77-79% = C+, 73-76% = C, 70-72% = C-, 67-69% = D+, 60-66% = D, <60% = F.

**Summary of point distribution:**

| Item                      | Points |
|---------------------------|--------|
| Exam 1                    | 125    |
| Exam 2                    | 125    |
| Exam 3                    | 125    |
| Final Exam                | 150    |
| Quizzes (10 of 11)        | 100    |
| Lab Report Drafts         | 60     |
| Final Lab Report          | 150    |
| Pre-Labs/Lab Conduct      | 55     |
| Writing Workshops/Exercises | 45    |
Examinations: Three in-class examinations (worth 125 pts. each) and a cumulative final examination (150 pts.) will be given. You are expected to take all exams on the dates and times scheduled. If an exam is missed due to extenuating circumstances, i.e., documented and Provost Office-approved medical or family emergency, the course instructor will use her discretion to determine whether the exam can be made up.

Examinations are designed for you to synthesize the concepts addressed in class, lab, and the assigned readings and to apply that knowledge. To accomplish this goal, the exams will consist of a combination of short and long-answer questions that may include data analysis and application of concepts learned in class. Exams will be written, closed book/notes, and time-limited. You may work on written exams in the classroom only, unless instructed otherwise. The final examination is cumulative; the first three exams are not directly cumulative; however, understanding basic material covered in previous sections of the course is necessary to learn and demonstrate comprehension of the more advanced material covered as the course proceeds.

Quizzes: Weekly quizzes will be given in class every Wednesday. Collectively, the quizzes are worth 10% of your final grade (almost as many points as an exam), so take these assignments seriously! The quizzes will cover the material from the day of the previous quiz through the Monday before the quiz. You will not be allowed to use your book or notes. The purpose of these quizzes is to help you to learn the material for the course as we go along. Cell and Molecular Biology is not the type of course in which you can just study the night before the exam. Success in this course requires dedication and constant study. At the end of the semester your lowest quiz grade out of the 11 quizzes will be dropped. Because this policy will be strictly enforced, you should use this drop grade wisely.

Laboratory: The laboratory is an essential component in the life of a cell and molecular biologist, and the laboratory experience in this course will focus on learning how the scientific method is used to address questions relevant to cell and molecular biology. You will work in pairs to complete two multi-week projects. Consult the laboratory manual for more detailed information about these projects. You will utilize the library to research the problems you will be investigating in the laboratory and develop relevant, testable hypotheses. Throughout the term, you will learn safe handling of common chemicals and techniques used in a modern cell and molecular biology research laboratory and will use these skills and techniques to collect and critically analyze data.

Your work in the laboratory will be assessed by: an accurate lab notebook that includes both pre-lab preparation and in-lab data collection; a scientifically formatted research paper; lab assignments focused on scientific writing, experimental design, and data analysis; and your ability to work safely, efficiently, carefully, and respectfully. Each of these aspects of the lab experience is described in more detail below.

a) Lab Notebooks: The lab notebook is to be a complete and accurate record of every step of a project from preparation through completion, including the planning required for each
experiment and a record of daily work. Although you will work in the lab in pairs, each student is required to keep his/her own notebook. With respect to pre-lab preparation, all good scientists carefully plan what they are going to do before they do it. To make this good habit one of your own, **we are requiring that you prepare “pre-labs” – outlines of the procedure that you plan to perform in the laboratory**. First, complete and prepare the assigned readings as well as any additional, relevant information in the lab manual and/or textbook before each laboratory session. Then, outline the experimental procedure and any information crucial to the experiment on the left half of your notebook. The pre-lab will be checked by the TA at the start of each lab period and you will earn 0-3 pts for each pre-lab. **For additional guidance on how to complete a pre-lab write-up, please refer to the BI 125 Moodle site.** It is important to realize that working in the lab unprepared can create a safety hazard for everyone. In addition to providing a safe lab environment, being well-prepared also permits you to more easily predict and confirm your results and troubleshoot your problems. In the laboratory, notebook entries should be completed daily with headings, hypotheses, protocols, observations, results, and a summary. The notebook should also include a table of contents and all final conclusions on the project. Each page should be numbered and dated and all entries made clearly and legibly. The notebook should be kept in a manner that someone unfamiliar with the project could pick up your notebook and interpret the project plan, protocols, and results, and be able to pick up with the work at any point. To keep an accurate notebook, record your observations and data as you collect them. Notebooks do not need to be works of art, but they do need to be complete, accurate, and legible. Carbon copies of your notebook entries will be collected and checked by your TA after each lab period and evaluated for completeness and legibility, and you will be given suggestions for improvement, if needed.

b) **Scientific Research Papers:** Scientists must learn to be good communicators in order to share their findings with the scientific community in the form of oral or written presentations. Written presentations are almost always reviewed by experts in the field prior to publication. To help you learn this skill of scientific presentation, we are requiring that each student present the cholinesterase project in the form of a scientific research paper, the final version of which is worth 150 pts. To facilitate the writing process, you are required to submit drafts of portions of this lab report. You are also encouraged to consult with the Writing Center prior to submitting these drafts and your final paper. All drafts (rough and final) must be submitted electronically via the appropriate TurnItIn.com assignment link integrated within the course Moodle site. Papers will not be accepted unless submitted via TurnItIn. This learning tool will help you learn about academic integrity and better understand plagiarism. To learn what plagiarism is and how to avoid it, you should also consult the resources on the BI 125 Moodle site, including plagiarism.org. Although lab partners should pool and discuss their data, each individual must write his/her own report. The Writing Center, located in the Humanities Center 102, offers one-on-one consultation with student writers in any BSC course. For an appointment, email Professor Lucas Johnson at ljjohnso@bsc.edu, or you can stop by HC 102 for a walk-in conference. Visit the Writing Center website at [http://www.bsc.edu/academics/arc/writing.cfm](http://www.bsc.edu/academics/arc/writing.cfm) for more information.
c) **Laboratory Assignments (Scientific Writing, Experimental Design, and Data Analysis):** Throughout the term you will be required to complete a variety of assignments focused on scientific writing, experimental design, and data analysis. Two exercises will introduce you to scientific resources in the library, and three workshops will guide you through careful analysis of the components of a scientific paper. Use of the scientific method will be reinforced in two assignments requiring you to design carefully-planned, controlled experiments. Additionally, four assignments will require you to analyze and interpret data collected from a variety of experiments.

d) **Laboratory Conduct/Safety/Participation:** While learning the tools of experimental cell and molecular biology is the major goal, those lessons are second to laboratory safety and responsible conduct. Work carefully and thoughtfully in the lab, and leave all work areas in the lab clean every day. Give special attention to equipment and areas of common use. You will earn 0-2 pts for each lab period for your active participation and safe conduct. If a safety hazard is created by irresponsible behavior to which no one fesses up, i.e. an unmarked container, unclean lab, then every student in the class will lose points on their laboratory conduct/safety grade. Have fun, but please be a responsible experimentalist!

**Participation & Attitude (P&A):** Attendance in laboratory is mandatory... no ifs, ands, or buts! Attendance at the lecture portion of the course is strongly encouraged, because it will help you focus your efforts to study the material presented in the text. If for any reason, you miss an exam or quiz, you must notify your instructor ASAP! I will decide on a case-by-case basis whether or not you will be allowed to make-up the exam/quiz. Furthermore, participation, attitude, and punctuality both in lecture and lab will be taken into account when calculating your final grade. Numerous pedagogical studies show that students learn best when they actively participate. Keep in mind that everyone brings a unique background to the course, and you have the opportunity to learn from these diverse backgrounds. The more involved you are in this course, the more you and your classmates will benefit. To encourage you to prepare for class and participate, I will assess your preparation and participation using clicker questions. Your participation grade for lecture will be derived from these clicker questions based on the following equation:

Participation (max 15 pts.) = Score for number of clickers answered + score for percent correct

Scores will be assigned as follows:

| Number of clicker questions answered | Percent Correct |
|------------------------------------|----------------|
| 90%-100%                           | 75%-100%       |
| 80%-90%                            | 50%-75%        |
| 70%-80%                            | 25%-50%        |
| 60%-70%                            | 10%-25%        |
| 50%-60%                            | <10%           |
| 40%-50%                            | 1 pt.          |
| 30%-40%                            | 2 pts.         |
| 20%-30%                            | 3 pts.         |
| 10%-20%                            | 4 pts.         |
Late Fees: 10% of the total possible points will be deducted for each day any written paper, assignment, etc. is late up to 50% of the total points. These days include Saturday and Sunday. All late work must be submitted in person, and it is your responsibility to find your instructor and place the late work in his/her hands. An unexcused, undocumented class absence does not excuse work from late fees.
Lecture Schedule (all dates are tentative):

| Date     | Lecture Topic                                | Reading/Video                      | Quizzes      |
|----------|----------------------------------------------|------------------------------------|--------------|
| Aug. 26  | Intro, What is a cell?                       | Ch. 1: p. 2-20                     |              |
|          |                                               | Video: Cellular History            |              |
| Aug. 28  | The Chemistry of Life: Bonding               | Ch. 2: p. 36-49                    |              |
|          |                                               | Video: Atomic Structure            |              |
| Aug. 31  | The Chemistry of Life: Bonding               | Ch. 2: p. 36-49                    |              |
| Sep. 2   | NO LECTURE—QUIZ ONLY                         |                                    | Quiz 1       |
| Sep. 4   | The Chemistry of Life: The role of H₂O       | Ch. 3: p. 54-64                    |              |
|          |                                               | Video: The Water Lattice           |              |
| Sep. 7   | LABOR DAY—NO CLASS                           |                                    |              |
| Sep. 9   | Organic Molecules and Functional Groups       | Ch. 4: p. 68-76                    | NO QUIZ      |
|          |                                               | Video: Intro to Organic Molecules  |              |
| Sep. 11  | Macromolecules: Carbohydrates                | Ch. 5: p. 80-86                    |              |
|          |                                               | Video: Macromolecules              |              |
| Sep. 14  | Macromolecules: Lipids and Nucleic Acids      | Ch. 5: p. 86-89, 98-102            |              |
| Sep. 16  | Macromolecules: Proteins                      | Ch. 5: p. 89-98                    | Quiz 2       |
| Sep. 18  | Transfer of Energy in Biological Systems      | Ch. 6: p. 108-117                  |              |
|          |                                               | Video: Types of Energy             |              |
| Sep. 21  | Enzymes and Biochemical Rxns                  | Ch. 6: p. 118-126                  | End of material for Exam 1|
| Sep. 23  | DNA: Experimental basis for heredity          | Ch. 7: p. 131-139                  | Quiz 3       |
|          |                                               | Video: DNA Structure               |              |
| Sep. 25  | EXAM 1                                        |                                    |              |
| Sep. 28  | DNA Replication                               | Ch. 7: p. 139-148                  |              |
| Sep. 30  | DNA Replication                               | Ch. 7: p. 139-148                  | Quiz 4       |
| Oct. 2   | Transcription                                 | Ch. 8: p. 153-162                  |              |
|          |                                               | Video: RNA and protein Structure   |              |
| Oct. 5   | Translation                                   | Ch. 8: p. 162-177                  |              |
| Oct. 7   | Translation                                   | Ch. 8: p. 165-177                  | Quiz 5       |
| Oct. 8-11| FALL BREAK—NO CLASS                           |                                    |              |
| Oct. 12  | Control of Gene Expression in Prokaryotes     | Ch. 9: p. 181-186                  |              |
|          |                                               | Video: Gene expression             |              |
| Oct. 14  | Control of Gene Expression in Eukaryotes      | Ch. 9: p. 186-207                  | Quiz 6       |
| Oct. 16  | Cell Cycle and Mitosis                        | Ch. 10: p. 214-229                 |              |
|          |                                               | Video: Cell cycle                  |              |
| Oct. 19  | Meiosis                                       | Ch. 11: p. 234-245                 |              |
|          |                                               | Video: Mitosis versus meiosis      |              |
| Date    | Topic                          | Chapter(s)                  | Video Notes                                    | Notes                                  |
|---------|--------------------------------|-----------------------------|-----------------------------------------------|----------------------------------------|
| Oct. 21 | Molecular Evolution            | Ch. 13: p. 278-293          | Ch. 12: p. 258-271                            | End of Material for Exam 2; Quiz 7     |
|         |                                |                             | Video: Intro to Evo                           |                                        |
| Oct. 23 | DNA Technology                 | Ch. 14: p. 298-306          | Ch. 13: p. 278-293                            |                                        |
|         |                                |                             | Video: Uses of DNA Technology                 |                                        |
| Oct. 26 | **EXAM 2**                     |                             |                                               |                                        |
| Oct. 28 | DNA Technology                 | Ch. 14: p. 307-325          | Ch. 13: p. 278-293                            | Quiz 8                                 |
| Oct. 30 | Membranes and Transport        | Ch. 15: p. 331-345          | Ch. 14: p. 298-306                            |                                        |
|         |                                |                             | Video: Membrane Structure                     |                                        |
| Nov. 2  | Membranes and Transport        |                             |                                               |                                        |
| Nov. 4  | Membranes and Transport        | Ch. 15: p. 331-345          |                                               | Quiz 9                                 |
| Nov. 6  | Cell Signaling                 | Ch. 16: p. 350-369          | Ch. 15: p. 331-345                            |                                        |
|         |                                |                             | Video: Intro to signaling                     |                                        |
| Nov. 9  | Cell Signaling                 | Ch. 17: p. 373-386          |                                               |                                        |
| Nov. 11 | Cellular Respiration           | Ch. 18: p. 391-397          | Ch. 16: p. 350-369                            | Quiz 10                                |
|         |                                |                             | Video: Overview of Respiration                 |                                        |
| Nov. 13 | Cellular Respiration           | Ch. 18: p. 397-410          |                                               |                                        |
| Nov. 16 | Photosynthesis                 | Ch. 19: p. 415-427          | Ch. 17: p. 373-386                            | Quiz 10                                |
|         |                                |                             | Video: Overview of Photosynthesis              |                                        |
| Nov. 18 | Photosynthesis                 | Ch. 19: p. 428-433          |                                               | End of Material for Exam 3; Quiz 11    |
| Nov. 20 | **EXAM 3**                     |                             |                                               |                                        |
| Nov. 23 | The Cytoskeleton and Muscle Contraction | Ch. 1: p. 20-30 | Ch. 18: p. 391-397                            |                                        |
|         |                                |                             | Video: Parts of the Cytoskeleton               |                                        |
| Nov. 25-29 | **THANKSGIVING BREAK—NO CLASS** |                             |                                               |                                        |
| Nov. 30 | The Cytoskeleton and Muscle Contraction | Ch. 20: p. 457-463 | Ch. 18: p. 391-397                            |                                        |
| Dec. 9  | **FINAL EXAM 1:00 pm-4:00 pm** |                             |                                               |                                        |
| Lab | Week of | Topic                                                                 | Required Reading            | Due*                                      |
|-----|---------|----------------------------------------------------------------------|----------------------------|-------------------------------------------|
| I   | 1-3 Sep | Introduction to the Laboratory and Scientific Literature Use of Micropipettes | Appendices B-D              | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • Library Exercise I due at end of lab    |
| II  | 8-10    | Horse Serum Cholinesterase: MW Determination                         | Symbiosis p. 307 (for DNA, not protein, but similar) Manual. pp. 1-19 | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • Solutions & Dilutions Problem Set       |
| III | 15-17   | Paper-Writing Workshop I: How to Make Figures Horse Serum Cholinesterase: Introduction to Ellman's Esterase Assay | Symbiosis pp. 118-121 Manual pp. 20-27 Appendix A, C, D, F | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • MW Graph                                |
| IV  | 22-24   | Horse Serum Cholinesterase: Experimental Design                      | Symbiosis pp. 121-122 Manual pp. 28-29 | • Draft of Figure/Legend Results/Methods for MW Determination (5PM Fri 2 Oct)* |
| V   | 29-1 Oct| Paper-Writing Workshop II: How to Write an Introduction Horse Serum Cholinesterase: Student Experiment 1 - Environmental Variables | Manual pp. 28-29 Appendix A, B | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • Library Exercise II                     |
| VI  | 13-15   | Horse Serum Cholinesterase: Molecular Modeling                       | Symbiosis pp. 89-97 Manual pp. 30-43 | • Molecular Modeling Pre-Lab Activity     |
|     |         |                                                                      |                            | • Introduction Draft and Literature Cited (5PM Monday 19 Oct)* |
| VII | 20-22   | Horse Serum Cholinesterase: Substrate Concentration                  | Manual pp. 44-51 Appendix D, F | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • Molecular Modeling Worksheet            |
| VIII | 27-29  | Horse Serum Cholinesterase: Data Analysis & Experimental Design     | Manual p. 52               | • V vs. S Graph                           |
|     |         |                                                                      |                            | • Draft of Results for Student Experiment 1 (5PM Mon 9 Nov)* |
| IX  | 3-5 Nov | Paper-Writing Workshop III: How to Write a Discussion Enzyme Kinetics: Student Experiment 2 | Manual pp. 53-66 Appendix A | • Pre-Lab Write-Up                        |
| X   | 10-12   | DNA Technology: Extraction & Restriction Digestion of Plasmid DNA, Polymerase Chain Reaction | Symbiosis pp. 298-305, pp. 305-308 Manual pp. 67-76 Appendix E, G | • Pre-Lab Write-Up                        |
| XI  | 17-19   | DNA Technology: Analysis of Restriction Digestion, Polymerase Chain Reaction and Transformation | Symbiosis pp. 298-308 Manual 77-83 Appendix E, G | • Pre-Lab Write-Up                        |
|     |         |                                                                      |                            | • DNA Datasheet due in class Mon 30 Nov*   |
|     |         |                                                                      |                            | • Cholinesterase Paper (5PM Tue 1 Dec)*    |
BI 225: Evolutionary Ecology

COURSE OVERVIEW

Members of all species (including humans) interact with other species and with their environment, and the traits they have are shaped by these interactions. Fundamentally, then, we all experience ecology every day, and who we are as an individual and as a species is influenced by evolution. Throughout this course, I hope that you gain a greater appreciation of these ecological and evolutionary interactions in the natural and human-influenced world.

The course is built around four modules. First, we will cover the essential properties of biological evolution, then explore the variations of this process in depth. In the second module, our focus will shift to ecological interactions but the context will involve the ways that these interactions shape the traits of species. In our third module, we will explicitly return to evolutionary processes, but now on larger scales—how speciation occurs, and how behavior and reproduction influences evolution. We will also cover the ways that humans have evolved and how human evolution is related to the study of medicine. In our final module, we will treat ecological concepts from large-scale and more practical perspectives.

EXPECTATIONS

for you: To achieve the goals described above, each student is expected to...
- abide by the Birmingham-Southern College Honor Code (see p. 3) and all other college policies
- read in advance, prepare for, and actively participate in class activities
- be an active participant in your education—ask lots of questions
- be respectful and polite when engaging in online and in-class discussions
- refrain from using a cell phone or computer for anything besides EvoEco material during class times (including during exams)

from me: My interest is in helping you get the most out of your education, so I...
- have carefully designed this course to be engaging and to help you learn.
- will be accessible throughout the semester
- will be respectful of your questions and mindful of your perspectives as a learner.
- will make every effort to return graded work in a timely fashion with meaningful feedback.

"I can explain it to you, but I can’t understand it for you"
Robert Gammage, Texas state senator
Why a focus on critical thinking and writing?
Nearly all employers surveyed (93 percent) say that “a demonstrated capacity to think critically, communicate clearly, and solve complex problems is more important than [a candidate’s] undergraduate major.” (source: AAC&U survey, 2013)

COURSE GOALS
While the subject matter of this course is Evolutionary Ecology, BI 225 is about much more than that. As you are learning content, you will also be honing your skills as a writer, an editor, a critical thinker, a reader of scientific literature, and designer of experiments. In short, the fundamental goal of this class is for you to continue your development as a scientist. These skills will be beneficial to you no matter what field you go into in the future. Specifically, upon successful completion of this course, a conscientious student should be able to...

Content-based goals
- Demonstrate an understanding of the process of biological evolution.
- List the essential steps required for biological evolution to occur and provide examples.
- Understand the ways that organisms interact with each other and their environment.
- Apply your knowledge of ecological and evolutionary principles to novel situations, examples, and simulations.

