

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: Intro Biology for Health Professions, BIO 119

Date: May 2017

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STUDENT LEARNING OUTCOMES

1. Exhibit the ability to use core content in the biology curriculum.
2. Students will demonstrate scientific literacy by effectively locating, evaluating, and communicating scientific information in oral, written, and/or visual formats.
3. Students will demonstrate familiarity with fundamental experimental design, laboratory technique, and data analysis.
4. Students will apply critical thinking skills to solve scientific problems.
5. Students will demonstrate a fundamental understanding of biological concepts including: the scientific method of inquiry, biological chemistry, bioenergetics, cellular and molecular biology, and genetics.
6. Demonstrate the transfer of information from diagrams, graphs and models to real life situations
7. General Education: Demonstrate the ability to access, process, analyze and synthesize scientific information:
 - a. Relate a basic core of scientific principles to an open-ended framework
 - b. Demonstrate observational and analytic skills in a structured situation.
 - c. Formulate conclusions based on observations and information.
 - d. Use technology to access scientific information, generate and analyze empirical data, and solve problems.

COURSE CONTENT OBJECTIVES

Students will be able to relate/apply/explain/describe:

1. Basic chemistry concepts: Chemical elements, molecules and compounds, water and life, pH
2. Chemistry of organic molecules: Carbohydrates, proteins, lipids, nucleic acids
3. Cell Theory, cell structures and their function
4. Cellular basis of life, prokaryotes and eukaryotes
5. Membrane structure, function and cell transport
6. Metabolism, energy, energy transformations, redox reactions, enzymes and coenzymes,
7. Glucose catabolism, glycolysis, fermentation, citric acid cycle, and electron transport system
8. The cell cycle and cellular reproduction
9. Meiosis and sexual reproduction
10. Mendelian patterns of inheritance
11. Molecular biology of the gene: Genetic code of life and the Central Dogma of Biology
12. Regulation of gene expression, including mutations and the genetic basis of disease
13. The biology of cancer
14. Biotechnology and genomics: cloning, gene therapy, biotechnology products
15. Evolution Theory: History, Darwin, evidence of evolution
16. Population ecology and evolution, natural selection, biodiversity
17. Microbiology and evolution: Viruses, bacteria and protists

18. Animal organization and homeostasis
19. Population ecology, population growth models, regulation of population size
20. Ecology of communities: Microbiome of the human gut and recent evolutionary changes

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

- 4 multiple choice Unit exams, administered on Moodle, that address specific course content objectives linked to each unit (100 Points each)
- 1 cumulative Common Final Exam (100 points)
- 17 lecture homework assignments online CONNECT (5 points each)
- 10 CONNECT online lecture quizzes (5 points each)
- 6 in class multiple choice lecture quizzes (10 points each)
- 5 CONNECT online Lab Reports
- 13 in class lab assignments
- 2 mini-lab practical quizzes (20 pts each)
- 1 Common Final Lab Practical (100 points)

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

CONNECT online homework assignments, quizzes and Lab Reports, are assessed automatically by educational software designed by the publisher of the course textbook providing students with immediate feedback. Each assessment item is linked to a specific learning objective. Reports are available for both students and the instructor that assesses student achievement by objective. This provides a ready source of information for helping students to study more effectively by alerting them to their content strengths and weaknesses.

In class multiple choice quizzes are used as formative assessment tools, and the questions are reviewed with students immediately after the quiz is completed in order to clarify misconceptions and provide students with timely feedback.

Lab assignments are assessed using a common rubric. All lab questions and data are reviewed at the end of each lab with the class to allow students to ask questions and clarify their thinking.

The Common Final Exam and the Common Final Lab Practical were developed by the lead instructor and both given for the first time this Spring. The exams were administered on Moodle graded electronically, and assessed using statistical analysis. Content objectives tied to particular questions were examined and several specific areas with the content objective were identified which were particularly difficult for students, based on overall scores <60%. These include:

- Objective 1 – Molecular bonding, in particular polar covalent bonds
- Objective 3 – Cell Theory, in particular endomembrane system
- Objective 9 – Meiosis and Sexual Reproduction, in particular meiosis versus mitosis
- Objective 11 – Molecular Biology of the Gene, in particular gene expression

SLOA data SP2017 BIO 119 M01/M02
(names have been redacted to protect student confidentiality)

Walk Away	Final Exam	Gen Ed	Lab
F	Score	Score	Grade
	43.5	80	38.06
	83.5	100	83.58
	52	40	58.21
	51.5	40	47.76
	34.5	20	47.76
	63	60	62.69
	57.5	60	61.19
yes			
	47.5	40	53.73
	72	80	74.63
	65.5	100	64.18
	52	40	59.7
	41.5	60	40.3
	39	0	32.09
	48	60	79.1

Walk Away F	Final Exam Score	Gen Ed Score	Lab Grade
	52.5	40	58.96
	68	60	68.66
	43.5	40	44.78
	61	60	53.73
	69	40	68.66
yes			
	58.5	60	64.18
	63	40	55.22
	62.5	60	76.12
	69.5	100	64.18
	52.5	20	37.31
	59.5	20	59.7
	74	80	80.6
	60	80	65.67
	84.5	100	85.82
	77.5	100	76.12
	48	0	55.97
	82	100	74.63

The overall mean for the Common Final Lecture Exam was 62%, with a high score of 89% and a low score of 35%. The overall mean for the Common Final Lab Practical was 61.17%, with a high score of 86% and a low score of 37%. The mean score on the Gen Ed questions was 57%, with a high score of 100% and a low score of 0%.

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

- The questions and answer keys on the topics of polar covalent bonds, endomembrane system, meiosis and mitosis, and gene expression for the Bio119 Common Final Exam will be reviewed for clarity and accuracy.
- Lab activities that focused on the specific assessed content objectives were edited to promote better student understanding of the topics of concern. Labs are also being revised to reflect more inquiry-based learning. Students had difficulty with writing lab reports and creating

graphs and data tables correctly. Knowledge attainment was not optimal as reflected in student scores on lab quizzes and the lab final.

- A model for lab reports will be incorporated into instruction as well as a module on graphing that students are to complete in the LSC.
- Prelab questions and critical thinking questions are being developed and will be added to each lab.
- A lab skills checklist is being developed to help students recognize the specific skills they are expected to master in the lab setting.
- A content knowledge checklist is also being developed to help students track their own learning.
- Emphasis will be placed on more experimental lab investigations versus controlled lab activities in order to foster critical thinking.
- Post lab activities such as writing concise conclusions and completing lab reports will be emphasized to ensure that students have mastered content objectives as well as skills.

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

Students rely heavily on Learning Support Center and Testing Center services for:

- access to course materials, physical and online
- taking all unit and final exams
- printing of course handouts and notes
- private tutoring
- group study
- learning assessment
- completing required LSC assignments