

Course Outcomes Guide (COG)

Directions: Please complete this form to document your progress toward improving student learning. For each item, indicate your progress and your anticipated next steps. Thank you!

Course Title: Bio 201 Spring 2017

Date: 5/16/17

Course Team: Lennon

Expected Learning Outcomes

STUDENT LEARNING OUTCOMES:

1. Apply a basic core of scientific and quantitative knowledge to enhance understanding of cell structure and function at the molecular level.
2. Develop and maintain a notebook of laboratory records.
3. Utilize laboratory skills to enhance understanding of cell structure and function while participating in a group environment.

COURSE CONTENT OBJECTIVES:

1. Build on the fundamental concepts of cell structure and function from previous study to include:
 - a. the relationship between molecular structure and function.
 - b. the dynamic character of cellular organelles.
 - c. the use of chemical energy in running cellular activities.
 - d. ensuring accurate macromolecular biosynthesis.
 - e. unity and diversity at the macromolecular and cellular levels and the relationship to adaptation through time.
 - f. homeostatic mechanisms that regulate cellular activity.
2. Relate experimental processes and evidence to the knowledge of cell structure and function that is being learned.
3. Relate the molecular and sub-cellular components of a cell to a framework of heredity and evolution.
4. Integrate classical research findings to current hands-on experiences with the latest biotechnology and information technology.

Assessment (How do or will students demonstrate achievement of each outcome? Please attach a copy of your assessment electronically.)

- Assessment of lecture learning content:
 - 3 multiple choice, true/false, short answer, and essay exams (100 pts each)
 - 1 cumulative final exam (100 pts)
 - Worksheet/quiz for each chapter or topic covered (points vary)

- Presentation of an original research paper related to course content. (25 pts)
- Assessment of lab learning content:
 - 5 lab reports (varying points value)
 - 2 oral presentation of lab experiment (25)
 - 3 experimental design activities (15 pts each)
 - Other assignments, as needed to bolster understanding (points vary)
 - 1 final project involving design of experiment, carrying out of experiment, and poster presentation to class (45 pts)

Grades were determined as follows:

Lecture work was worth 65% of the final grade

Lab was worth 35% of the final grade

Validation (What methods have you used or will you use to validate your assessment?)

A variety of assessment strategies were employed to address student strengths, weaknesses, and assessment preferences. No one type of tool was used, allowing the student to demonstrate proficiency more fully.

Rubrics were created for each assignment/exercise, and students are given access to the rubrics used to assess their work prior to the work being due. In most cases (apart from exams) students were given rubrics to use a guidelines as part of their assignments, and those rubrics were explained in the classroom prior to the due date. In addition, students were assigned an anonymous lab report from another student and asked to grade that lab report with the given rubric. This was to encourage students to use the rubric critically while writing their reports.

Results (What do your assessment data show? If you have not yet assessed student achievement of your learning outcomes, when is assessment planned?)

Avg Exam I (n=17)	Avg Exam II (n=17)	Avg Exam III (n=17)	Avg Final Exam (n=17)	Avg Lab Grade (n=17)
72.2%	64.8%	64%	69.6%	87%

%A	%B	%C	%D	%F	% Walkaway F
18	29	29	24	0	0

Follow-up (How have you used or how will you use the data to improve student learning?)

Student performance in BIO 201 was much lower than I would expect from upper level majors. As you can see from the statistics above, students tended to perform very well in lab, but not as well in lecture, though grades were slightly higher than last year. Higher lab grades appear to have significantly impacted their overall grades in the course as low exam scores still resulted in 100% of students passing the class. While I am happy that they are succeeding in lab, where the focus is on developing the critical thinking skills needed to do laboratory biology (experimental design, carrying out their own experiments, collecting, analyzing, and presenting data), I am concerned with the low level of performance in lecture. From talking with students, my hypothesis as to what may be going on in lecture relates to a continuing problem with

inconsistent preparation for the class material. To address this continuing problem in the moment, I stressed that students were expected to have mastered their introductory biology material and that if they had not, they needed to review it and/or come see me for help. This was stated on the very first day of class, and continued to be stressed throughout the semester. Although it was not my official office hour, I often stayed after lecture to work with students who had questions.

As mentioned in previous COGs, the Biology faculty are working to solve this problem by working together to make sure all students are getting the same material in their introductory biology class (BIO 113). In the meantime, I continued to provide extra resources for students in BIO 201, and tried to indicate what topics from their introductory classes they needed to brush up on in order to succeed in BIO 201. In some cases, I have provided access to materials that I use when teaching BIO 113.

In another instance, at least one student was admitted to the class even though the pre-requisites had not been completed. This student was at a considerable disadvantage, though took full responsibility for the lack of understanding and followed up with me often in an effort to augment class material. However, it was not possible for this student to successfully pass the lecture portion of the class without the previous base on which to build understanding. Given that precedent – that this student was allowed to enroll even though she shouldn't have been – I suspect that other students may have had similar experiences.

This is the fourth time I have taught this course. Following student feedback, a new textbook was selected for the Spring of 2015, and creation of a completely new lecture portion of the course began in Spring 2015 and continued in Spring 2016. A new edition of this text was released in Spring 2016, and incorporation of advances in cell biology outlined in that edition has been ongoing. Cell Biology is an ever changing field, with new advances each day that need to be considered and, possibly, incorporated into this class. It is incredibly challenging to teach and to learn, as things change continuously, but it is also very exciting and engaging because of this. The goal for this course, including lecture and lab, is to align it with the American Society for Cell Biology *Cell Biology Learning Framework* (<http://www.coursesource.org/courses/cell-biology>) and with the inquiry- and evidence-based reasoning spirit of the Next Generation Science Standards (<http://www.nextgenscience.org/>) and the AAAS Vision and Change in Undergraduate Biology Education (<http://visionandchange.org/>).

Budget Justification (What resources are necessary to improve student learning?)

Class will require supplies to support labs, sometimes with only a week's notice. The Instructor often needs to purchase these in the interest of time and for specificity. Request flexibility with reimbursement.

Labs focus on increasing students' understanding of the nature of science, including experimental design, carrying out of experiments, data analysis, and presentation of results.

Supplies need to be flexible to support student-designed experiments.

Request funds to allow students to print research posters.