Skills-based goals
- Think, argue, and reason critically while analyzing scientific literature.
- Write clearly and critique scientific writing as both an author and peer editor.
- Interpret figures and data and relate these results to hypotheses & predictions of a study.
- Evaluate primary literature in Moodle discussion boards and in class.
- Critique the ways scientists gather data and design experiments to test hypotheses.

Planning on becoming an evolutionary ecologist? (Probably not)
Even so, there is value to learning evolutionary ecology. Evolution is happening to all species (and even viruses). Besides, this class helps you develop your skills as a scientist, and you can’t apply your scientific skills if you don’t know the content.
THE BSC HONOR CODE:

All students in this course are expected to maintain academic integrity and uphold the Honor Code at all times. Specifically in this course, the following are considered violations of the Honor Code: collaborating on work assigned for individual completion; consulting or possessing work (except exams) of those who have previously completed this course; overstating your level of participation in a group assignment; using unauthorized resources in the completion of exams, quizzes, and assignments; plagiarism; turning in work that is not your own; lying, stealing, and lack of adherence to the instructions on any examination, quiz, assignment, or course policies listed in this syllabus. Any violation of the honor code will be reported to the Honor Council and will result in a zero on that assignment. Penalties imposed by the Honor Council may be in addition to this academic penalty, and often include academic probation, suspension, or expulsion.

COURSE POLICIES

Attendance & Participation: Successful attainment of the goals of this course requires active participation. Therefore, attendance in the classroom is a good idea. Students will be called on at random to answer questions from the readings or other course materials. You are expected to be on time and to stay for the duration of the class meetings. If you know you will be missing class due to a documented and scheduled event (athletic or academic), you should notify me in advance to make accommodations. It is your responsibility to make up any missed material.

Academic Adjustments: BSC is committed to providing appropriate accommodations to meet the learning needs of students. It is your responsibility to communicate your needs with me. If you have questions about academic accommodations, please contact the Counseling and Health Services office at 205-226-4717 or you may email Jason Peevy, at jpeevy@bsc.edu.

Communication: I will check and respond to student email within 48 business hours. I will send you lots of information via email, so read your BSC email.

Cancellations & Time/Location Changes: If class is cancelled or if there is a change in time or location of class for any reason, an email announcement will be sent and posted on Moodle and a sign posted on the classroom door as soon as possible. In the event that class is cancelled, you will be expected to complete the scheduled reading. You will also be expected to complete assignments due for the cancelled class.

Late assignment policy: Late assignments will still receive credit, so it’s always a good idea to turn something in even if it’s late. Unless otherwise specified for a particular assignment, late assignments will lose 5% per day (maximum penalty = 50%).

Don’t be afraid of questions

“Everyone is an idiot, not just the people with low SAT scores. The only differences among us is that we’re idiots about different things at different times. No matter how smart you are, you spend much of your day being an idiot.” Scott Adams, cartoonist

THE VALUE OF FLIPPED LEARNING

While the structure of this course gives you more control over your learning, it also requires responsibility on your part. However, you are not expected to teach yourself the material in this course. Instead, the rationale for the course is that you will be receiving more guidance, material, and assistance from me in this format that you would in a traditional format.

This approach is sometimes referred to as a flipped (or inverted) classroom, because we are flipping the traditional roles of in-class and out-of-class work. It can also be described as a form of blended learning, because digital content (videos, simulations, etc.) are blended together with traditional lectures in class.

There is a large body of research that shows that this approach helps you not only to learn the material better but also to learn how to learn (which is what a liberal arts education is supposed to be about, right?).
EXAMS
There are 2 exams during the semester and 1 cumulative final.

Exams include a combination of multiple choice, short answer, and essay questions relating to all course goals and content.

The focus will be on critical thinking rather than just memorization. That is, you must understand the concepts in order to apply them to new situations.

If you know in advance that you’ll be absent during an exam for an excused reason, I will arrange for an alternate test that will be entirely essay based.

If an exam is missed due to an excusable absence, then the average score from the other exams will be substituted (this does not apply to missing the final exam).

QUIZZES
There will be quizzes for most class meetings to encourage you to be on time to class, do the readings, watch the videos, and come prepared for class.

Missed quizzes cannot be made up, but you will drop your lowest two quiz grades.

If a quiz is missed due to extenuating circumstances (e.g., documented and Provost office-approved medical or family emergency, athletic event) the average score from the other quizzes will be used as the grade for the missing quiz.

ASSIGNMENTS & GRADING
Letter grades, as defined by the current BSC Catalog, will be assigned at the end of the course based on the number of points that you earn where 93-100% = A, 90-92% = A-, 87-89% = B+, 83-86% = B, 80-82% = B-, 77-79% = C+, 73-76% = C, 70-72% = C-, 67-69% = D+, 60-66% = D, and <60% = F.

| Grade category                          | % of total grade |
|----------------------------------------|------------------|
| In-class Exams                         | 20%              |
| Final Exam                             | 15%              |
| Quizzes                                | 9%               |
| Paper Discussions                      |                  |
| Moodle Forum                           | 6%               |
| Participation                          | 6%               |
| Article summary                        | 10%              |
| Peer review                            | 2%               |
| Peer grade for 1st drafts              | 2%               |
| EvoBeakers and online activities       | 25%              |
| Additional Assignments / Participation | 5%               |

DOING WELL IN THIS COURSE

READING AND VIDEO GUIDES
The readings and videos for this course have been chosen to help you understand the material and are complimentary with class topics. Many studies have shown that comprehension increases substantially when students are actively engaged in their education and utilize many approaches to learn the material. Therefore, reading guides are provided for each of the class readings and many videos. You will learn best if you complete these guides before we cover the material for that class period.

SIMUTEXT & ONLINE ACTIVITIES
There are several online exercises that require the use of SimUTText or other software. Instructions for accessing the software are available on the Moodle page. These assignments require you to keep track of answers from computer simulations. Your answers will be graded for accuracy and completeness. You may consult with classmates while working on these assignments, but each student is required to do their own work, write answers in their own words, and submit their own workbook. There will be additional homework problems and other activities assigned in class as opportunities arise.

STUDY SKILLS
The college rule of thumb is that for each class, students should spend approximately 2-3 of study time for each hour that they spend in class (obviously, this must be focused, active studying not watching TV while your book is open).

Don’t just rely on logging a lot of hours studying, though. You may want to train your study skills by reading up on some active learning techniques (Google “study less study smart”).

I also encourage you to visit the Study Skills web site from BSC’s Counseling and Health Services (search for “study skills” on the BSC home page). Another good resource at BSC is the Academic Resource Center, or ARC (http://www.bsc.edu/academics/arc/index.cfm), which provides you help with paper writing, study skills, and can even put you in touch with a peer tutor for your classes.
PAPER DISCUSSIONS

There will be 6 scientific journal articles assigned throughout the semester. These journal articles are posted on the Moodle page and are central to the course. For the paper discussions, your obligations are to:

1. READ THE PAPER. All students are responsible for reading EACH assigned paper.

2. POST ON FORUM (on the Moodle page). For each paper, you will post on the Moodle Forum either a novel question pertaining to the paper or a thoughtful answer to someone else’s question. You will be graded on the quality of the question or answer, and trivial or unoriginal posts will earn 0 points (you can’t just rephrase someone else’s question or write, “Yeah, I agree with John”). These posts will have a strong influence on the direction of the discussion, so you must also read each of the postings listed for each paper the morning before class. Postings must be made before midnight the night before the class discussion. Late postings between midnight and 8am can still receive up to 5 points, but postings made after 8am will receive 0 points.

- **Hint:** reading the paper early and posting a thoughtful question before anyone else does is a good way to avoid being scooped.

3. PARTICIPATE IN THE DISCUSSION. The success of the discussions will rely heavily on participation from the WHOLE class! You will be graded on your level and quality of participation. Showing up will be necessary to earn any points, but speaking up during the discussion is the only way to earn full points. The more thought-provoking your comments, the higher your participation grade will be (again, saying “Yeah, I agree with John” is not adequate).

**Hint:** bringing up something from the discussion board when it seems appropriate is an easy way to contribute to the discussion.

Turnitin (through Moodle): You will be turning in drafts, final summaries, and other assignments through Moodle, and they will be checked for plagiarism by turnitin.com. The service at turnitin.com includes tools to educate students about what plagiarism is and how to avoid it by citing sources correctly. Plagiarism is a serious offense and blatant cases will be sent to the honor council; therefore, I strongly encourage you to check out the following web site for ways to avoid plagiarism: [http://www.plagiarism.org](http://www.plagiarism.org). Talk with me if you have any problems, questions, or concerns.

"If you can’t explain it simply, you don’t understand it well enough”

Albert Einstein
# Class Schedule (subject to change)

*all deadlines are by the start of class unless noted otherwise*

| Date | Day | Topic | Readings/Assignments | Important deadlines & notes |
|------|-----|-------|-----------------------|-----------------------------|
| 8/26 | W   | Course introduction | Syllabus
Videos on Moodle | Quiz on syllabus and introduction videos |
| 8/28 | F   | Terminology and scientific method | EoN Ch. 1 | Quiz on chapter 1 (see reading guide on Moodle) |
| 8/31 | M   | Population Genetics / Hardy-Weinberg equilibrium | EoN Ch. 7a
Videos on Moodle | Know your three articles!!! (come prepared with authors’ names)
Hypothesis testing assignment due (see Moodle)
In-class activity |
| 9/2  | W   | Exceptions to Hardy-Weinberg equilibrium | EoN Ch. 7b
Videos on Moodle | |
| 9/4  | F   | Paper 1 Discussion: How to Read a Scientific Paper | Paper 1: Gonzálvez et al. 2013 – ants deter bees | Discussion board posts due @ midnight before class
HWE problem set due (assigned in class) |
| 9/7  | M   | Labor day—no classes | |
| 9/9  | W   | *Sickle-Cell Alleles* Simutext (in class) | pp. 1–6 of *Sickle-Cell Alleles* workbook
Sickle-Cell video (see Moodle) | Meet in SSC 240
Are these pop'ns in HWE? assignment due |
| 9/11 | F   | Discussion of “Judgment Day” | Watch “Judgment Day” (see link and guide on Moodle) | “Judgment Day” assignment due
SimUText *Sickle-cell Alleles* due |
| 9/14 | M   | Genetic variation and Evolution by natural selection | EoN Ch. 7c
Videos on Moodle | SimUText *Evolution for Ecology* due (do on your own) |
| 9/16 | W   | Paper 2 Discussion: How to Summarize a Scientific Paper | Paper 2: Rundus et al. 2007 – infrared squirrels
Blumstein 2007 – comment | Discussion board posts due @ midnight before class |
| 9/18 | F   | Modes of Selection | EoN Ch. 7d
Videos on Moodle | |
| 9/21 | M   | Critical thinking exercise | | In-class activity |
| 9/23 | W   | Misconceptions about Evolution and Natural Selection | Misconceptions videos (see Moodle) | In-class activity |
| 9/25 | F   | Exam 1 | | See practice exams on Moodle |
### Module 2: Ecological Interactions

| Date  | Day | Activity                                      | Reading         | Material/Assignment                                                                 |
|-------|-----|-----------------------------------------------|-----------------|-------------------------------------------------------------------------------------|
| 9/28  | M   | Population Dynamics                           | EoN Ch. 11, 12  | SimUText *Understanding Population Growth Models* due (do on your own)               |
|       |     |                                               | Videos on Moodle| In-class activity                                                                    |
| 9/30  | W   | Agents of Selection: Competition I           | EoN Ch. 16      | Authors: Paper 3 summary draft due to Moodle by start of class                       |
|       |     |                                               | Videos on Moodle|                                                                                     |
| 10/2  | F   | Agents of Selection: Competition II          | EoN Ch. 16      | SimUText *Niche Wars* due (do on your own)                                          |
|       |     |                                               | Videos on Moodle| In-class activity                                                                    |
| 10/5  | M   | Agents of Selection: Predation I             | EoN Ch. 14      | Editors: Reviews of Paper 3 summaries due to Moodle by start of class                |
|       |     |                                               | Videos on Moodle|                                                                                     |
| 10/7  | W   | Paper 3 Discussion                            | Paper 3: Becker & Leiss 2015 – interactions affect adaptation | Teleology assignment due                                                                 |
|       |     |                                               |                  | Discussion board posts due @ midnight before class                                   |
|       |     |                                               |                  | Authors: Final summary for Article 3 due on Moodle by start of class                  |
| 10/9  | F   | Fall break – no class                        |                  |                                                                                     |
| 10/12 | M   | Agents of Selection: Predation II            | EoN Ch. 14      | SimUText *Darwinian Snails* due (do on your own)                                     |
|       |     |                                               | Videos on Moodle| In-class activity                                                                    |
| 10/14 | W   | Agents of Selection: Mutualism and Parasitism| EoN Ch. 15, 17  | Authors: Paper 4 summary draft due to Moodle by start of class                       |
|       |     |                                               |                  |                                                                                     |
| 10/16 | F   | Agents of Selection: Herbivory               | EoN Ch. 14      | Editors: Reviews of Paper 4 summaries due to Moodle by start of class                |
|       |     |                                               |                  | In-class activity                                                                    |
| 10/19 | M   | Field activity on diversity of interactions  | Videos on Moodle|                                                                                     |
|       |     |                                               |                  | Editors: Reviews of Paper 4 summaries due to Moodle by start of class                |
|       |     |                                               |                  | In-class activity                                                                    |
| 10/21 | W   | Paper 4 Discussion                            | Paper 4: Kohl et al. 2014 – attractive cactus spines | Interactions assignment due (see Moodle)                                            |
|       |     |                                               |                  | Discussion board posts due @ midnight before class                                   |
|       |     |                                               |                  | Authors: Final summary for Paper 4 due to Moodle by start of class                   |
| 10/23 | F   | Critical thinking exercise                   |                  | In-class activity                                                                    |
| 10/26 | M   | EXAM 2                                        |                  |                                                                                     |
### Module 3: Macroevolution and Alternatives to Natural Selection

| Date   | Day | Topic                  | Readings/Assignments                                                                 |
|--------|-----|------------------------|-------------------------------------------------------------------------------------|
| 10/28  | W   | Speciation             | EoN Ch. 7e, Videos on Moodle                                                         |
|        |     |                        | Speciation computer exercise due in-class activity                                   |
| 10/30  | F   | Cladogenesis and phylogeny | Readings on Moodle, Videos on Moodle                                                 |
|        |     |                        | SimUText *Flowers and Trees* due (do on your own)                                    |
| 11/2   | M   | Cladogenesis and phylogeny | In-class activity                                                                   |
|        |     |                        | **Authors:** Paper 5 summary draft due to Moodle by start of class                   |
| 11/4   | W   | Human Evolution        | In-class activity                                                                   |
| 11/6   | F   | Sexual Selection       | EoN Ch. 9                                                                           |
| 11/9   | M   | **Paper 5 Discussion** | **Paper 5: Byrne & Nichols 1999 – London subway mosquitoes**                         |
|        |     |                        | Discussion board posts due @ midnight before class                                   |
|        |     |                        | **Authors:** Final summary for Paper 5 due to Moodle by start of class               |
| 11/11  | W   | Evolution and medicine | Videos on Moodle, Online readings (see Moodle for links)                             |
|        |     |                        | **Authors:** Paper 6 summary draft due to Moodle by start of class                   |
| 11/13  | F   | Kin and Group selection | EoN Ch. 10, Videos on Moodle                                                         |
|        |     |                        | In-class activity                                                                   |

### Module 4: Ecology at Larger Scales

| Date   | Day | Topic                  | Readings/Assignments                                                                 |
|--------|-----|------------------------|-------------------------------------------------------------------------------------|
| 11/16  | M   | Food webs and trophic cascades | EoN Ch. 18, Videos on Moodle                                                       |
|        |     |                        | Kin selection assignment due in-class activity                                      |
|        |     |                        | **Editors:** Reviews of Paper 6 summaries due to Moodle by start of class           |
| 11/18  | W   | **Paper 6 Discussion** | **Paper 6: Farkas et al. 2013 – camo evolution & cascades**                        |
|        |     |                        | Discussion board posts due @ midnight before class                                  |
|        |     |                        | **Authors:** Final summary for Paper 6 due to Moodle by start of class              |
| 11/20  | F   | Island Biogeography and Species-area relationships | EoN Ch. 22, Videos on Moodle                                                       |
|        |     |                        | SimUText *Biogeography* due (do on your own)                                       |
| 11/23  | M   | Conservation Biology   | EoN Ch. 23, Videos on Moodle                                                        |
|        |     |                        | Biodiversity assignment due in-class activity                                       |
| 11/25-  | W-F | Thanksgiving break – no classes | In-class activity                                                                  |
| 11/27  |     |                        |                                                                                   |
| 11/30  | M   | Critical thinking exercise | In-class activity                                                                  |

**FINAL EXAM**

| Section A: Thursday, December 10 1:00-4:00 pm |
| Section B: Wednesday, December 9 1:00-4:00 pm |
1 COURSE DESCRIPTION AND OBJECTIVES

CH308/BI308 is a one semester introductory to biochemistry course for biology and chemistry majors. This course aims to provide an overview of a variety of biochemical principles such as metabolism, enzyme kinetics, biosynthesis of macromolecules, structure and function of macromolecules, and energetics; as well as prepare students to think critically and apply these topics to modern day problems. This course also aims to explore the physiological pathways within the cell and how they become dysfunctional in disease states. After completion of this course students should be able to:

- Apply knowledge of biological systems and their interactions to explain how the human body functions in health and disease,
- Apply knowledge of the atomic and molecular characteristics of biological molecules to predict normal and pathological molecular function,
- Explain how the regulation of major metabolic pathways function to maintain health and identify major forms of dysregulation in disease,
- Apply major principles of physics and chemistry to explain normal biology, pathology and significant diseases,
- Explain the mechanism of action of major technologies used in the prevention, diagnosis and treatment of disease.

COURSE INFORMATION

Meeting: Blended Learning Classroom, Library Room LSR, MWF 11:00 a.m. – 12:00 p.m.
Instructor: Kate Hayden, SSC 342
Email: khayden@bsc.edu
Phone: 205-223-4872
Office Hours: T: 1:00-3:30pm W: 2:00-3:30pm F: 1:30-3:30pm
Facebook Hours: T/Th: 8:00–10:00pm
Teaching Asst: Sean McCarthy
Email: sjmccart@bsc.edu

Required Materials:

*Fundamentals of Biochemistry* 4th ed. By Donald Voet, Judith Voet, and Charlotte Pratt.
*Foundations of Biochemistry* 3rd ed. By Jenny Loertscher and Vicky Minderhout
2 COURSE WORK AND EVALUATION

Letter grades, as defined in the BSC Catalog, will be assigned at the end of the course based on the number of possible points that you can earn, where 93-100% = A, 90-92% = A-, 87-89% = B+, 83-86% = B, 80-82% = B-, 77-79% = C+, 73-76% = C, 70-72% = C-, 67-69% = D+, 60-66% = D, and <60% = F.

| Item                  | Possible Points |
|-----------------------|-----------------|
| Exam I                | 100             |
| Exam II               | 100             |
| Exam III              | 100             |
| Cumulative Final Exam | 200             |
| Literature Review Paper | 200          |
| Lecture Quizzes       | 100             |
| In Class Assignments  | 200             |
| Total Possible        | 1000            |

3 PRE-CLASS PREPARATION

Since this is a “flipped class”, each student must prepare for class ahead of time by reading the assigned chapter from the text and watching the lecture videos. Lecture videos will be posted to the course Moodle page when available. After reading and watching the video, students are encouraged to post comments, questions, or concerns about the material in the course page discussion board for that chapter. These responses can even include comments, questions and concerns regarding the material. For classes involving POGIL activities, each activity has a pre-activity assignment that must be completed and turned in prior to the start of class Students are encouraged to read and respond to each other’s posts in the string. Proper preparation before class will help ensure students’ success in group activities, discussions and POGIL workshops during class.

4 LITERATURE REVIEW PAPER

Throughout the semester students will write a literature review term paper concerning a disease, disorder, or illness and describe how it impacts the human body via disruption of various physiological pathways and discuss existing or possible treatment options. For instance, patients with cystic fibrosis suffer from a genetic mutation that causes the Na+/K+ protein pumps found in various tissues to be dysfunctional. As a result, patients suffer from poor digestion and absorption of dietary triglycerides (the salt pumps are linked to the release of lipases into the small intestines), high risk of bacterial infections in the lungs (improper pumping of salts causes mucus build up and abnormal pH levels on the lining of the lung in which bacteria thrive), and male patients are unable to reproduce (the malfunctioning salt pumps prevent the release of semen). As can be seen, one mutation in one protein can cause a myriad of disturbances through a variety of physiological processes which can greatly impact patients’ quality of life. Student papers should be original and should tie in as much RELEVANT course material as possible. More detailed information on this term paper, as well as a detailed rubric will be given at a later date.

5 LECTURE QUIZZES

Throughout the term, various lecture videos will have quizzes embedded within the video. To initiate the quiz you must provide your bsc.edu email address and full name at the start of the video. Once you have finished the lecture, the program will compile and score your answers and sends me a report daily. To earn full credit for the quiz you MUST complete the lecture video prior to the start of class (each report is time stamped), quizzes not completed will be given a score of zero, NO MAKE UPS ARE ALLOWED FOR QUIZZES. You will have the option to drop your lowest quiz score at the end of the term.
6 IN-CLASS ACTIVITIES
During class, students will participate in various group activities and discussions to apply the material studied prior to meeting. Students will work together in teams of three to discuss and work through activities. The solutions or results from activities will be discussed at the end of class as a class and any necessary work will be collected for participation grading. Groups will be selected by the instructor at random and groups will be reassigned after every exam to increase learning diversity. To ensure full group participation, confidential peer-reviews of group work will be completed after every exam and submitted to the instructor.

7 EXAMINATIONS
Three in-class examinations and a cumulative final examination will be given. You are expected to take all exams on the dates and times scheduled. If an exam is missed due to extenuating circumstances, i.e., documented and Provost Office-approved medical or family emergency, the course instructor will use her discretion to determine whether the exam can be made up.

8 ATTENDANCE POLICY
Due to the nature of this course, attendance in class is mandatory and will be taken each day of class. More than three unexcused absences will result in an F for the course. Those who attend all classes will receive a 10 point bonus. Attendance will be taken daily at the start of class.

9 HONOR CODE
Each student is expected to follow the BSC Honor Code. If it is determined that you have violated the honor code during a pre-activity, in-class activity, homework assignment, quiz, or exam you will receive a zero on that component of your grade. Students may not look at POGIL activities from previous years.

10 PORTABLE DEVICES
Use of cell phones or other electronic devices to send or receive calls, text messages, surf the internet, etc. are not allowed in the classroom for personal use. Such devices can only be used to aid in group activities when suitable. However, these devices are NOT allowed for use during exams and should be turned off before the start of the exam so they will not ring, vibrate, or otherwise disturb you, your fellow students, or your instructor.

11 DISABILITY SUPPORT SERVICES
Under the directives and guidance of the Americans with Disabilities Act (ADA) and Rehabilitation Act of 1973, we are committed to providing appropriate accommodations to meet the learning needs of disabled students. If you believe that you qualify for learning accommodations based official documentation, please contact me and appropriate learning accommodations in accordance with the recommendations can be arranged. It is critical that you contact your instructor within the first week of the course so that appropriate arrangements can be made. If you believe that you have a learning disability, but do not yet possess substantial supporting documentation, please contact the BSC Counseling and Health Services by calling x4717.
| Group Member | Contact Information |
|--------------|---------------------|
|              |                     |
|              |                     |
|              |                     |
|              |                     |
|              |                     |
|              |                     |
| Lecture | Date   | Topic                                  | Ch.# | In-Class Activity                        |
|---------|--------|----------------------------------------|------|------------------------------------------|
|         | 8/26   | Introduction                            |      |                                          |
| 1       | 8/28   | Thermodynamics (QUIZ)                   | 1    | CAT Test                                 |
| 2       | 8/31   | Water, Weak acids, Buffers              | 2    | Worksheet                                |
| 3       | 9/02   | Nucleic Acids                           | 3    | S18: Higher Order Structure of Nucleic Acids |
| 4       | 9/04   | Amino Acids (QUIZ)                      | 4    | S1: Amino Acids and the Primary Structure |
| 5       | 9/07   | Labor Day – No Class                    |      |                                          |
| 6       | 9/09   | Protein Structure                       | 6    | S2: 3-D Structure of Proteins            |
| 7       | 9/11   | Protein Function – Hemoglobin (QUIZ)    | 7    | S6: Hemoglobin – Structure and Function  |
| 8       | 9/14   | Protein Function – Muscle Contraction   | 7    | S5: Problem-Solving Challenge            |
| 9       | 9/16   | Carbohydrates                           | 8    | S11: Carbohydrates and Glycoproteins     |
| 10      | 9/18   | Lipids                                  | 9    | S12: Lipid Structure and Function        |
| 11      | 9/21   | Biochemical Techniques (QUIZ)           | 3,5  | S3: Tools of Biochemistry                |
| 12      | 9/23   | Biochemical Techniques                  | 3,5  | S4: LWBGase                              |
| 9/25    |        | EXAM I (Lectures 1 through 12)          |      |                                          |
| 13      | 9/28   | Enzyme Catalysis (QUIZ)                 | 11   | S7: Enzyme Catalysis                     |
| 14      | 9/30   | Enzyme Kinetics                         | 12   | S8: Enzyme Kinetics                      |
| 15      | 10/02  | Enzyme Inhibition (QUIZ)                | 12   | S9: Enzyme Inhibition                    |
| 16      | 10/05  | Enzyme Control and Drug Design          | 12   | S10: Enzyme Problems                     |
| 17      | 10/07  | Introduction to Metabolism I (QUIZ)     | 14   | S19: Understanding the Rate Determining stp |
| 10/09   |        | FALL BREAK                              |      |                                          |
| 18      | 10/12  | Introduction to Metabolism II           | 14   | S20: Understanding Metabolically Far From |
| 19      | 10/14  | Glycolysis                              | 15   | S22: Enzymes in Glycolysis               |
| 20      | 10/16  | Glycolysis (QUIZ)                       | 15   | S23: Regulation of Glycolysis            |
| 21      | 10/19  | Fermentation                           | 15   | S26: Glycolysis and Gluconeogenesis P.S.1  |
| 22      | 10/21  | Pentose Phosphate Pathway               | 15   | S28: Pentose Phosphate Pathway           |
| 23      | 10/23  | Gluconeogenesis                         | 16   | S27: Glycolysis and Gluconeogenesis P.S.2  |
| 10/26   |        | Review Day/Mid-course Assessment        |      |                                          |
| 10/28   |        | EXAM II (Lectures 13 through 23)        |      |                                          |
| 24      | 10/30  | The Citric Acid Cycle (QUIZ)            | 17   | S29: Exploring Pyruvate Dehydrogenase and The Citric Acid Cycle |
| 25      | 11/02  | The Citric Acid Cycle                   | 17   | S30: Exploring the Citric Acid Cycle     |
| 26      | 11/04  | Electron Transport (QUIZ)               | 18   | S31: Electron Transport                  |
| 27      | 11/06  | Electron Transport                      | 18   | Case Study – The Effect of DNP on ETC    |
| 28      | 11/09  | ATP Synthesis (QUIZ)                    | 18   | S32: Oxidative Phosphorylated            |
| 29      | 11/11  | ATP Synthesis                           | 18   | Case Study/Reflection                    |
| 30      | 11/13  | Lipid Metabolism                        | 20   | S33: Fatty Acid Degradation and Glucose Synthesis |
| 31      | 11/16  | Lipid Metabolism                        | 20   | S34: Understanding Fatty Acid Biosynthesis |
| 32      | 11/18  | Amino Acid Metabolism                   | 21   | S38: The Urea Cycle and the Effects of Protein Degradation |
| 33      | 11/20  | Integrated Metabolism (Review)          |      | S36: Integrated Metabolism              |
| 11/23   |        | Exam III (Lectures 24-33)               |      |                                          |
| 11/25   |        | THANKSGIVING BREAK                      |      |                                          |
| 11/27   |        | THANKSGIVING BREAK                      |      |                                          |
| 11/30   |        | Post-course Assessment and/or catch up  |      |                                          |
| 12/10   |        | FINAL EXAM 9am                          |      |                                          |
1. Describe the relationship between temperature and the density of water.

2. A student in your class hypothesizes that as the temperature approaches 4°C, individual water molecules become heavier, leading to an increase in density compared to higher or lower temperatures. How strongly does the data support this statement?
   
   ______  Very strongly
   ______  Moderately
   ______  Weakly
   ______  Not at all

Adapted from http://w3.marietta.edu/~biol/biomes/water_physics.htm.
3. Based on your knowledge of water structure, state an alternative hypothesis that explains the relationship shown in the graph.

4. What additional information could help to test or confirm your hypothesis?
Critical Thinking Exercises

For the scenarios below, please work together in your groups to answer the questions. You need only turn in one file for each group, but each group member’s name should appear on the file.

Group members:

**Scenario 1)** A middle-aged, slightly overweight white male is admitted to the emergency room complaining of intense chest pain and shortness of breath.

1) List off 5 different possible explanations for the cause of this patient's symptoms.
   a.
   b.
   c.
   d.
   e.

2) Choose two of these explanations that you think you should investigate and circle their letters above. Why did you choose those two over the others?

3) For each of the two explanations you chose above, describe the additional information (tests, observations, manipulations, etc.) that would help you determine whether or not this potential explanation is the true cause of the patient’s pain. Please describe two sources of information per explanation as a bare minimum.
Scenario 2) Scudder et al. (2014) gave 46 preadolescent children fitness tests (by measuring their aerobic fitness following a 2 minute walk on a treadmill) and also gave them a standardized academic tests in reading, spelling, and arithmetic. The results are shown below, and the dark bars are students in the 25th (lowest) percentile for aerobic fitness, while the lighter bars are the students in the 75th (highest) percentile for aerobic fitness. Asterisks indicate statistically significant differences between groups of students.

A

Achievement

1) What relationship or pattern is shown in figure A?

2) Scudder et al. concluded that exercise made children smarter. How strongly do the data support this statement?

- Very strongly
- Moderately
- Weakly
- Not at all

3) Develop at least three alternative explanations for why the pattern in figure A could be observed. Try to be as specific as possible in your explanations, but keep them brief.

4) Choose (and indicate) two of any of the possible explanations for the data, and list additional information that would help you determine which explanation was most likely to be correct.
19. Recently a research group from Spain published a 5 year study in JAMA Internal Medicine in which female participants who were randomly allocated to a Mediterranean diet supplemented with extra-virgin olive oil, a Mediterranean diet supplemented with mixed nuts, or a control diet (advice to reduce dietary fat), and published the following results:

|                        | Mediterranean diet supplemented with extra-virgin olive oil | Mediterranean diet supplemented with mixed nuts | Control diet – advice to reduce dietary fat |
|------------------------|-------------------------------------------------------------|------------------------------------------------|---------------------------------------------|
| Incidence of Breast Cancer after 5 years | 1.1                                                          | 1.8                                              | 2.9                                          |

The researchers concluded that women who eat a Mediterranean diet with olive oil can reduce their risk of breast cancer by as much as 68%.

a. How do you interpret the table above?

b. How strongly do you believe the data supports the researcher’s hypothesis?

c. What are three pieces of additional information you would find helpful in assessing the study described above?

d. List two possible alternative explanations for the data above:
e. Describe an experiment you could conduct to test one of your alternative explanations:
SALG - Student Assessment of their Learning Gains

Melanie Styers,  
Instrument #71238, BI 125, Fall 2015  
Administered Mon Aug 31, 2015 - Fri Sep 04, 2015

http://www.salgsite.org/
| ID  | Numl | Question                                                                 | Type         | Choices...                      |
|-----|------|--------------------------------------------------------------------------|--------------|---------------------------------|
| 826 |      | **Understanding**                                                        | Category     |                                 |
| 827 | 1    | Presently, I understand...                                               | Category     |                                 |
| 15066 | 9   | The distinction between scientific ideas and non-scientific ideas        | Select one   | 1: not applicable 2: not at all |
| 22435 | 1.2 | How studying topics in this course help people address real world issues | Select one   | 1: not applicable 2: not at all |
| 858 |      | **Skills**                                                               | Category     |                                 |
| 869 | 2    | Presently, I can...                                                     | Category     |                                 |
| 860 | 2.1  | Find articles relevant to a particular problem in professional journals or elsewhere | Select one   | 1: not applicable 2: not at all |
| 865 | 2.2  | Write documents in discipline-appropriate style and format               | Select one   | 1: not applicable 2: not at all |
| 866 | 2.3  | Work effectively with others                                            | Select one   | 1: not applicable 2: not at all |
| 15003 | 7   | **Critical Thinking Skills**                                             | Category     |                                 |
| 15003 | 3   | Presently, I can...                                                     | Category     |                                 |
| 15003 | 9   | 3.1 Separate factual information from inferences.                       | Select one   | 1: not applicable 2: not at all |
| 15004 | 0   | 3.2 Interpret numerical relationships in graphs.                       | Select one   | 1: not applicable 2: not at all |
| 15004 | 1   | 3.3 Understand the limitations of correlational data.                   | Select one   | 1: not applicable 2: not at all |
| 15004 | 2   | 3.4 Evaluate evidence and identify inappropriate conclusions.            | Select one   | 1: not applicable 2: not at all |
| 15004 | 3   | 3.5 Identify alternative interpretations for data or observations.      | Select one   | 1: not applicable 2: not at all |
| 15004 | 4   | 3.6 Identify new information that might support or contradict a hypothesis. | Select one   | 1: not applicable 2: not at all |
| 15004 | 5   | 3.7 Explain how new information can change a problem.                    | Select one   | 1: not applicable 2: not at all |
| 15004 | 6   | 3.8 Separate relevant from irrelevant information.                      | Select one   | 1: not applicable 2: not at all |
| 15004 | 7   | 3.9 Integrate information to solve problems.                            | Select one   | 1: not applicable 2: not at all |
| 15004 | 8   | 3.10 Learn and apply new information.                                   | Select one   | 1: not applicable 2: not at all |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|---|-----------------|-------------|---------|----------------|
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 15004 | 3.11 | Use mathematical skills to solve real-world problems. | Select one | 1: not applicable | 2: not at all |
|-------|-------|----------------------------------------------------|------------|-----------------|-------------|
| 15005 | 0     | Communicate ideas effectively.                     | Select one | 1: not applicable | 2: not at all |
| 870   |       | **Attitudes**                                       | Category   |                 |             |
| 871   | 4     | Presently, I am...                                 | Category   |                 |             |
| 15067 | 0     | **Enthusiastic about cell and molecular biology**  | Select one | 1: not applicable | 2: not at all |
| 15067 | 1     | **Interested in taking or planning to take additional courses in cell and molecular biology** | Select one | 1: not applicable | 2: not at all |
| 15067 | 2     | **Confident that I understand cell and molecular biology** | Select one | 1: not applicable | 2: not at all |
| 13490 | 8     | Confident that I can perform well in future Biology courses | Select one | 1: not applicable | 2: not at all |
| 877   | 4.5   | Comfortable working with complex ideas              | Select one | 1: not applicable | 2: not at all |
| 878   | 4.6   | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 1: not applicable | 2: not at all |
| 13490 | 9     | Intimidated by the prospect of speaking in class    | Select one | 1: not applicable | 2: not at all |
| 13491 | 5     | Thinking that science is an accumulation of facts, rules, and formulas. | Select one | 1: not applicable | 2: not at all |
| 880   |       | **Integration of learning**                         | Category   |                 |             |
| 881   | 5     | Presently, I am in the habit of...                  | Category   |                 |             |
| 883   | 5.1   | Applying what I learn in classes to other situations | Select one | 1: not applicable | 2: not at all |
| 884   | 5.2   | Using systematic reasoning in my approach to problems | Select one | 1: not applicable | 2: not at all |
| 885   | 5.3   | Using a critical approach to analyzing data and arguments in my daily life | Select one | 1: not applicable | 2: not at all |
| 13491 | 0     | **Major and goals**                                 | Category   |                 |             |
| 888   | 6     | What best characterizes your major in college?      | Category   |                 |             |
| 22445 | 6.1   | Major is in the sciences (life, physical, etc.)     | Select one | 1: Yes           | 2: No       |
| 22446 | 6.2   | Not a major in the sciences (life, physical, etc.)  | Select one | 1: Yes           | 2: No       |
| 891   | 6.3   | Undecided at this time                             | Select one | 1: Yes           | 2: No       |
| 13491 | 1     | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 1: Yes           | 2: No       |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|----------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| GPA | Category |
|-----|----------|
| 894 |          |
| 895 | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? |
| 15090 |          |
| 6   | My GPA is... (please skip if you are a first-semester freshman) |
| 13491 |          |
| 6   | student information |
| 13491 |          |
| 7   | Please enter information below to help me interpret the survey results and improve the course |
| 13491 |          |
| 8   | Enter your student number here ((this will help me track your responses across all the times you take this survey) |
| 15003 |          |
| 6   | Please ignore this question. |

**Select one**

1: 4.00-3.60

2: 3.01-3.59

| Long answer | Category |
|-------------|----------|
| 1: Section A (9:30 AM) |
| 2: Section B (12:30 PM) |
|   |   |   |
|---|---|---|
| 3: 2.51-3.00 | 4: 2.01-2.50 | 5: 2.00 or lower |
|   |   |   |
| ID  | Num | Question                                                                 | Type         | N  | Mean | Std dev |
|-----|-----|--------------------------------------------------------------------------|--------------|----|------|---------|
| 826 |     | **Understanding**                                                        | Category     |    |      |         |
| 827 | 1   | Presently, I understand...                                               | Category     |    |      |         |
| 15066 | 9  | 1.1 The distinction between scientific ideas and non-scientific ideas    | Select one   | 37 | 4.6  | 0.86    |
| 22435 | 1.2| How studying topics in this course help people address real world issues | Select one   | 37 | 5.0  | 0.76    |
| 858 |     | **Skills**                                                               | Category     |    |      |         |
| 869 | 2   | Presently, I can...                                                      | Category     |    |      |         |
| 860 | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one   | 37 | 4.3  | 1.07    |
| 865 | 2.2 | Write documents in discipline-appropriate style and format               | Select one   | 37 | 4.1  | 1.17    |
| 866 | 2.3 | Work effectively with others                                            | Select one   | 37 | 5.3  | 0.70    |
| 15003 | 7  | **Critical Thinking Skills**                                             | Category     |    |      |         |
| 15003 | 8  | 3 Presently, I can...                                                   | Category     |    |      |         |
| 15003 | 9  | 3.1 Separate factual information from inferences.                       | Select one   | 37 | 4.8  | 0.88    |
| 15004 | 0  | 3.2 Interpret numerical relationships in graphs.                         | Select one   | 37 | 4.9  | 0.86    |
| 15004 | 1  | 3.3 Understand the limitations of correlational data.                    | Select one   | 37 | 4.2  | 0.95    |
| 15004 | 2  | 3.4 Evaluate evidence and identify inappropriate conclusions.            | Select one   | 37 | 4.4  | 0.90    |
| 15004 | 3  | 3.5 Identify alternative interpretations for data or observations.       | Select one   | 37 | 4.1  | 0.82    |
| 15004 | 4  | 3.6 Identify new information that might support or contradict a hypothesis.| Select one   | 37 | 4.4  | 0.83    |
| 15004 | 5  | 3.7 Explain how new information can change a problem.                    | Select one   | 37 | 4.6  | 0.87    |
| 15004 | 6  | 3.8 Separate relevant from irrelevant information.                       | Select one   | 37 | 4.7  | 0.84    |
| 15004 | 7  | 3.9 Integrate information to solve problems.                             | Select one   | 37 | 4.5  | 1.04    |
| 15004 | 8  | 3.10 Learn and apply new information.                                   | Select one   | 37 | 4.8  | 0.64    |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1: 0% | 2: 0% | 3: 8% | 4: 24% | 5: 33% | 6: 10% |
| 1: 0% | 2: 0% | 3: 2% | 4: 14% | 5: 39% | 6: 20% |
| 1: 0% | 2: 4% | 3: 12% | 4: 29% | 5: 20% | 6: 10% |
| 1: 2% | 2: 6% | 3: 10% | 4: 27% | 5: 24% | 6: 6% |
| 1: 0% | 2: 0% | 3: 2% | 4: 4% | 5: 39% | 6: 31% |
| 1: 0% | 2: 2% | 3: 2% | 4: 18% | 5: 39% | 6: 14% |
| 1: 0% | 2: 0% | 3: 6% | 4: 14% | 5: 39% | 6: 16% |
| 1: 0% | 2: 6% | 3: 4% | 4: 37% | 5: 24% | 6: 4% |
| 1: 0% | 2: 2% | 3: 6% | 4: 35% | 5: 24% | 6: 8% |
| 1: 0% | 2: 2% | 3: 14% | 4: 31% | 5: 29% | 6: 0% |
| 1: 0% | 2: 2% | 3: 8% | 4: 24% | 5: 39% | 6: 2% |
| 1: 0% | 2: 0% | 3: 10% | 4: 20% | 5: 37% | 6: 8% |
| 1: 0% | 2: 0% | 3: 6% | 4: 20% | 5: 37% | 6: 12% |
| 1: 2% | 2: 4% | 3: 2% | 4: 18% | 5: 45% | 6: 4% |
| 1: 0% | 2: 0% | 3: 2% | 4: 20% | 5: 47% | 6: 6% |
| 15004 | 3.11 | Use mathematical skills to solve real-world problems. | Select one | 37 | 4.5 | 0.96 |
| 15005 | 3.12 | Communicate ideas effectively. | Select one | 37 | 4.9 | 0.84 |
| 870   |     | **Attitudes** | Category |
| 871   | 4   | Presently, I am... | Category |
| 15067 | 0   | Enthusiastic about cell and molecular biology | Select one | 37 | 4.7 | 0.90 |
| 15067 | 1   | Interested in taking or planning to take additional courses in cell and molecular biology | Select one | 37 | 4.6 | 1.07 |
| 15067 | 2   | Confident that I understand cell and molecular biology | Select one | 37 | 4.0 | 0.90 |
| 13490 | 8   | Confident that I can perform well in future Biology courses | Select one | 37 | 4.7 | 0.88 |
| 877   | 4.3 | Comfortable working with complex ideas | Select one | 37 | 4.4 | 0.89 |
| 878   | 4.6 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 37 | 5.2 | 0.85 |
| 13490 | 9   | intimidated by the prospect of speaking in class | Select one | 37 | 3.4 | 1.28 |
| 13491 | 5   | thinking that science is an accumulation of facts, rules, and formulas. | Select one | 37 | 4.1 | 1.09 |
| 880   |     | **Integration of learning** | Category |
| 881   | 5   | Presently, I am in the habit of... | Category |
| 883   | 5.1 | Applying what I learn in classes to other situations | Select one | 37 | 4.3 | 0.90 |
| 884   | 5.2 | Using systematic reasoning in my approach to problems | Select one | 37 | 4.3 | 1.03 |
| 885   | 5.3 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 37 | 4.4 | 0.82 |
| 13491 | 0   | **Major and goals** | Category |
| 888   | 6   | What best characterizes your major in college? | Category |
| 22445 | 6.1 | Major is in the sciences (life, physical, etc.) | Select one | 37 | 0.35 |
| 22446 | 6.2 | Not a major in the sciences (life, physical, etc.) | Select one | 37 | 0.28 |
| 891   | 6.3 | Undecided at this time | Select one | 37 | 0.42 |
| 13491 | 1   | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 37 | 0.23 |
| 894 | GPA | Category |
|-----|-----|----------|
| 895 | 7   | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? |
| 15090 | 6 | My GPA is... (please skip if you are a first-semester freshman) |
| 13491 | 6 | student information |
| 13491 | 7 | Please enter information below to help me interpret the survey results and improve the course |
| 13491 | 8 | Enter your student number here ((this will help me track your responses across all the times you take this survey) |
| 15003 | 6 | Please ignore this question. |
|    | 1: 55% | 2: 16% | 3: 4%  | 4: 0%  | 5: 0%  |
|----|--------|--------|--------|--------|--------|
|    |        |        |        |        |        |
| 1: | 6%     | 2: 69% |        |        |        |
SALG - Student Assessment of their Learning Gains

Melanie Styers, Instrument #72110, Administered Mon Nov 23, 2015 - Mon Nov 30, 2015

http://www.salgsite.org/
| ID  | Num| Question                                                                 | Type          | Choices...                     |
|-----|----|--------------------------------------------------------------------------|---------------|--------------------------------|
| 826 |    | **Understanding**                                                        | Category      |                                |
| 827 | 1  | Presently, I understand...                                              | Category      |                                |
| 15066 | 9 | The distinction between scientific ideas and non-scientific ideas        | Select one    | 1: not applicable 2: not at all|
| 22435 | 1.2 | How studying topics in this course help people address real world issues | Select one    | 1: not applicable 2: not at all|
| 858 |    | **Skills**                                                               | Category      |                                |
| 869 | 2  | Presently, I can...                                                     | Category      |                                |
| 860 | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one    | 1: not applicable 2: not at all|
| 865 | 2.2 | Write documents in discipline-appropriate style and format               | Select one    | 1: not applicable 2: not at all|
| 866 | 2.3 | Work effectively with others                                            | Select one    | 1: not applicable 2: not at all|
| 15003 | 7| **Critical Thinking Skills**                                            | Category      |                                |
| 15003 | 8 | Presently, I can...                                                     | Category      |                                |
| 15003 | 9 | 3.1 Separate factual information from inferences.                       | Select one    | 1: not applicable 2: not at all|
| 15004 | 0 | 3.2 Interpret numerical relationships in graphs.                        | Select one    | 1: not applicable 2: not at all|
| 15004 | 1 | 3.3 Understand the limitations of correlational data.                   | Select one    | 1: not applicable 2: not at all|
| 15004 | 2 | 3.4 Evaluate evidence and identify inappropriate conclusions.            | Select one    | 1: not applicable 2: not at all|
| 15004 | 3 | 3.5 Identify alternative interpretations for data or observations.      | Select one    | 1: not applicable 2: not at all|
| 15004 | 4 | 3.6 Identify new information that might support or contradict a hypothesis. | Select one    | 1: not applicable 2: not at all|
| 15004 | 5 | 3.7 Explain how new information can change a problem.                    | Select one    | 1: not applicable 2: not at all|
| 15004 | 6 | 3.8 Separate relevant from irrelevant information.                      | Select one    | 1: not applicable 2: not at all|
| 15004 | 7 | 3.9 Integrate information to solve problems.                            | Select one    | 1: not applicable 2: not at all|
| 15004 | 8 | 3.10 Learn and apply new information.                                   | Select one    | 1: not applicable 2: not at all|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|----------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 15004 | 9 | 3.11 Use mathematical skills to solve real-world problems. | Select one | 1: not applicable | 2: not at all |
| 15005 | 0 | 3.12 Communicate ideas effectively. | Select one | 1: not applicable | 2: not at all |
| 870 |   | **Attitudes** | Category |   |   |
| 871 | 4 | Presently, I am... | Category |   |   |
| 15067 | 0 | 4.1 Enthusiastic about cell and molecular biology | Select one | 1: not applicable | 2: not at all |
| 15067 | 1 | 4.2 Interested in taking or planning to take additional courses in cell and molecular biology | Select one | 1: not applicable | 2: not at all |
| 15067 | 2 | 4.3 Confident that I understand cell and molecular biology | Select one | 1: not applicable | 2: not at all |
| 13490 | 8 | 4.4 Confident that I can perform well in future Biology courses | Select one | 1: not applicable | 2: not at all |
| 877 | 4.5 Comfortable working with complex ideas | Select one | 1: not applicable | 2: not at all |
| 878 | 4.6 Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 1: not applicable | 2: not at all |
| 13490 | 9 | 4.7 intimidated by the prospect of speaking in class | Select one | 1: not applicable | 2: not at all |
| 13491 | 5 | 4.8 thinking that science is an accumulation of facts, rules, and formulas. | Select one | 1: not applicable | 2: not at all |
| 880 |   | **Integration of learning** | Category |   |   |
| 881 | 5 | Presently, I am in the habit of... | Category |   |   |
| 883 | 5.1 Applying what I learn in classes to other situations | Select one | 1: not applicable | 2: not at all |
| 884 | 5.2 Using systematic reasoning in my approach to problems | Select one | 1: not applicable | 2: not at all |
| 885 | 5.3 Using a critical approach to analyzing data and arguments in my daily life | Select one | 1: not applicable | 2: not at all |
| 13491 |   | **Major and goals** | Category |   |   |
| 888 | 6 | What best characterizes your major in college? | Category |   |   |
| 22445 | 6.1 | Major is in the sciences (life, physical, etc.) | Select one | 1: Yes | 2: No |
| 22446 | 6.2 | Not a major in the sciences (life, physical, etc.) | Select one | 1: Yes | 2: No |
| 891 | 6.3 | Undecided at this time | Select one | 1: Yes | 2: No |
| 13491 | 6.4 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 1: Yes | 2: No |
| 3: just a little | 4: somewhat | 5: a lot       | 6: a great deal |
|-----------------|-------------|---------------|----------------|
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot       | 6: a great deal |
|   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 13491 | **student information** | Please enter information below to help me interpret the survey results and improve the course | Category |
| 6 |   | Enter your student number here ((this will help me track your responses across all the times you take this survey) | Long answer |
| 13491 |   |   |   |   |   |   |   |   |   |   |   |
| 15460 | 7.2 | Just select one of the two options here (I couldn't delete this question.) | Select one |
| 2 |   | 1: Section A (9:30 AM) |   |
| 15460 | 2 | **Student investment** | Category |
| 15460 | 8 | In an average week, how much time did you spend on this class in the following areas? | Category |
| 15460 | 8.1 | Reading the book. | Select one |
| 5 |   | 1: none | 2: a little |
| 15460 | 8.2 | Watching course-related videos produced by Dr. Styers. | Select one |
| 6 |   | 1: none | 2: a little |
| 15460 | 8.3 | Reviewing your notes. | Select one |
| 7 |   | 1: none | 2: a little |
| 15460 | 8.4 | Reviewing materials online (powerpoints, clickers, supplemental videos). | Select one |
| 8 |   | 1: none | 2: a little |
| 15460 | 8.5 | Attending tutoring. | Select one |
| 9 |   | 1: none | 2: a little |
| 15460 | 8.6 | Studying with other students in the class. | Select one |
| 0 |   | 1: none | 2: a little |
| 15461 |   | **Student effort** | Category |
| 15461 | 9 | Compared to other BSC science courses, rate this course in terms of the following areas: | Category |
| 15461 | 9.1 | Amount of critical thinking you had to do (versus memorization). | Select one |
| 2 |   | 1: none | 2: a little |
| 15461 | 9.2 | Amount of assigned work (lecture only) | Select one |
| 3 |   | 1: none | 2: a little |
| 15461 | 9.3 | Amount of assigned work (lab only) | Select one |
| 4 |   | 1: none | 2: a little |
| 15461 | 9.4 | Amount of effort you put in throughout the semester | Select one |
| 5 |   | 1: none | 2: a little |
| Level | Description       |
|-------|-------------------|
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 3     | some              |
| 4     | a fair amount     |
| 5     | a great deal      |
| 9     | not applicable    |
| 15461 | 6 | 9.5 | How much you learned | Select one | 1: none | 2: a little |
|   | some          | a fair amount | a great deal | not applicable |
|---|---------------|---------------|--------------|----------------|
| 3 |               |               |              |                |
| 4 |               |               |              |                |
| 5 |               |               |              |                |
| 9 |               |               |              |                |
| ID  | Num | Question                                                                 | Type       | N  | Mean | Std dev |
|-----|-----|--------------------------------------------------------------------------|------------|----|------|---------|
| 826 |     | Understanding                                                             | Category   |    |      |         |
| 827 | 1   | Presently, I understand...                                               | Category   |    |      |         |
| 15066 | 9   | The distinction between scientific ideas and non-scientific ideas         | Select one | 33 | 5.0  | 0.92    |
| 22435 | 1.2 | How studying topics in this course help people address real world issues | Select one | 33 | 5.4  | 0.78    |
| 858 |     | Skills                                                                   | Category   |    |      |         |
| 869 | 2   | Presently, I can...                                                      | Category   |    |      |         |
| 860 | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one | 33 | 4.9  | 0.97    |
| 865 | 2.2 | Write documents in discipline-appropriate style and format               | Select one | 33 | 4.5  | 0.91    |
| 866 | 2.3 | Work effectively with others                                            | Select one | 33 | 5.5  | 0.62    |
| 15003 | 7   | Critical Thinking Skills                                                 | Category   |    |      |         |
| 15003 | 8   | Presently, I can...                                                      | Category   |    |      |         |
| 15003 | 9   | Separate factual information from inferences.                            | Select one | 33 | 5.1  | 0.86    |
| 15004 | 0   | Interpret numerical relationships in graphs.                             | Select one | 33 | 5.3  | 0.73    |
| 15004 | 1   | Understand the limitations of correlational data.                        | Select one | 33 | 4.9  | 0.90    |
| 15004 | 2   | Evaluate evidence and identify inappropriate conclusions.                | Select one | 33 | 4.8  | 0.70    |
| 15004 | 3   | Identify alternative interpretations for data or observations.           | Select one | 33 | 4.7  | 0.92    |
| 15004 | 4   | Identify new information that might support or contradict a hypothesis.  | Select one | 33 | 4.7  | 0.81    |
| 15004 | 5   | Explain how new information can change a problem.                        | Select one | 33 | 5.0  | 0.75    |
| 15004 | 6   | Separate relevant from irrelevant information.                           | Select one | 33 | 5.1  | 0.89    |
| 15004 | 7   | Integrate information to solve problems.                                 | Select one | 33 | 4.9  | 0.88    |
| 15004 | 8   | Learn and apply new information.                                         | Select one | 33 | 5.0  | 0.83    |
| Choices... |   |   |   |   |   |
|-----------|---|---|---|---|---|
|           | 1: 0% | 2: 0% | 3: 9% | 4: 12% | 5: 45% | 6: 33% |
|           | 1: 0% | 2: 0% | 3: 0% | 4: 18% | 5: 27% | 6: 55% |
|           | 1: 0% | 2: 3% | 3: 0% | 4: 30% | 5: 33% | 6: 33% |
|           | 1: 0% | 2: 3% | 3: 6% | 4: 39% | 5: 39% | 6: 12% |
|           | 1: 0% | 2: 0% | 3: 0% | 4: 6%  | 5: 42% | 6: 52% |
|           | 1: 0% | 2: 0% | 3: 6% | 4: 12% | 5: 45% | 6: 36% |
|           | 1: 0% | 2: 0% | 3: 0% | 4: 15% | 5: 39% | 6: 45% |
|           | 1: 0% | 2: 0% | 3: 6% | 4: 24% | 5: 39% | 6: 30% |
|           | 1: 0% | 2: 0% | 3: 0% | 4: 36% | 5: 48% | 6: 15% |
|           | 1: 0% | 2: 0% | 3: 9% | 4: 33% | 5: 36% | 6: 21% |
|           | 1: 0% | 2: 0% | 3: 3% | 4: 42% | 5: 36% | 6: 18% |
|           | 1: 0% | 2: 0% | 3: 0% | 4: 27% | 5: 45% | 6: 27% |
|           | 1: 0% | 2: 3% | 3: 0% | 4: 15% | 5: 45% | 6: 36% |
|           | 1: 0% | 2: 0% | 3: 6% | 4: 24% | 5: 42% | 6: 27% |
|           | 1: 0% | 2: 0% | 3: 3% | 4: 24% | 5: 42% | 6: 30% |
| 15004 | 9 | 3.11 | Use mathematical skills to solve real-world problems. | Select one | 33 | 4.9 | 0.93 |
| 15005 | 0 | 3.12 | Communicate ideas effectively. | Select one | 33 | 5.2 | 0.75 |
| 870   |   |   |**Attitudes** | Category |
| 871   | 4 |   | Presently, I am... | Category |
| 15067 | 0 | 4.1 | Enthusiastic about cell and molecular biology | Select one | 33 | 4.5 | 0.94 |
| 15067 | 1 | 4.2 | Interested in taking or planning to take additional courses in cell and molecular biology | Select one | 33 | 4.2 | 1.26 |
| 15067 | 2 | 4.3 | Confident that I understand cell and molecular biology | Select one | 33 | 4.3 | 1.13 |
| 13490 | 8 | 4.4 | Confident that I can perform well in future Biology courses | Select one | 33 | 4.6 | 1.06 |
| 877   | 4.5 | Comfortable working with complex ideas | Select one | 33 | 4.5 | 1.03 |
| 878   | 4.6 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 33 | 5.2 | 0.92 |
| 13490 | 9 | 4.7 | intimidated by the prospect of speaking in class | Select one | 33 | 3.7 | 1.42 |
| 13491 | 5 | 4.8 | thinking that science is an accumulation of facts, rules, and formulas. | Select one | 33 | 4.0 | 1.05 |
| 880   |   |   |**Integration of learning** | Category |
| 881   | 5 |   | Presently, I am in the habit of... | Category |
| 883   | 5.1 | Applying what I learn in classes to other situations | Select one | 33 | 4.6 | 0.99 |
| 884   | 5.2 | Using systematic reasoning in my approach to problems | Select one | 33 | 4.6 | 0.96 |
| 885   | 5.3 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 33 | 4.7 | 0.85 |
| 13491 | 0 |   |**Major and goals** | Category |
| 888   | 6 |   | What best characterizes your major in college? | Category |
| 22445 | 6.1 | Major is in the sciences (life, physical, etc.) | Select one | 33 | 0.17 |
| 22446 | 6.2 | Not a major in the sciences (life, physical, etc.) | Select one | 33 | 0.29 |
| 891   | 6.3 | Undecided at this time | Select one | 33 | 0.36 |
| 13491 | 1 | 6.4 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 33 | 0.33 |
| 13491 | **student information** |
|-------|-------------------------|
| 13491 | Please enter information below to help me interpret the survey results and improve the course |
| 13491 | Enter your student number here ((this will help me track your responses across all the times you take this survey)) |

| 15460 | **Student investment** |
|-------|------------------------|
| 15460 | In an average week, how much time did you spend on this class in the following areas? |

| 15460 | **Student effort** |
|-------|-------------------|
| 15460 | Compared to other BSC science courses, rate this course in terms of the following areas: |
| 1: 9% | 2: 91% |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 1: 12% | 2: 15% | 3: 24% | 4: 27% | 5: 21% | 9: 0% |
| 1: 0% | 2: 3% | 3: 24% | 4: 24% | 5: 48% | 9: 0% |
| 1: 0% | 2: 0% | 3: 9% | 4: 33% | 5: 58% | 9: 0% |
| 1: 3% | 2: 9% | 3: 15% | 4: 33% | 5: 39% | 9: 0% |
| 1: 42% | 2: 12% | 3: 15% | 4: 6% | 5: 24% | 9: 0% |
| 1: 9% | 2: 12% | 3: 18% | 4: 30% | 5: 27% | 9: 3% |
| 1: 0% | 2: 0% | 3: 6% | 4: 30% | 5: 55% | 9: 9% |
| 1: 0% | 2: 12% | 3: 21% | 4: 36% | 5: 18% | 9: 12% |
| 1: 0% | 2: 3% | 3: 3% | 4: 48% | 5: 36% | 9: 9% |
| 1: 0% | 2: 0% | 3: 3% | 4: 18% | 5: 70% | 9: 9% |
| 15461 | 6   | 9.5 | How much you learned | Select one | 30 | 4.7 | 0.55 |
SALG - Student Assessment of their Learning Gains

Peter Van Zandt, ,
Instrument #71210, BI 225 (pre), Fall 2015
Administered Mon Aug 31, 2015 - Sat Sep 05, 2015

http://www.salgsite.org/
| ID   | Num | Question                                                                 | Type                     | Choices...                  |
|------|-----|--------------------------------------------------------------------------|--------------------------|----------------------------|
| 826  |     | **Understanding**                                                        | **Category**             |                            |
| 827  | 1   | Presently, I understand...                                               | **Category**             |                            |
| 13490| 0   | (for each of the following, indicate your level of current understanding) | **Category**             |                            |
| 14997| 1   | 1.1.1 The distinction between scientific ideas and non-scientific ideas | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22431| 1.1.2| Darwin's theory of common descent and theory of natural selection       | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22409| 1.1.3| How natural populations evolve                                          | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22410| 1.1.4| Similarities and differences among species concepts                      | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22417| 1.1.5| Population structure and dynamics                                        | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22414| 1.1.6| Mechanisms of macroevolution                                             | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22418| 1.1.7| Structure and dynamics of natural communities                            | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 13490| 1   | 1.1.8 Threats to biodiversity                                            | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 13490| 2   | 1.1.9 The coolness of EvoEco                                              | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 13490| 3   | 1.1.10 Evolution occurs within individuals                                | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 22435| 1.2 | How studying topics in this course help people address real world issues| **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 12513| 1.3 | Shared ancestry explains most similarity among divergent organisms       | **Select one**           | 1: not applicable          |
|      |     |                                                                          |                          | 2: not at all              |
| 12513| 1.4 | Mutation is random, mostly deleterious, and is the source of heritable  | **Select one**           | 1: not applicable          |
|      |     | variation                                                                |                          | 2: not at all              |
| 12513| 1.5 | Most evolution happens as a consequence of selection acting on heritable | **Select one**           | 1: not applicable          |
|      |     | variation                                                                |                          | 2: not at all              |
| 22436| 1.6 | What do you expect to understand at the end of the class that you do not| **Long answer**          |                            |
|      |     | know now? (Please be as specific as possible.)                           |                          |                            |
| 858  |     | **Skills**                                                               | **Category**             |                            |
| 869  | 2   | Presently, I can...                                                      | **Category**             |                            |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|----------------|-------------|---------|----------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 860 | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one | 1: not applicable | 2: not at all |
| 22437 | 2.2 | Critically read articles about issues raised in this class | Select one | 1: not applicable | 2: not at all |
| 863 | 2.3 | Recognize a sound argument and appropriate use of evidence | Select one | 1: not applicable | 2: not at all |
| 865 | 2.4 | Write documents in discipline-appropriate style and format | Select one | 1: not applicable | 2: not at all |
| 866 | 2.5 | Work effectively with others | Select one | 1: not applicable | 2: not at all |
| 13490 | 2.6 | Brush my teeth regularly and effectively | Select one | 1: not applicable | 2: not at all |
| 12513 | 2.7 | Collaborate with people of varying knowledge and points of view toward common goals | Select one | 1: not applicable | 2: not at all |
| 13490 | 2.8 | Communicate with brevity, clarity, and scientific persuasion | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.9 | Separate factual information from inferences | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.10 | Interpret numerical relationships in graphs | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.11 | Understand the limitations of correlational data | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.12 | Evaluate evidence and identify inappropriate conclusions | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.13 | Identify alternative interpretations for data or observations | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.14 | Identify new information that might support or contradict a hypothesis | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.15 | Explain how new information can change a problem | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.16 | Separate relevant from irrelevant information | Select one | 1: not applicable | 2: not at all |
| 15081 | 2.17 | Use mathematical skills to solve real-world problems | Select one | 1: not applicable | 2: not at all |
| 13490 | 2.18 | What do you expect to be able to do better by the end of the course? | Long answer |   | |
| 870 | **Attitudes** |   | Category |   | |
| 871 | 3 | Presently, I am... | Category |   | |
| 22439 | 3.1 | Enthusiastic about ecology and/or evolution | Select one | 1: not applicable | 2: not at all |
|   | just a little | 4: somewhat | 5: a lot | 6: a great deal |
|---|--------------|-------------|---------|----------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| Question                                                                 | Response | Options                  |
|--------------------------------------------------------------------------|----------|--------------------------|
| Interested in discussing ecology and/or evolution with friends or family | Select one | 1: not applicable 2: not at all |
| Interested in taking or planning to take additional classes in ecology and/or evolution | Select one | 1: not applicable 2: not at all |
| Confident that I understand ecology and/or evolution                      | Select one | 1: not applicable 2: not at all |
| Confident that I can perform well in future Biology courses               | Select one | 1: not applicable 2: not at all |
| Comfortable working with complex ideas                                    | Select one | 1: not applicable 2: not at all |
| Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 1: not applicable 2: not at all |
| intimidated by the prospect of speaking in class                         | Select one | 1: not applicable 2: not at all |
| thinking that science is an accumulation of facts, rules, and formulas.  | Select one | 1: not applicable 2: not at all |
| Please comment on your present level of interest in ecology and/or evolution. | Long answer | |
| Integration of learning                                                   | Category | |
| Presently, I am in the habit of...                                       | Category | |
| Applying what I learn in classes to other situations                      | Select one | 1: not applicable 2: not at all |
| Using systematic reasoning in my approach to problems                    | Select one | 1: not applicable 2: not at all |
| Using a critical approach to analyzing data and arguments in my daily life | Select one | 1: not applicable 2: not at all |
| Please comment on how you expect this material to integrate with your studies, career, and/or life? | Long answer | |
| Major and goals                                                          | Category | |
| What best characterizes your major in college?                           | Category | |
| Major is in the sciences (life, physical, etc.)                          | Select one | 1: Yes 2: No |
| Not a major in the sciences (life, physical, etc.)                       | Select one | 1: Yes 2: No |
| Undecided at this time                                                    | Select one | 1: Yes 2: No |
| Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 1: Yes 2: No |
| GPA                                                                      | Category | |
|   | 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|---|-----------------|-------------|---------|---------------|
| 1 |                 |             |         |               |
| 2 |                 |             |         |               |
| 3 |                 |             |         |               |
| 4 |                 |             |         |               |
| 5 |                 |             |         |               |
| 6 |                 |             |         |               |
| 7 |                 |             |         |               |
| 8 |                 |             |         |               |
| 9 |                 |             |         |               |
| 10|                 |             |         |               |
| 11|                 |             |         |               |
| 12|                 |             |         |               |
| 13|                 |             |         |               |
| 14|                 |             |         |               |
| 15|                 |             |         |               |
| 16|                 |             |         |               |
| 17|                 |             |         |               |
| 18|                 |             |         |               |
| 19|                 |             |         |               |
| 20|                 |             |         |               |
| 21|                 |             |         |               |
| 22|                 |             |         |               |
| 23|                 |             |         |               |
| 24|                 |             |         |               |
| 25|                 |             |         |               |
| 26|                 |             |         |               |
| 27|                 |             |         |               |
| 28|                 |             |         |               |
| 29|                 |             |         |               |
| 30|                 |             |         |               |
|   |   | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? | Category |
|---|---|---------------------------------------------|----------|
| 895 | 6.1 | My GPA is... | Select one 1: 4.00-3.60 2: 3.01-3.59 |

**Student Information**

|   |   | Please enter information below to help me interpret the survey results and improve the course | Category |
|---|---|------------------------------------------------------------------------------------------------|----------|
| 13491 | 7 | Enter your student number here ((this will help me track your responses across all the times you take this survey) | Long answer |

|   |   | Please tell me which section of EvoEco you are in | Select one 1: Section A (9:30 AM) 2: Section B (12:30 PM) |
|---|---|-------------------------------------------------|----------------------------------------------------------|
| 3: 2.51-3.00 | 4: 2.01-2.50 | 5: 2.00 or lower |
|-------------|-------------|------------------|
| ID   | Number | Question                                                                 | Type            | N  | Mean | Std dev |
|------|--------|----------------------------------------------------------------------------|-----------------|----|------|---------|
| 826  |        | **Understanding**                                                         | Category        |    |      |         |
| 827  | 1      | Presently, I understand...                                                 | Category        |    |      |         |
| 13490| 0      | (for each of the following, indicate your level of current understanding)  | Category        |    |      |         |
| 14997| 1      | 1.1.1 The distinction between scientific ideas and non-scientific ideas   | Select one      | 20 | 4.3  | 0.88    |
| 22431| 1.1.2  | Darwin's theory of common descent and theory of natural selection          | Select one      | 20 | 4.5  | 0.76    |
| 22409| 1.1.3  | How natural populations evolve                                            | Select one      | 20 | 4.0  | 0.94    |
| 22410| 1.1.4  | Similarities and differences among species concepts                        | Select one      | 20 | 4.0  | 0.92    |
| 22417| 1.1.5  | Population structure and dynamics                                          | Select one      | 20 | 3.5  | 0.76    |
| 22414| 1.1.6  | Mechanisms of macroevolution                                               | Select one      | 20 | 3.0  | 0.97    |
| 22418| 1.1.7  | Structure and dynamics of natural communities                             | Select one      | 20 | 3.1  | 0.81    |
| 13490| 1      | 1.1.8 Threats to biodiversity                                             | Select one      | 20 | 4.0  | 1.12    |
| 13490| 2      | 1.1.9 The coolness of EvoEco                                               | Select one      | 20 | 4.4  | 1.39    |
| 13490| 3      | 1.1.10 Evolution occurs within individuals                                 | Select one      | 20 | 4.5  | 1.15    |
| 22435| 1.2    | How studying topics in this course help people address real world issues   | Select one      | 20 | 4.6  | 0.94    |
| 12513| 1.3    | Shared ancestry explains most similarity among divergent organisms         | Select one      | 20 | 4.2  | 1.24    |
| 12513| 1.4    | Mutation is random, mostly deleterious, and is the source of heritable     | Select one      | 20 | 4.3  | 1.23    |
| 12513| 1.5    | Most evolution happens as a consequence of selection acting on heritable   | Select one      | 20 | 4.0  | 1.32    |
| 22436| 1.6    | What do you expect to understand at the end of the class that you do not   | Long answer     | 20 |      |         |
| 858  |        | know now? (Please be as specific as possible.)                             | Category        |    |      |         |
| 869  | 2      | Presently, I can...                                                       | Category        |    |      |         |
| Choices... |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|
| 1: 0%     | 2: 3% | 3: 0% | 4: 39% | 5: 16% | 6: 6% |
| 1: 0%     | 2: 0% | 3: 6% | 4: 23% | 5: 32% | 6: 3% |
| 1: 0%     | 2: 3% | 3: 10% | 4: 39% | 5: 6% | 6: 6% |
| 1: 0%     | 2: 0% | 3: 19% | 4: 32% | 5: 6% | 6: 6% |
| 1: 0%     | 2: 3% | 3: 32% | 4: 23% | 5: 6% | 6: 0% |
| 1: 0%     | 2: 26% | 3: 16% | 4: 19% | 5: 3% | 6: 0% |
| 1: 0%     | 2: 13% | 3: 32% | 4: 16% | 5: 3% | 6: 0% |
| 1: 0%     | 2: 6% | 3: 16% | 4: 16% | 5: 23% | 6: 3% |
| 1: 3%     | 2: 0% | 3: 13% | 4: 16% | 5: 13% | 6: 19% |
| 1: 0%     | 2: 3% | 3: 10% | 4: 19% | 5: 19% | 6: 13% |
| 1: 0%     | 2: 0% | 3: 6% | 4: 26% | 5: 19% | 6: 13% |
| 1: 3%     | 2: 0% | 3: 13% | 4: 23% | 5: 16% | 6: 10% |
| 1: 3%     | 2: 0% | 3: 13% | 4: 10% | 5: 32% | 6: 6% |
| 1: 3%     | 2: 3% | 3: 13% | 4: 23% | 5: 13% | 6: 10% |
|   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|
| 860 | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one | 20 | 4.8 | 0.88 |
| 22437 | 2.2 | Critically read articles about issues raised in this class (learn and apply) | Select one | 20 | 4.5 | 0.76 |
| 863 | 2.3 | Recognize a sound argument and appropriate use of evidence (integrate information to solve problems) | Select one | 20 | 4.5 | 0.76 |
| 865 | 2.4 | Write documents in discipline-appropriate style and format | Select one | 20 | 4.3 | 0.93 |
| 866 | 2.5 | Work effectively with others | Select one | 20 | 5.2 | 0.77 |
| 13490 | 4 | Brush my teeth regularly and effectively | Select one | 20 | 5.7 | 0.67 |
| 12513 | 8 | Collaborate with people of varying knowledge and points of view toward common goals | Select one | 20 | 5.2 | 0.77 |
| 13490 | 6 | Communicate with brevity, clarity, and scientific persuasion (communicate effectively) | Select one | 20 | 4.5 | 0.94 |
| 15081 | 0 | Separate factual information from inferences. | Select one | 20 | 4.5 | 0.89 |
| 15081 | 1 | Interpret numerical relationships in graphs. | Select one | 20 | 4.4 | 0.99 |
| 15081 | 2 | Understand the limitations of correlational data. | Select one | 20 | 4.2 | 1.20 |
| 15081 | 3 | Evaluate evidence and identify inappropriate conclusions. | Select one | 20 | 4.1 | 1.02 |
| 15081 | 4 | Identify alternative interpretations for data or observations. | Select one | 20 | 4.3 | 1.17 |
| 15081 | 5 | Identify new information that might support or contradict a hypothesis. | Select one | 20 | 4.5 | 0.95 |
| 15081 | 6 | Explain how new information can change a problem. | Select one | 20 | 4.4 | 0.88 |
| 15081 | 7 | Separate relevant from irrelevant information. | Select one | 20 | 4.6 | 1.04 |
| 15081 | 8 | Use mathematical skills to solve real-world problems. | Select one | 20 | 4.6 | 1.19 |
| 13490 | 7 | Use mathematical skills to solve real-world problems. | Select one | 20 | 4.6 | 1.19 |
| 2.18 | What do you expect to be able to do better by the end of the course? | Long answer | 20 |

### Attitudes

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|
| 870 |   |   |   |   |   |   |
| 871 | 3 | Presently, I am... | Category |   |   |   |
| 872 | 2 |   | Category |   |   |   |
|   | 1: 0% | 2: 0% | 3: 3% | 4: 19% | 5: 26% | 6: 16% |
|---|-------|-------|-------|--------|--------|--------|
|   | 1: 0% | 2: 0% | 3: 3% | 4: 32% | 5: 23% | 6: 6%  |
|   | 1: 0% | 2: 0% | 3: 6% | 4: 23% | 5: 32% | 6: 3%  |
|   | 1: 0% | 2: 3% | 3: 6% | 4: 23% | 5: 29% | 6: 3%  |
|   | 1: 0% | 2: 0% | 3: 0% | 4: 13% | 5: 26% | 6: 26% |
|   | 1: 0% | 2: 0% | 3: 0% | 4: 6%  | 5: 10% | 6: 48% |
|   | 1: 0% | 2: 0% | 3: 0% | 4: 13% | 5: 26% | 6: 26% |
|   | 1: 0% | 2: 3% | 3: 0% | 4: 29% | 5: 23% | 6: 10% |
|   | 1: 0% | 2: 0% | 3: 10%| 4: 23% | 5: 26% | 6: 6%  |
|   | 1: 0% | 2: 3% | 3: 6% | 4: 23% | 5: 26% | 6: 6%  |
|   | 1: 0% | 2: 6% | 3: 10%| 4: 23% | 5: 16% | 6: 10% |
|   | 1: 0% | 2: 3% | 3: 16%| 4: 19% | 5: 23% | 6: 3%  |
|   | 1: 0% | 2: 3% | 3: 16%| 4: 13% | 5: 23% | 6: 10% |
|   | 1: 0% | 2: 0% | 3: 10%| 4: 23% | 5: 23% | 6: 10% |
|   | 1: 0% | 2: 0% | 3: 10%| 4: 26% | 5: 23% | 6: 6%  |
|   | 1: 0% | 2: 0% | 3: 10%| 4: 19% | 5: 19% | 6: 16% |
|   | 1: 0% | 2: 3% | 3: 10%| 4: 13% | 5: 23% | 6: 16% |
|   |   |   |
|---|---|---|
| 22439 | 3.1 | Enthusiastic about ecology and/or evolution | Select one | 20 | 4.8 | 0.97 |
| 22440 | 3.2 | Interested in discussing ecology and/or evolution with friends or family | Select one | 20 | 4.2 | 1.12 |
| 22441 | 3.3 | Interested in taking or planning to take additional classes in ecology and/or evolution | Select one | 20 | 3.5 | 1.15 |
| 22442 | 3.4 | Confident that I understand ecology and/or evolution | Select one | 20 | 4.1 | 1.04 |
| 13490 | 8 | Confident that I can perform well in future Biology courses | Select one | 20 | 4.7 | 1.09 |
| 877 | 3.6 | Comfortable working with complex ideas | Select one | 20 | 4.6 | 0.94 |
| 878 | 3.7 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 20 | 5.1 | 1.07 |
| 13490 | 9 | Intimidated by the prospect of speaking in class | Select one | 20 | 3.2 | 1.29 |
| 13491 | 5 | Thinking that science is an accumulation of facts, rules, and formulas. | Select one | 20 | 3.6 | 1.19 |
| 22444 | 3.10 | Please comment on your present level of interest in ecology and/or evolution. | Long answer | 20 | |
| 880 |   | **Integration of learning** | Category |   |   |   |
| 881 | 4 | Presently, I am in the habit of... | Category |   |   |   |
| 883 | 4.1 | Applying what I learn in classes to other situations | Select one | 20 | 4.6 | 0.75 |
| 884 | 4.2 | Using systematic reasoning in my approach to problems | Select one | 20 | 4.4 | 0.94 |
| 885 | 4.3 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 20 | 4.3 | 0.92 |
| 886 | 4.4 | Please comment on how you expect this material to integrate with your studies, career, and/or life? | Long answer | 20 |   |   |
| 13491 | 0 | **Major and goals** | Category |   |   |   |
| 888 | 5 | What best characterizes your major in college? | Category |   |   |   |
| 22445 | 5.1 | Major is in the sciences (life, physical, etc.) | Select one | 20 | 0.37 |   |
| 22446 | 5.2 | Not a major in the sciences (life, physical, etc.) | Select one | 20 | 0.37 |   |
| 891 | 5.3 | Undecided at this time | Select one | 20 | 0.22 |   |
| 13491 | 1 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 20 | 0.47 |   |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1: 0% | 2: 0% | 3: 6% | 4: 19% | 5: 23% | 6: 16% |
| 1: 0% | 2: 3% | 3: 13% | 4: 23% | 5: 16% | 6: 10% |
| 1: 0% | 2: 19% | 3: 6% | 4: 26% | 5: 13% | 6: 0% |
| 1: 0% | 2: 0% | 3: 23% | 4: 16% | 5: 19% | 6: 6% |
| 1: 0% | 2: 3% | 3: 6% | 4: 13% | 5: 29% | 6: 13% |
| 1: 0% | 2: 0% | 3: 6% | 4: 26% | 5: 19% | 6: 13% |
| 1: 0% | 2: 0% | 3: 10% | 4: 3% | 5: 23% | 6: 29% |
| 1: 3% | 2: 13% | 3: 29% | 4: 10% | 5: 3% | 6: 6% |
| 1: 3% | 2: 10% | 3: 13% | 4: 29% | 5: 6% | 6: 3% |
|   |   |   |   |   |   |
| 1: 0% | 2: 0% | 3: 3% | 4: 26% | 5: 29% | 6: 6% |
| 1: 0% | 2: 3% | 3: 6% | 4: 19% | 5: 32% | 6: 3% |
| 1: 0% | 2: 6% | 3: 0% | 4: 26% | 5: 32% | 6: 0% |
|   |   |   |   |   |   |
| 1: 55% | 2: 10% |   |   |   |   |
| 1: 10% | 2: 55% |   |   |   |   |
| 1: 3% | 2: 61% |   |   |   |   |
| 1: 45% | 2: 19% |   |   |   |   |
|   | GPA | Category |
|---|-----|----------|
| 894 | **What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)?** | |
| 895 | 6 | |
| 896 | 6.1 | **My GPA is...** Select one 20 2.0 0.79 |
| 13491 | **student information** | |
| 13491 | 6 | |
| 13491 | Please enter information below to help me interpret the survey results and improve the course | |
| 13491 | 7 | |
| 13491 | Enter your student number here ((this will help me track your responses across all the times you take this survey) | |
| 13491 | 8 | |
| 13491 | 7.1 | |
| 13491 | Please tell me which section of EvoEco you are in | Select one 20 0.44 |
|   |   |   |   |   |
|---|---|---|---|---|
| 1: 16% | 2: 35% | 3: 10% | 4: 3% | 5: 0% |

|   |   |
|---|---|
| 1: 48% | 2: 16% |
SALG - Student Assessment of their Learning Gains

Peter Van Zandt, ,
Instrument #72084, Evolutionary Ecology BI 225 (post), Fall 2015
Administered Mon Nov 30, 2015 - Sat Dec 12, 2015

http://www.salgsite.org/
| ID   | Number | Question                                                                 | Type              | Choices...                                      |
|------|--------|--------------------------------------------------------------------------|-------------------|------------------------------------------------|
| 826  |        | **Understanding**                                                        | Category          |                                                |
| 827  | 1      | Presently, I understand...                                               | Category          |                                                |
| 15404| 0      | (Now that you've finished the course, please indicate your level of current understanding) | Category          |                                                |
| 14997| 1      | 1.1.1 The distinction between scientific ideas and non-scientific ideas  | Select one        | 1: not applicable 2: not at all                |
| 22431| 1.1.2  | Darwin's theory of common descent and theory of natural selection        | Select one        | 1: not applicable 2: not at all                |
| 22409| 1.1.3  | How natural populations evolve                                           | Select one        | 1: not applicable 2: not at all                |
| 22410| 1.1.4  | Similarities and differences among species concepts                      | Select one        | 1: not applicable 2: not at all                |
| 22417| 1.1.5  | Population structure and dynamics                                        | Select one        | 1: not applicable 2: not at all                |
| 22414| 1.1.6  | Mechanisms of macroevolution                                             | Select one        | 1: not applicable 2: not at all                |
| 22418| 1.1.7  | Structure and dynamics of natural communities                           | Select one        | 1: not applicable 2: not at all                |
| 13490| 1      | 1.1.8 Threats to biodiversity                                            | Select one        | 1: not applicable 2: not at all                |
| 13490| 3      | 1.1.9 Evolution occurs within individuals                                | Select one        | 1: not applicable 2: not at all                |
| 22435| 1.2    | How studying topics in this course help people address real world issues | Select one        | 1: not applicable 2: not at all                |
| 12513| 0      | 1.3 Shared ancestry explains most similarity among divergent organisms   | Select one        | 1: not applicable 2: not at all                |
| 12513| 3      | 1.4 Mutation is random, mostly deleterious, and is the source of heritable variation | Select one        | 1: not applicable 2: not at all                |
| 12513| 4      | 1.5 Most evolution happens as a consequence of selection acting on heritable variation | Select one        | 1: not applicable 2: not at all                |
| 15403| 9      | 1.6 What do you think you understand better after taking this class? (Please be as specific as possible.) | Long answer       |                                                |
| 858  |        | **Skills**                                                               | Category          |                                                |
| 869  | 2      | Presently, I can...                                                     | Category          |                                                |
| 860  | 2.1    | Find articles relevant to a particular problem in professional journals or elsewhere | Select one        | 1: not applicable 2: not at all                |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|--------|----------------|
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
|                 |             |        |                |
| Attitudes | Category |
|-----------|----------|
| Presently, I am... | Category |

| 22437 | 2.2 | Critically read articles about issues raised in this class | Select one | 1: not applicable | 2: not at all |
| 15404 | 3 | Recognize a sound argument and appropriate use of evidence. | Select one | 1: not applicable | 2: not at all |
| 15404 | 4 | Write in a discipline-appropriate style and format. | Select one | 1: not applicable | 2: not at all |
| 15404 | 5 | Work effectively with others. | Select one | 1: not applicable | 2: not at all |
| 13490 | 4 | Brush my teeth regularly and effectively | Select one | 1: not applicable | 2: not at all |
| 12513 | 8 | Collaborate with people of varying knowledge and points of view toward common goals | Select one | 1: not applicable | 2: not at all |
| 13490 | 6 | Communicate with brevity, clarity, and scientific persuasion | Select one | 1: not applicable | 2: not at all |
| 15081 | 0 | Separate factual information from inferences. | Select one | 1: not applicable | 2: not at all |
| 15081 | 1 | Interpret numerical relationships in graphs. | Select one | 1: not applicable | 2: not at all |
| 15081 | 2 | Understand the limitations of correlational data. | Select one | 1: not applicable | 2: not at all |
| 15081 | 3 | Evaluate evidence and identify inappropriate conclusions. | Select one | 1: not applicable | 2: not at all |
| 15081 | 4 | Identify alternative interpretations for data or observations. | Select one | 1: not applicable | 2: not at all |
| 15081 | 5 | Identify new information that might support or contradict a hypothesis. | Select one | 1: not applicable | 2: not at all |
| 15081 | 6 | Explain how new information can change a problem. | Select one | 1: not applicable | 2: not at all |
| 15081 | 7 | Separate relevant from irrelevant information. | Select one | 1: not applicable | 2: not at all |
| 15081 | 8 | Use mathematical skills to solve real-world problems. | Select one | 1: not applicable | 2: not at all |
| 15404 | 1 | Have any of your skills improved after taking this course? If so, please describe here. | Long answer |

870  | **Attitudes** |
871  | Category |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|-----------------|
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little| 4: somewhat | 5: a lot | 6: a great deal |
|   | 3.1 Enthusiastic about ecology and/or evolution | Select one | 1: not applicable | 2: not at all |
|---|-----------------------------------------------|------------|------------------|--------------|
| 22439 | Interested in discussing ecology and/or evolution with friends or family | Select one | 1: not applicable | 2: not at all |
| 22441 | Interested in taking or planning to take additional classes in ecology and/or evolution | Select one | 1: not applicable | 2: not at all |
| 22442 | Confident that I understand ecology and/or evolution | Select one | 1: not applicable | 2: not at all |
| 13490 | Confident that I can perform well in future Biology courses | Select one | 1: not applicable | 2: not at all |
| 877 | Comfortable working with complex ideas | Select one | 1: not applicable | 2: not at all |
| 878 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 1: not applicable | 2: not at all |
| 13490 | Intimidated by the prospect of speaking in class | Select one | 1: not applicable | 2: not at all |
| 880 | Thinking that science is an accumulation of facts, rules, and formulas. | Select one | 1: not applicable | 2: not at all |
| 22444 | Please comment on your present level of interest in ecology and/or evolution. | Long answer |
| 880 | **Integration of learning** | Category |
| 881 | Presently, I am in the habit of... | Category |
| 883 | Applying what I learn in classes to other situations | Select one | 1: not applicable | 2: not at all |
| 884 | Using systematic reasoning in my approach to problems | Select one | 1: not applicable | 2: not at all |
| 885 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 1: not applicable | 2: not at all |
| 886 | Please comment on how you expect this material to integrate with your studies, career, and/or life? | Long answer |
| 13491 | **Major and goals** | Category |
| 888 | What best characterizes your major in college? | Category |
| 22445 | Major is in the sciences (life, physical, etc.) | Select one | 1: Yes | 2: No |
| 22446 | Not a major in the sciences (life, physical, etc.) | Select one | 1: Yes | 2: No |
| 891 | Undecided at this time | Select one | 1: Yes | 2: No |
| 13491 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 1: Yes | 2: No |
| Rating   | Description          |
|----------|----------------------|
| 3: just a little | 4: somewhat |
| 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 894 | **GPA** | Category |
|-----|---------|----------|
| 895 | 6 | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? |
| 896 | 6.1 | My GPA is... |

| 13491 | **student information** | Category |
|-------|--------------------------|----------|
| 13491 | 7 | Please enter information below to help me interpret the survey results and improve the course |
| 13491 | 8.1 | Enter your student number here ((this will help me track your responses across all the times you take this survey)) |

| 14516 | **Student investment** | Category |
|-------|-------------------------|----------|
| 14516 | 8 | In an average week, how many hours did you spend on this class in the following areas. Feel free to elaborate with comments where appropriate. |
| 14516 | 7.1 | Please tell me which section of EvoEco you are in |

| 14537 | **Effort for this course** | Category |
|-------|-----------------------------|----------|
| 14537 | 9 | Compared to other Biology courses, rate this course in terms of the following areas |
| 14537 | 9.1 | Amount of critical thinking you had to do (i.e., versus memorization) |
| 14538 | 9.2 | Amount of assigned work |
| 14538 | 9.3 | How much effort you put in throughout the semester |
| Rating | Description           |
|--------|-----------------------|
| 3: 2.51-3.00 | just a little         |
| 4: 2.01-2.50 | somewhat             |
| 5: 2.00 or lower | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| 3: just a little | somewhat             |
| 4: somewhat | a lot               |
| 6: a great deal |                    |
| Page | Section | Question                                                                                         | Category | Answer Type |
|------|---------|--------------------------------------------------------------------------------------------------|----------|-------------|
| 14538| 2.4     | How much you learned                                                                             | Select one | 1: not applicable 2: not at all |
| 14538| 3.4     | **Course design and organization**                                                                | Category  |             |
| 14538| 4.4     | Please comment on the overall effectiveness of the following course components. Where appropriate, include your thoughts on the usefulness of different assignments for accomplishing course goals (listed in syllabus). | Category  |             |
| 14538| 5.4     | 10.1 Focus on the interpretation of figures                                                      | Long answer |             |
| 14538| 6.4     | 10.2 The use of pre-class videos (produced by others and by me) for delivering course content.    | Long answer |             |
| 14538| 7.4     | 10.3 The peer editing process                                                                     | Long answer |             |
| 14538| 8.4     | 10.4 Summarizing a published paper in writing (recall that this is a WR course, so you may want to comment on whether you felt like this process improved your writing ability or not). | Long answer |             |
| 14538| 9.4     | 10.5 Paper discussions (online and in class)                                                      | Long answer |             |
| 14539| 10.4    | 10.6 Use of SimuText and other activities to explore class concepts                               | Long answer |             |
| 14539| 11.4    | 10.7 Use of video and reading guides                                                              | Long answer |             |
| 14539| 12.4    | 10.8 Quizzes as motivation for keeping up with reading                                             | Long answer |             |
| 14539| 13.4    | 10.9 The organization of the course Moodle page (both the layout of the homepage and the use of topic-specific Moodle pages with learning objectives) | Long answer |             |
| 14539| 14.4    | **Additional feedback**                                                                           | Category  |             |
| 14539| 15.4    | Please comment freely on any other aspect of the course. Remember that I want to use these comments to improve the course, so the more detailed comments or suggestions you can offer the better. | Category  |             |
| 14539| 16.4    | 11.1 Here’s a list of things to potentially comment on: the book (and how much you read it), the organization, difficulty level of exams, list of topics covered in class. | Long answer |             |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|----------------|
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
|                 |             |         |                |
| ID   | Num| Question                                                                 | Type               | N  | Mean | Std dev |
|------|----|--------------------------------------------------------------------------|--------------------|----|------|---------|
| 826  |    | **Understanding**                                                        | Category           |    |      |         |
| 827  | 1  | Presently, I understand...                                               | Category           |    |      |         |
| 15404 | 0  | (Now that you’ve finished the course, please indicate your level of current understanding) | Category           |    |      |         |
| 14997 | 1  | 1.1.1 The distinction between scientific ideas and non-scientific ideas | Select one         | 25 | 5.1  | 0.57    |
|      | 22431 | 1.1.2 Darwin’s theory of common descent and theory of natural selection | Select one         | 25 | 5.3  | 0.75    |
|      | 22409 | 1.1.3 How natural populations evolve                                    | Select one         | 25 | 5.6  | 0.58    |
|      | 22410 | 1.1.4 Similarities and differences among species concepts                | Select one         | 25 | 5.3  | 0.74    |
|      | 22417 | 1.1.5 Population structure and dynamics                                  | Select one         | 25 | 5.0  | 0.84    |
|      | 22414 | 1.1.6 Mechanisms of macroevolution                                       | Select one         | 25 | 4.8  | 0.75    |
|      | 22418 | 1.1.7 Structure and dynamics of natural communities                     | Select one         | 25 | 5.1  | 0.60    |
| 13490 | 1  | 1.1.8 Threats to biodiversity                                            | Select one         | 25 | 5.4  | 0.70    |
| 13490 | 3  | 1.1.9 Evolution occurs within individuals                                | Select one         | 25 | 5.1  | 1.38    |
| 22435 | 1.2 | How studying topics in this course help people address real world issues | Select one         | 25 | 5.4  | 0.65    |
| 12513 | 0  | 1.3 Shared ancestry explains most similarity among divergent organisms   | Select one         | 25 | 5.3  | 0.69    |
| 12513 | 3  | 1.4 Mutation is random, mostly deleterious, and is the source of heritable variation | Select one         | 25 | 5.1  | 0.76    |
| 12513 | 4  | 1.5 Most evolution happens as a consequence of selection acting on heritable variation | Select one         | 25 | 5.2  | 0.80    |
| 15403 | 9  | 1.6 What do you think you understand better after taking this class? (Please be as specific as possible.) | Long answer        | 24 |      |         |
| 858  |    | **Skills**                                                               | Category           |    |      |         |
| 869  | 2  | Presently, I can...                                                     | Category           |    |      |         |
| 860  | 2.1 | Find articles relevant to a particular problem in professional journals or elsewhere | Select one         | 25 | 5.2  | 0.65    |
| Choices... |   |   |   |   |   |   |
|------------|---|---|---|---|---|---|
|            | 1: 0% | 2: 0% | 3: 0% | 4: 10% | 5: 59% | 6: 17% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 14% | 5: 31% | 6: 41% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 3%  | 5: 31% | 6: 52% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 3%  | 5: 45% | 6: 34% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 21% | 5: 38% | 6: 24% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 21% | 5: 48% | 6: 14% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 10% | 5: 55% | 6: 21% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 10% | 5: 34% | 6: 41% |
|            | 1: 3% | 2: 3% | 3: 3% | 4: 10% | 5: 17% | 6: 48% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 7%  | 5: 34% | 6: 45% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 0%  | 5: 48% | 6: 34% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 10% | 5: 48% | 6: 24% |
|            | 1: 0% | 2: 0% | 3: 3% | 4: 10% | 5: 41% | 6: 31% |
|            | 1: 0% | 2: 0% | 3: 0% | 4: 10% | 5: 48% | 6: 28% |
| ID  | Score | Description                                                                 | Selection | Category | Subcategory | Marks |
|-----|-------|------------------------------------------------------------------------------|-----------|----------|-------------|-------|
| 22437 | 2.2   | Critically read articles about issues raised in this class (learn and apply) | Select one | 25       | 5.1         | 0.83  |
| 15404 | 3.0   | Recognize a sound argument and appropriate use of evidence.                  | Select one | 25       | 5.0         | 0.73  |
| 15404 | 4.0   | Write in a discipline-appropriate style and format.                          | Select one | 25       | 5.2         | 0.71  |
| 15404 | 5.0   | Work effectively with others.                                                | Select one | 25       | 5.4         | 0.82  |
| 13490 | 4.6   | Brush my teeth regularly and effectively                                    | Select one | 25       | 5.3         | 1.28  |
| 12513 | 8.0   | Collaborate with people of varying knowledge and points of view toward common goals | Select one | 25       | 5.5         | 0.59  |
| 13490 | 6.8   | Communicate with brevity, clarity, and scientific persuasion                  | Select one | 25       | 5.2         | 0.80  |
| 15081 | 0.9   | Separate factual information from inferences.                                | Select one | 25       | 5.2         | 0.62  |
| 15081 | 1.0   | Interpret numerical relationships in graphs.                                 | Select one | 25       | 5.4         | 0.91  |
| 15081 | 2.1   | Understand the limitations of correlational data.                            | Select one | 25       | 5.0         | 1.10  |
| 15081 | 3.1   | Evaluate evidence and identify inappropriate conclusions.                    | Select one | 25       | 5.1         | 0.67  |
| 15081 | 4.1   | Identify alternative interpretations for data or observations.              | Select one | 25       | 5.1         | 0.70  |
| 15081 | 5.1   | Identify new information that might support or contradict a hypothesis.      | Select one | 25       | 5.3         | 0.63  |
| 15081 | 6.1   | Explain how new information can change a problem.                            | Select one | 25       | 5.3         | 0.75  |
| 15081 | 7.1   | Separate relevant from irrelevant information.                               | Select one | 25       | 5.4         | 0.65  |
| 15081 | 8.1   | Use mathematical skills to solve real-world problems.                       | Select one | 25       | 4.9         | 1.15  |
| 15404 | 1.8   | Have any of your skills improved after taking this course? If so, please describe here. | Long answer | 24       |             |       |
| 870   | 3     | Presently, I am...                                                          | Category   |          |             |       |
| 871   | 3     |                                             | Category   |          |             |       |
|   | Column 1 | Column 2 | Column 3 | Column 4 | Column 5 | Column 6 |
|---|----------|----------|----------|----------|----------|----------|
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 14%   | 5: 38%   | 6: 31%   |
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 10%   | 5: 52%   | 6: 21%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 14%   | 5: 41%   | 6: 31%   |
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 7%    | 5: 24%   | 6: 52%   |
| 1 | 3%       | 2: 0%    | 3: 7%    | 4: 3%    | 5: 14%   | 6: 59%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 3%    | 5: 38%   | 6: 45%   |
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 10%   | 5: 41%   | 6: 31%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 10%   | 5: 52%   | 6: 24%   |
| 1 | 0%       | 2: 0%    | 3: 7%    | 4: 3%    | 5: 28%   | 6: 48%   |
| 1 | 0%       | 2: 3%    | 3: 7%    | 4: 10%   | 5: 34%   | 6: 31%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 14%   | 5: 48%   | 6: 24%   |
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 7%    | 5: 55%   | 6: 21%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 7%    | 5: 45%   | 6: 34%   |
| 1 | 0%       | 2: 0%    | 3: 3%    | 4: 3%    | 5: 41%   | 6: 38%   |
| 1 | 0%       | 2: 0%    | 3: 0%    | 4: 7%    | 5: 38%   | 6: 41%   |
| 1 | 0%       | 2: 3%    | 3: 7%    | 4: 17%   | 5: 24%   | 6: 34%   |
|   | Question                                                                 | Response | Score | Error |
|---|--------------------------------------------------------------------------|----------|-------|-------|
| 22439 | Enthusiastic about ecology and/or evolution | Select one | 25 | 5.0 | 0.65 |
| 22440 | Interested in discussing ecology and/or evolution with friends or family | Select one | 25 | 4.9 | 0.95 |
| 22441 | Interested in taking or planning to take additional classes in ecology and/or evolution | Select one | 25 | 4.4 | 1.38 |
| 22442 | Confident that I understand ecology and/or evolution | Select one | 25 | 5.0 | 0.91 |
| 13490 | Confident that I can perform well in future Biology courses | Select one | 25 | 5.0 | 1.12 |
| 877 | Comfortable working with complex ideas | Select one | 25 | 5.2 | 0.85 |
| 878 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 25 | 5.2 | 1.04 |
| 13490 | Intimidated by the prospect of speaking in class | Select one | 25 | 3.0 | 1.22 |
| 13491 | Thinking that science is an accumulation of facts, rules, and formulas. | Select one | 25 | 3.1 | 1.32 |
| 22444 | Please comment on your present level of interest in ecology and/or evolution. | Long answer | 25 | | |
| 880 | Integration of learning | Category | | | |
| 881 | Presently, I am in the habit of... | Category | | | |
| 883 | Applying what I learn in classes to other situations | Select one | 25 | 5.0 | 0.84 |
| 884 | Using systematic reasoning in my approach to problems | Select one | 25 | 5.3 | 0.68 |
| 885 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 25 | 5.2 | 0.85 |
| 886 | Please comment on how you expect this material to integrate with your studies, career, and/or life? | Long answer | 24 | | |
| 13491 | Major and goals | Category | | | |
| 888 | What best characterizes your major in college? | Category | | | |
| 22445 | Major is in the sciences (life, physical, etc.) | Select one | 25 | | 0.41 |
| 22446 | Not a major in the sciences (life, physical, etc.) | Select one | 25 | | 0.46 |
| 891 | Undecided at this time | Select one | 25 | | 0.00 |
| 13491 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 25 | | 0.48 |
|    | 1: 0% | 2: 0% | 3: 0% | 4: 17% | 5: 52% | 6: 17% |
|----|-------|-------|-------|--------|--------|--------|
| 1: 0% | 2: 0% | 3: 10% | 4: 10% | 5: 41% | 6: 24% |
| 1: 3% | 2: 3% | 3: 14% | 4: 24% | 5: 17% | 6: 24% |
| 1: 0% | 2: 3% | 3: 0% | 4: 14% | 5: 45% | 6: 24% |
| 1: 0% | 2: 3% | 3: 7% | 4: 10% | 5: 31% | 6: 34% |
| 1: 0% | 2: 0% | 3: 3% | 4: 14% | 5: 34% | 6: 34% |
| 1: 0% | 2: 3% | 3: 0% | 4: 17% | 5: 21% | 6: 45% |
| 1: 3% | 2: 31% | 3: 31% | 4: 7% | 5: 10% | 6: 3% |
| 1: 0% | 2: 45% | 3: 10% | 4: 14% | 5: 14% | 6: 3% |
| 1: 0% | 2: 0% | 3: 3% | 4: 17% | 5: 38% | 6: 28% |
| 1: 0% | 2: 0% | 3: 0% | 4: 10% | 5: 41% | 6: 34% |
| 1: 0% | 2: 0% | 3: 3% | 4: 14% | 5: 34% | 6: 34% |

|    | 1: 69% | 2: 17% |
|----|--------|--------|
| 1: 24% | 2: 62% |
| 1: 0% | 2: 86% |
| 1: 59% | 2: 28% |
|   | **GPA**                                                                 |   |   |   |
|---|----------------------------------------------------------------------|---|---|---|
| 894 | What is your current GPA in a system that assumes a 4.00 as an A     |   |   |   |
|    | (highest score possible)?                                           |   |   |   |
| 895 | My GPA is...                                                        |   | Select one | 25 | 2.0 | 0.93 |
| 13491 | **student information**                                             |   |   |   |
| 13491 | Please enter information below to help me interpret the survey       |   |   |   |
| 13491 | results and improve the course                                      |   |   |   |
| 13491 | Enter your student number here ((this will help me track your       |   | Long answer | 23 |   |   |
| 13491 | responses across all the times you take this survey)                |   |   |   |
| 14516 | Please tell me which section of EvoEco you are in                   |   | Select one | 25 | 0.46 |   |
| 14516 | In an average week, how many hours did you spend on this class in   |   |   |   |
| 14516 | the following areas. Feel free to elaborate with comments           |   |   |   |
| 14516 | where appropriate.                                                   |   |   |   |
| 14516 | reading the book                                                    |   | Select one | 25 | 4.1 | 1.05 |
| 14516 | Reviewing your notes                                                |   | Select one | 25 | 4.0 | 0.96 |
| 14516 | Watching course-related videos                                      |   | Select one | 25 | 4.9 | 0.76 |
| 14517 | Studying for this class in other ways                               |   | Select one | 25 | 4.8 | 0.88 |
| 14517 | How much total time per week did you spend on this class (excluding |   | Select one | 25 | 5.1 | 0.70 |
| 14537 | Effort for this course                                              |   |   |   |
| 14537 | Compared to other Biology courses, rate this course in terms of     |   |   |   |
| 14537 | the following areas                                                  |   |   |   |
| 14537 | Amount of critical thinking you had to do (i.e., versus memorization)|   | Select one | 25 | 5.1 | 1.09 |
| 14538 | Amount of assigned work                                             |   | Select one | 25 | 5.2 | 1.07 |
| 14538 | How much effort you put in throughout the semester                  |   | Select one | 25 | 5.1 | 1.19 |
|   | 1: 24% | 2: 41% | 3: 17% | 4: 0% | 5: 3% |
|---|--------|--------|--------|------|------|
|   | 1: 62% | 2: 24% |
|   | 1: 3%  | 2: 3%  | 3: 7%  | 4: 41%| 5: 28%| 6: 3% |
|   | 1: 0%  | 2: 0%  | 3: 31% | 4: 31%| 5: 17%| 6: 7% |
|   | 1: 0%  | 2: 0%  | 3: 3%  | 4: 17%| 5: 48%| 6: 17%|
|   | 1: 0%  | 2: 0%  | 3: 7%  | 4: 24%| 5: 38%| 6: 17%|
|   | 1: 0%  | 2: 0%  | 3: 0%  | 4: 17%| 5: 45%| 6: 24%|
|   | 1: 3%  | 2: 0%  | 3: 0%  | 4: 10%| 5: 38%| 6: 34%|
|   | 1: 3%  | 2: 0%  | 3: 0%  | 4: 7% | 5: 41%| 6: 34%|
|   | 1: 3%  | 2: 0%  | 3: 3%  | 4: 10%| 5: 31%| 6: 38%|
| ID  | Section | Question                                                                                                                                                                                                 | Response Type | Points | Notes |
|-----|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|--------|-------|
| 14538 | 2       | How much you learned                                                                                                                                  | Select one    | 25     | 5.1   |
| 14538 | 3       | **Course design and organization**                                                                                                               | Category      |         |       |
| 14538 | 4       | Please comment on the overall effectiveness of the following course components. Where appropriate, include your thoughts on the usefulness of different assignments for accomplishing course goals (listed in syllabus) | Category      |         |       |
| 14538 | 5       | 10.1 Focus on the interpretation of figures                                                                                                      | Long answer   | 25     |       |
| 14538 | 6       | 10.2 The use of pre-class videos (produced by others and by me) for delivering course content                                                     | Long answer   | 25     |       |
| 14538 | 7       | 10.3 The peer editing process                                                                                                                     | Long answer   | 25     |       |
| 14538 | 8       | 10.4 Summarizing a published paper in writing (recall that this is a WR course, so you may want to comment on whether you felt like this process improved your writing ability or not). | Long answer   | 25     |       |
| 14538 | 9       | 10.5 Paper discussions (online and in class)                                                                                                      | Long answer   | 25     |       |
| 14538 | 10      | 10.6 Use of SimuText and other activities to explore class concepts                                                                             | Long answer   | 25     |       |
| 14538 | 11      | 10.7 Use of video and reading guides                                                                                                               | Long answer   | 25     |       |
| 14538 | 12      | 10.8 Quizzes as motivation for keeping up with reading                                                                                             | Long answer   | 25     |       |
| 14539 | 13      | 10.9 The organization of the course Moodle page (both the layout of the home page and the use of topic-specific Moodle pages with learning objectives) | Long answer   | 25     |       |
| 14539 | 14      | **Additional feedback**                                                                                                                             | Category      |         |       |
| 14539 | 15      | 11 Please comment freely on any other aspect of the course. Remember that I want to use these comments to improve the course, so the more detailed comments or suggestions you can offer the better. | Category      |         |       |
| 14539 | 16      | 11.1 Here’s a list of things to potentially comment on: the book (and how much you read it), the organization, difficulty level of exams, list of topics covered in class. | Long answer   | 21     |       |
|   | 1: 3% | 2: 0% | 3: 0% | 4: 3% | 5: 52% | 6: 28% |
|---|-------|-------|-------|-------|--------|--------|
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
|   |       |       |       |       |        |        |
SALG - Student Assessment of their Learning Gains

Kate Hayden, ,
Instrument #71457, CH/BI308, Fall 2015
Administered Tue Sep 01, 2015 - Thu Sep 10, 2015

http://www.salgsite.org/
| ID  | Num  | Question                                                                 | Type          | Choices...                |
|-----|------|---------------------------------------------------------------------------|---------------|---------------------------|
| 826 |      | **Understanding**                                                         | Category      |                           |
| 827 | 1    | Presently, I understand...                                                | Category      |                           |
| 15066 | 9 | The distinction between scientific ideas and non-scientific ideas         | Select one    | 1: not applicable 2: not at all |
| 22435 | 1.2 | How studying topics in this course help people address real world issues | Select one    | 1: not applicable 2: not at all |
| 858 |      | **Skills**                                                                | Category      |                           |
| 869 | 2    | Presently, I can...                                                       | Category      |                           |
| 860 | 2.1  | Find articles relevant to a particular problem in professional journals or elsewhere | Select one  | 1: not applicable 2: not at all |
| 865 | 2.2  | Write documents in discipline-appropriate style and format                | Select one    | 1: not applicable 2: not at all |
| 866 | 2.3  | Work effectively with others                                              | Select one    | 1: not applicable 2: not at all |
| 15003 | 7 | **Critical Thinking Skills**                                              | Category      |                           |
| 15003 | 8 | Presently, I can...                                                       | Category      |                           |
| 15003 | 9 | 3.1 Separate factual information from inferences.                         | Select one    | 1: not applicable 2: not at all |
| 15004 | 0 | 3.2 Interpret numerical relationships in graphs.                          | Select one    | 1: not applicable 2: not at all |
| 15004 | 1 | 3.3 Understand the limitations of correlational data.                     | Select one    | 1: not applicable 2: not at all |
| 15004 | 2 | 3.4 Evaluate evidence and identify inappropriate conclusions.             | Select one    | 1: not applicable 2: not at all |
| 15004 | 3 | 3.5 Identify alternative interpretations for data or observations.       | Select one    | 1: not applicable 2: not at all |
| 15004 | 4 | 3.6 Identify new information that might support or contradict a hypothesis. | Select one    | 1: not applicable 2: not at all |
| 15004 | 5 | 3.7 Explain how new information can change a problem.                     | Select one    | 1: not applicable 2: not at all |
| 15004 | 6 | 3.8 Separate relevant from irrelevant information.                        | Select one    | 1: not applicable 2: not at all |
| 15004 | 7 | 3.9 Integrate information to solve problems.                             | Select one    | 1: not applicable 2: not at all |
| 15004 | 8 | 3.10 Learn and apply new information.                                     | Select one    | 1: not applicable 2: not at all |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|---------------|
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|                 |             |         |               |
|   |   |   |   |   |
|---|---|---|---|---|
| 15004 | 9 | 3.11 | Use mathematical skills to solve real-world problems. | Select one 1: not applicable 2: not at all |
| 15005 | 0 | 3.12 | Communicate ideas effectively. | Select one 1: not applicable 2: not at all |
| 870 |   |   | **Attitudes** | Category |
| 871 | 4 |   | Presently, I am... | Category |
| 15098 | 4 | 4.1 | Enthusiastic about biochemistry. | Select one 1: not applicable 2: not at all |
| 15098 | 5 | 4.2 | Interested in taking or planning to take additional courses in biochemistry. | Select one 1: not applicable 2: not at all |
| 15098 | 6 | 4.3 | Confident that I understand biochemistry | Select one 1: not applicable 2: not at all |
| 15098 | 7 | 4.4 | Confident that I can perform well in future Biology and/or Chemistry courses | Select one 1: not applicable 2: not at all |
| 877 | 4.5 | Comfortable working with complex ideas | Select one 1: not applicable 2: not at all |
| 878 | 4.6 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one 1: not applicable 2: not at all |
| 13490 | 9 | 4.7 | intimidated by the prospect of speaking in class | Select one 1: not applicable 2: not at all |
| 13491 | 5 | 4.8 | thinking that science is an accumulation of facts, rules, and formulas. | Select one 1: not applicable 2: not at all |
| 880 |   |   | **Integration of learning** | Category |
| 881 | 5 |   | Presently, I am in the habit of... | Category |
| 883 | 5.1 | Applying what I learn in classes to other situations | Select one 1: not applicable 2: not at all |
| 884 | 5.2 | Using systematic reasoning in my approach to problems | Select one 1: not applicable 2: not at all |
| 885 | 5.3 | Using a critical approach to analyzing data and arguments in my daily life | Select one 1: not applicable 2: not at all |
| 13491 | 6 |   | **Major and goals** | Category |
| 888 | 6 |   | What best characterizes your major in college? | Category |
| 22445 | 6.1 | Major is in the sciences (life, physical, etc.) | Select one 1: Yes 2: No |
| 22446 | 6.2 | Not a major in the sciences (life, physical, etc.) | Select one 1: Yes 2: No |
| 891 | 6.3 | Undecided at this time | Select one 1: Yes 2: No |
| 13491 | 6.4 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one 1: Yes 2: No |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
|---|---------------|---|----------|---|------|---|--------------|
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 3 | just a little | 4 | somewhat | 5 | a lot | 6 | a great deal |
| 894 | **GPA** | Category |
|-----|---------|----------|
| 895 | 7       | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? | Category |
| 15090 | 7.1 | My GPA is... (please skip if you are a first-semester freshman) | Select one 1: 4.00-3.60 2: 3.01-3.59 |
| 13491 | **student information** | Category |
| 13491 | 8       | Please enter information below to help me interpret the survey results and improve the course | Category |
| 13491 | 8.1 | Enter your student number here ((this will help me track your responses across all the times you take this survey)) | Long answer |
| 15003 | 8.2 | Please ignore this question. | Select one 1: Section A (9:30 AM) 2: Section B (12:30 PM) |
|   |   |   |
|---|---|---|
| 3: 2.51-3.00 | 4: 2.01-2.50 | 5: 2.00 or lower |

|   |   |   |
|---|---|---|
|   |   |   |

|   |   |   |
|---|---|---|
|   |   |   |
| ID  | Num   | Question                                                                 | Type       | N  | Mean | Std dev |
|-----|-------|---------------------------------------------------------------------------|------------|----|------|---------|
| 826 |       | **Understanding**                                                         | Category   |    |      |         |
| 827 | 1     | Presently, I understand...                                               | Category   |    |      |         |
| 15066 | 9.1   | The distinction between scientific ideas and non-scientific ideas         | Select one | 22 | 4.9  | 0.75    |
| 22435 | 1.2   | How studying topics in this course help people address real world issues | Select one | 22 | 5.1  | 0.87    |
| 858 |       | **Skills**                                                                | Category   |    |      |         |
| 869 | 2     | Presently, I can...                                                      | Category   |    |      |         |
| 860 | 2.1   | Find articles relevant to a particular problem in professional journals or elsewhere | Select one | 22 | 5.0  | 0.69    |
| 865 | 2.2   | Write documents in discipline-appropriate style and format                | Select one | 22 | 4.8  | 0.81    |
| 866 | 2.3   | Work effectively with others                                             | Select one | 22 | 5.0  | 0.82    |
| 15003 | 7     | **Critical Thinking Skills**                                              | Category   |    |      |         |
| 15003 | 3     | Presently, I can...                                                      | Category   |    |      |         |
| 15003 | 9.1   | Separate factual information from inferences.                            | Select one | 22 | 4.8  | 0.81    |
| 15003 | 9.2   | Interpret numerical relationships in graphs.                             | Select one | 22 | 5.1  | 0.81    |
| 15003 | 9.3   | Understand the limitations of correlational data.                        | Select one | 22 | 5.0  | 0.87    |
| 15003 | 9.4   | Evaluate evidence and identify inappropriate conclusions.                | Select one | 22 | 4.6  | 0.91    |
| 15003 | 9.5   | Identify alternative interpretations for data or observations.           | Select one | 22 | 4.6  | 0.96    |
| 15004 | 4.1   | Identify new information that might support or contradict a hypothesis.  | Select one | 22 | 4.5  | 0.67    |
| 15004 | 4.2   | Explain how new information can change a problem.                        | Select one | 22 | 4.7  | 0.84    |
| 15004 | 4.3   | Separate relevant from irrelevant information.                           | Select one | 22 | 4.8  | 0.87    |
| 15004 | 4.7   | Integrate information to solve problems.                                 | Select one | 22 | 4.7  | 0.89    |
| 15004 | 4.10  | Learn and apply new information.                                         | Select one | 22 | 4.8  | 0.92    |
| Choices... |   |   |   |   |   |   |
|-----------|---|---|---|---|---|---|
| 1: 0%     | 2: 0% | 3: 5% | 4: 18% | 5: 59% | 6: 18% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 18% | 5: 41% | 6: 36% |
| 1: 0%     | 2: 0% | 3: 0% | 4: 23% | 5: 55% | 6: 23% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 32% | 5: 45% | 6: 18% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 18% | 5: 50% | 6: 27% |
| 1: 0%     | 2: 0% | 3: 0% | 4: 23% | 5: 55% | 6: 23% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 14% | 5: 50% | 6: 32% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 23% | 5: 41% | 6: 32% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 55% | 5: 18% | 6: 23% |
| 1: 0%     | 2: 0% | 3: 9% | 4: 45% | 5: 23% | 6: 23% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 41% | 5: 50% | 6: 5% |
| 1: 0%     | 2: 0% | 3: 5% | 4: 41% | 5: 36% | 6: 18% |
| 1: 0%     | 2: 0% | 3: 9% | 4: 23% | 5: 50% | 6: 18% |
| 1: 0%     | 2: 0% | 3: 9% | 4: 32% | 5: 41% | 6: 18% |
| 1: 0%     | 2: 0% | 3: 9% | 4: 27% | 5: 41% | 6: 23% |
| Category | Number | Description | Value | Weight | Change |
|----------|--------|-------------|-------|--------|--------|
| Use mathematical skills to solve real-world problems. | 15004 | 3.11 | | | |
| Communicate ideas effectively. | 15005 | 3.12 | | | |
| Attitudes | 870 | | | | |
| Presently, I am... | 871 | 4 | | | |
| Enthusiastic about biochemistry. | 15098 | 4 | 4.1 | | 0.87 |
| Interested in taking or planning to take additional courses in biochemistry. | 15098 | 5 | 4.2 | | 1.34 |
| Confident that I understand biochemistry | 15098 | 6 | 4.3 | | 1.17 |
| Confident that I can perform well in future Biology and/or Chemistry courses | 15098 | 7 | 4.4 | | 0.90 |
| Comfortable working with complex ideas | 877 | 4.5 | | | 0.94 |
| Willing to seek help from others (teacher, peers, TA) when working on academic problems | 878 | 4.6 | | | 0.84 |
| Applying what I learn in classes to other situations | 880 | 5.1 | | | 1.40 |
| Using systematic reasoning in my approach to problems | 884 | 5.2 | | | 0.79 |
| Using a critical approach to analyzing data and arguments in my daily life | 885 | 5.3 | | | 0.80 |
| Major and goals | 888 | 6 | | | |
| What best characterizes your major in college? | 22445 | 6.1 | | | 0.00 |
| Major is in the sciences (life, physical, etc.) | 22446 | 6.2 | | | 0.21 |
| Not a major in the sciences (life, physical, etc.) | 891 | 6.3 | | | 0.00 |
| Undecided at this time | 13491 | 6.4 | | | 0.21 |
| Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | 13491 | 6.4 | | |
| 1: 0%  | 2: 0%  | 3: 23% | 4: 36% | 5: 23% | 6: 18% |
|--------|--------|--------|--------|--------|--------|
| 1: 0%  | 2: 0%  | 3: 5%  | 4: 36% | 5: 45% | 6: 14% |
| 1: 0%  | 2: 0%  | 3: 9%  | 4: 23% | 5: 50% | 6: 18% |
| 1: 5%  | 2: 14% | 3: 14% | 4: 32% | 5: 27% | 6: 9%  |
| 1: 0%  | 2: 27% | 3: 36% | 4: 18% | 5: 14% | 6: 5%  |
| 1: 0%  | 2: 0%  | 3: 14% | 4: 23% | 5: 50% | 6: 14% |
| 1: 0%  | 2: 5%  | 3: 14% | 4: 36% | 5: 41% | 6: 5%  |
| 1: 0%  | 2: 0%  | 3: 0%  | 4: 32% | 5: 32% | 6: 36% |
| 1: 0%  | 2: 23% | 3: 32% | 4: 23% | 5: 5%  | 6: 18% |
| 1: 0%  | 2: 23% | 3: 14% | 4: 45% | 5: 5%  | 6: 14% |
| 1: 0%  | 2: 0%  | 3: 9%  | 4: 55% | 5: 27% | 6: 9%  |
| 1: 0%  | 2: 0%  | 3: 9%  | 4: 41% | 5: 36% | 6: 14% |
| 1: 0%  | 2: 0%  | 3: 9%  | 4: 32% | 5: 50% | 6: 9%  |
| 1: 100%| 2: 0%  |        |        |        |        |
| 1: 5%  | 2: 95% |        |        |        |        |
| 1: 0%  | 2: 100%|        |        |        |        |
| 1: 95% | 2: 5%  |        |        |        |        |
|   | GPA |
|---|-----|
| 894 | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? |
| 895 | My GPA is... (please skip if you are a first-semester freshman) |
| 15090 | Please enter information below to help me interpret the survey results and improve the course |
| 13491 | Enter your student number here ((this will help me track your responses across all the times you take this survey)) |
| 15003 | Please ignore this question. |
| 1: 41% | 2: 55% | 3: 5% | 4: 0% | 5: 0% |
|-------|-------|------|------|------|
| 1: 73% | 2: 27% |      |      |      |
SALG - Student Assessment of their Learning Gains

Kate Hayden, ,
Instrument #72178, CH/BI308, Fall 2015
Administered Tue Nov 24, 2015 - Thu Dec 03, 2015

http://www.salgsite.org/
| ID   | ID   | Question                                                                 | Type       | Choices...                           |
|------|------|--------------------------------------------------------------------------|------------|--------------------------------------|
| 826  | 1    | Presently, I understand...                                               | Category   |                                      |
| 15066| 9    | The distinction between scientific ideas and non-scientific ideas         | Select one | 1: not applicable 2: not at all       |
| 22435| 1.2  | How studying topics in this course help people address real world issues | Select one | 1: not applicable 2: not at all       |
| 858  | 2    | Presently, I can...                                                      | Category   |                                      |
| 860  | 2.1  | Find articles relevant to a particular problem in professional journals or elsewhere | Select one | 1: not applicable 2: not at all       |
| 865  | 2.2  | Write documents in discipline-appropriate style and format               | Select one | 1: not applicable 2: not at all       |
| 866  | 2.3  | Work effectively with others                                             | Select one | 1: not applicable 2: not at all       |
| 15003| 7    | Presently, I can...                                                      | Category   |                                      |
| 15003| 3    | Presently, I can...                                                      | Category   |                                      |
| 15004| 0    | Separate factual information from inferences.                            | Select one | 1: not applicable 2: not at all       |
| 15004| 2    | Interpret numerical relationships in graphs.                             | Select one | 1: not applicable 2: not at all       |
| 15004| 3    | Understand the limitations of correlational data.                        | Select one | 1: not applicable 2: not at all       |
| 15004| 4    | Evaluate evidence and identify inappropriate conclusions.                | Select one | 1: not applicable 2: not at all       |
| 15004| 5    | Identify alternative interpretations for data or observations.           | Select one | 1: not applicable 2: not at all       |
| 15004| 6    | Identify new information that might support or contradict a hypothesis.  | Select one | 1: not applicable 2: not at all       |
| 15004| 7    | Explain how new information can change a problem.                        | Select one | 1: not applicable 2: not at all       |
| 15004| 8    | Separate relevant from irrelevant information.                           | Select one | 1: not applicable 2: not at all       |
| 15004| 9    | Integrate information to solve problems.                                 | Select one | 1: not applicable 2: not at all       |
| 15004| 10   | Learn and apply new information.                                         | Select one | 1: not applicable 2: not at all       |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|------------------|--------------|---------|----------------|
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat  | 5: a lot | 6: a great deal |
| 15004 | 3.11 | Use mathematical skills to solve real-world problems. | Select one | 1: not applicable | 2: not at all |
|-------|------|-----------------------------------------------------|------------|------------------|---------------|
| 15005 | 3.12 | Communicate ideas effectively. | Select one | 1: not applicable | 2: not at all |
| 870   |      | **Attitudes**                                        | Category   |                  |               |
| 871   | 4    | Presently, I am...                                   | Category   |                  |               |
| 15098 | 4    | Enthusiastic about biochemistry. | Select one | 1: not applicable | 2: not at all |
| 15098 | 5    | Interested in taking or planning to take additional courses in biochemistry. | Select one | 1: not applicable | 2: not at all |
| 15098 | 6    | Confident that I understand biochemistry.            | Select one | 1: not applicable | 2: not at all |
| 15098 | 7    | Confident that I can perform well in future Biology and/or Chemistry courses | Select one | 1: not applicable | 2: not at all |
| 877   | 4.5  | Comfortable working with complex ideas               | Select one | 1: not applicable | 2: not at all |
| 878   | 4.6  | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 1: not applicable | 2: not at all |
| 13490 | 4.7  | intimidated by the prospect of speaking in class     | Select one | 1: not applicable | 2: not at all |
| 13491 | 5    | thinking that science is an accumulation of facts, rules, and formulas. | Select one | 1: not applicable | 2: not at all |
| 880   |      | **Integration of learning**                          | Category   |                  |               |
| 881   | 5    | Presently, I am in the habit of...                   | Category   |                  |               |
| 883   | 5.1  | Applying what I learn in classes to other situations | Select one | 1: not applicable | 2: not at all |
| 884   | 5.2  | Using systematic reasoning in my approach to problems | Select one | 1: not applicable | 2: not at all |
| 885   | 5.3  | Using a critical approach to analyzing data and arguments in my daily life | Select one | 1: not applicable | 2: not at all |
| 13491 |      | **Major and goals**                                  | Category   |                  |               |
| 888   | 6    | What best characterizes your major in college?       | Category   |                  |               |
| 22445 | 6.1  | Major is in the sciences (life, physical, etc.)      | Select one | 1: Yes            | 2: No         |
| 22446 | 6.2  | Not a major in the sciences (life, physical, etc.)   | Select one | 1: Yes            | 2: No         |
| 891   | 6.3  | Undecided at this time                               | Select one | 1: Yes            | 2: No         |
| 13491 | 6.4  | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 1: Yes            | 2: No         |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|-----------------|-------------|---------|----------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 894 | **GPA**                                                                 | Category |
|-----|------------------------------------------------------------------------|----------|
| 895 | 7 | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? | Category |
| 15090 | 6 | 7.1 My GPA is... (please skip if you are a first-semester freshman) | Select one 1: 4.00-3.60 2: 3.01-3.59 |
| 13491 | 6 | **student information**                                              | Category |
| 13491 | 7 | 8 | Please enter information below to help me interpret the survey results and improve the course | Category |
| 13491 | 8 | 8.1 Enter your student number here ((this will help me track your responses across all the times you take this survey)) | Long answer |
| 15003 | 6 | 8.2 Please ignore this question. | Select one 1: Section A (9:30 AM) 2: Section B (12:30 PM) |
| 14516 | 5 | **Student investment**                                               | Category |
| 14516 | 6 | 9 | In an average week, how many hours did you spend on this class in the following areas. Feel free to elaborate with comments where appropriate. | Category |
| 14516 | 7 | 9.1 reading the book | Select one 1: not applicable 2: not at all |
| 14516 | 8 | 9.2 Reviewing your notes | Select one 1: not applicable 2: not at all |
| 14516 | 9 | 9.3 Watching course-related videos | Select one 1: not applicable 2: not at all |
| 14517 | 0 | 9.4 Studying for this class in other ways | Select one 1: not applicable 2: not at all |
| 14517 | 1 | 9.5 How much total time per week did you spend on this class (excluding time in class and studying for exams)? | Select one 1: not applicable 2: not at all |
| 14537 | 6 | **Effort for this course**                                           | Category |
| 14537 | 7 | 10 | Compared to other Biology courses, rate this course in terms of the following areas | Category |
| 14537 | 9 | 10.1 Amount of critical thinking you had to do (i.e., versus memorization) | Select one 1: not applicable 2: not at all |
| 14538 | 0 | 10.2 Amount of assigned work | Select one 1: not applicable 2: not at all |
| 3: 2.51-3.00 | 4: 2.01-2.50 | 5: 2.00 or lower |
|--------------|-------------|------------------|
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
| 3: just a little | 4: somewhat | 5: a lot | 6: a great deal |
|   | 10.3 | How much effort you put in throughout the semester | Select one | 1: not applicable | 2: not at all |
|---|------|-------------------------------------------------|------------|-----------------|-------------|
| 2 | 10.4 | How much you learned                            | Select one | 1: not applicable | 2: not at all |

### Additional feedback

Please comment freely on any other aspect of the course. Remember that I want to use these comments to improve the course, so the more detailed comments or suggestions you can offer the better.

|   | 11.1 | Here’s a list of things to potentially comment on: the book (and how much you read it), the organization, difficulty level of exams, list of topics covered in class. | Long answer |
|            | 3: just a little | 4: somewhat     | 5: a lot       | 6: a great deal |
|------------|-----------------|----------------|---------------|----------------|
|            | 3: just a little | 4: somewhat     | 5: a lot      | 6: a great deal |
|            |                 |                 |               |                |
| ID   | Number | Question                                                                 | Type            | N  | Mean | Std dev |
|------|--------|--------------------------------------------------------------------------|-----------------|----|------|---------|
| 826  |        | **Understanding**                                                        | Category        |    |      |         |
| 827  | 1      | Presently, I understand...                                               | Category        |    |      |         |
| 15066| 9      | 1.1 The distinction between scientific ideas and non-scientific ideas    | Select one      | 21 | 5.2  | 1.17    |
| 22435| 1.2    | How studying topics in this course help people address real world issues | Select one      | 21 | 5.7  | 0.58    |
| 858  |        | **Skills**                                                               | Category        |    |      |         |
| 869  | 2      | Presently, I can...                                                      | Category        |    |      |         |
| 860  | 2.1    | Find articles relevant to a particular problem in professional journals or elsewher | Select one  | 21 | 5.4  | 0.68    |
| 865  | 2.2    | Write documents in discipline-appropriate style and format                | Select one      | 21 | 5.0  | 0.55    |
| 866  | 2.3    | Work effectively with others                                             | Select one      | 21 | 5.4  | 0.68    |
| 15003| 7      | **Critical Thinking Skills**                                             | Category        |    |      |         |
| 15003| 8      | 3 Presently, I can...                                                    | Category        |    |      |         |
| 15003| 9      | 3.1 Separate factual information from inferences.                        | Select one      | 21 | 5.0  | 0.74    |
| 15004| 0      | 3.2 Interpret numerical relationships in graphs.                         | Select one      | 21 | 5.4  | 0.60    |
| 15004| 1      | 3.3 Understand the limitations of correlational data.                    | Select one      | 21 | 5.2  | 0.87    |
| 15004| 2      | 3.4 Evaluate evidence and identify inappropriate conclusions.            | Select one      | 21 | 5.0  | 0.74    |
| 15004| 3      | 3.5 Identify alternative interpretations for data or observations.       | Select one      | 21 | 5.0  | 0.80    |
| 15004| 4      | 3.6 Identify new information that might support or contradict a hypothesis. | Select one  | 21 | 5.2  | 0.68    |
| 15004| 5      | 3.7 Explain how new information can change a problem.                    | Select one      | 21 | 5.2  | 0.68    |
| 15004| 6      | 3.8 Separate relevant from irrelevant information.                       | Select one      | 21 | 5.2  | 0.77    |
| 15004| 7      | 3.9 Integrate information to solve problems.                             | Select one      | 21 | 5.1  | 0.62    |
| 15004| 8      | 3.10 Learn and apply new information.                                   | Select one      | 21 | 5.2  | 0.60    |
| Choices... |   |   |   |   |   |
|------------|---|---|---|---|---|
| 1: 5%      | 2: 0% | 3: 0% | 4: 9% | 5: 36% | 6: 45% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 5% | 5: 23% | 6: 68% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 9% | 5: 36% | 6: 50% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 14% | 5: 68% | 6: 14% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 9% | 5: 36% | 6: 50% |
| 1: 0%      | 2: 0% | 3: 5% | 4: 9% | 5: 59% | 6: 23% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 5% | 5: 45% | 6: 45% |
| 1: 0%      | 2: 0% | 3: 5% | 4: 14% | 5: 36% | 6: 41% |
| 1: 0%      | 2: 0% | 3: 5% | 4: 14% | 5: 59% | 6: 18% |
| 1: 0%      | 2: 0% | 3: 5% | 4: 14% | 5: 50% | 6: 27% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 14% | 5: 50% | 6: 32% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 14% | 5: 50% | 6: 32% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 18% | 5: 36% | 6: 41% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 14% | 5: 59% | 6: 23% |
| 1: 0%      | 2: 0% | 3: 0% | 4: 9% | 5: 59% | 6: 27% |
|   |   |   |   |   |
|---|---|---|---|---|
| 15004 | 3.11 | Use mathematical skills to solve real-world problems. | Select one | 21 | 4.8 | 0.81 |
| 15005 | 3.12 | Communicate ideas effectively. | Select one | 21 | 5.0 | 0.67 |
| 870 | Attitudes | Category |   |   |
| 871 | Presently, I am... | Category |   |   |
| 15098 | 4.1 | Enthusiastic about biochemistry. | Select one | 21 | 4.7 | 0.97 |
| 15098 | 4.2 | Interested in taking or planning to take additional courses in biochemistry. | Select one | 21 | 3.9 | 1.35 |
| 15098 | 4.3 | Confident that I understand biochemistry | Select one | 21 | 4.4 | 0.92 |
| 15098 | 4.4 | Confident that I can perform well in future Biology and/or Chemistry courses | Select one | 21 | 5.0 | 0.92 |
| 877 | 4.5 | Comfortable working with complex ideas | Select one | 21 | 4.7 | 0.90 |
| 878 | 4.6 | Willing to seek help from others (teacher, peers, TA) when working on academic problems | Select one | 21 | 5.1 | 0.91 |
| 13490 | 4.7 | intimidated by the prospect of speaking in class | Select one | 21 | 3.0 | 1.00 |
| 13491 | 4.8 | thinking that science is an accumulation of facts, rules, and formulas. | Select one | 21 | 3.5 | 1.03 |
| 880 | Integration of learning | Category |   |   |
| 881 | Presently, I am in the habit of... | Category |   |   |
| 883 | 5.1 | Applying what I learn in classes to other situations | Select one | 21 | 4.7 | 0.78 |
| 884 | 5.2 | Using systematic reasoning in my approach to problems | Select one | 21 | 4.8 | 0.81 |
| 885 | 5.3 | Using a critical approach to analyzing data and arguments in my daily life | Select one | 21 | 4.8 | 0.81 |
| 13491 | Major and goals | Category |   |   |
| 888 | 6 | What best characterizes your major in college? | Category |   |   |
| 22445 | 6.1 | Major is in the sciences (life, physical, etc.) | Select one | 21 | 0.22 |   |
| 22446 | 6.2 | Not a major in the sciences (life, physical, etc.) | Select one | 21 | 0.00 |   |
| 891 | Undecided at this time | Select one | 21 | 0.00 |   |
| 13491 | 6.4 | Planning on a career in a medical field (including PA, dentistry, veterinary, etc.) | Select one | 21 | 0.30 |   |
|   | 1: 0% | 2: 0% | 3: 5% | 4: 27% | 5: 45% | 6: 18% |
|---|-------|-------|-------|-------|-------|-------|
|   | 1: 0% | 2: 0% | 3: 0% | 4: 18% | 5: 55% | 6: 23% |
|   | 1: 0% | 2: 5% | 3: 0% | 4: 36% | 5: 36% | 6: 18% |
|   | 1: 5% | 2: 9% | 3: 23% | 4: 32% | 5: 14% | 6: 14% |
|   | 1: 0% | 2: 0% | 3: 18% | 4: 32% | 5: 36% | 6: 9% |
|   | 1: 0% | 2: 0% | 3: 9%  | 4: 14% | 5: 45% | 6: 27% |
|   | 1: 0% | 2: 5% | 3: 0%  | 4: 27% | 5: 50% | 6: 14% |
|   | 1: 0% | 2: 5% | 3: 0%  | 4: 5%  | 5: 55% | 6: 32% |
|   | 1: 0% | 2: 41% | 3: 18% | 4: 32% | 5: 5%  | 6: 0%  |
|   | 1: 0% | 2: 18% | 3: 27% | 4: 41% | 5: 5%  | 6: 5%  |
|   | 1: 0% | 2: 0% | 3: 5%  | 4: 32% | 5: 45% | 6: 14% |
|   | 1: 0% | 2: 0% | 3: 5%  | 4: 27% | 5: 45% | 6: 18% |
|   | 1: 0% | 2: 0% | 3: 5%  | 4: 27% | 5: 45% | 6: 18% |
|   | 1: 91% | 2: 5% |
|   | 1: 0% | 2: 95% |
|   | 1: 0% | 2: 95% |
|   | 1: 86% | 2: 9% |
|   | GPA |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 894 | GPA |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 895 | 7 | What is your current GPA in a system that assumes a 4.00 as an A (highest score possible)? | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 15090 | 6 | My GPA is... (please skip if you are a first-semester freshman) | Select one | 21 | 1.7 | 0.64 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 13491 | 6 | student information | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 13491 | 7 | Please enter information below to help me interpret the survey results and improve the course | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 13491 | 8 | Enter your student number here (this will help me track your responses across all the times you take this survey) | Long answer | 21 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 15003 | 6 | Please ignore this question. | Select one | 21 |   | 0.40 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14516 | 5 | Student investment | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14516 | 6 | In an average week, how many hours did you spend on this class in the following areas. Feel free to elaborate with comments where appropriate. | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14516 | 7 | reading the book | Select one | 21 | 3.3 | 1.15 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14516 | 8 | Reviewing your notes | Select one | 21 | 4.2 | 1.18 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14516 | 9 | Watching course-related videos | Select one | 21 | 5.1 | 0.77 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14517 | 0 | Studying for this class in other ways | Select one | 21 | 4.3 | 1.32 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14517 | 1 | How much total time per week did you spend on this class (excluding time in class and studying for exams)? | Select one | 21 | 4.9 | 0.89 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14537 | 6 | Effort for this course | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14537 | 7 | Compared to other Biology courses, rate this course in terms of the following areas | Category |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14537 | 9 | Amount of critical thinking you had to do (i.e., versus memorization) | Select one | 21 | 5.6 | 0.75 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 14538 | 0 | Amount of assigned work | Select one | 21 | 4.4 | 1.02 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1: 36% | 2: 50% | 3: 9% | 4: 0% | 5: 0% |
|--------|--------|------|------|------|
| 1: 77% | 2: 18% |      |      |      |
| 1: 5%  | 2: 14% | 3: 45%| 4: 18%| 5: 9% | 6: 5% |
| 1: 0%  | 2: 5%  | 3: 27%| 4: 18%| 5: 32%| 6: 14%|
| 1: 0%  | 2: 0%  | 3: 5% | 4: 9% | 5: 55%| 6: 27%|
| 1: 5%  | 2: 0%  | 3: 18%| 4: 32%| 5: 18%| 6: 23%|
| 1: 0%  | 2: 0%  | 3: 5% | 4: 27%| 5: 36%| 6: 27%|
| 1: 0%  | 2: 0%  | 3: 5% | 4: 0% | 5: 27%| 6: 64%|
| 1: 0%  | 2: 0%  | 3: 18%| 4: 41%| 5: 18%| 6: 18%|
| Category | ID  | Questions                                                                 | Responses                                                                 |
|----------|-----|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 10.3     | 14538 | How much effort you put in throughout the semester                       | Select one 21 5.3 0.85                                                     |
| 10.4     | 14538 | How much you learned                                                     | Select one 21 4.8 1.00                                                     |
|          | 14539 | **Additional feedback**                                                  | Category                                                                  |
| 11       | 14539 | Please comment freely on any other aspect of the course. Remember that I want to use these comments to improve the course, so the more detailed comments or suggestions you can offer the better. | Category                                                                  |
| 11.1     | 14539 | Here's a list of things to potentially comment on: the book (and how much you read it), the organization, difficulty level of exams, list of topics covered in class. | Long answer 16                                                             |
|   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1: 0% | 2: 0% | 3: 5% | 4: 9% | 5: 36% | 6: 45% |
| 1: 0% | 2: 5% | 3: 5% | 4: 18% | 5: 50% | 6: 18% |