

Program Outcomes Guide (POG) 2013-2014

Program Title: Biology

Program Team: R. Nickerson, J. Peisen

Expected Program Learning Outcomes (PLO)

1. Students will demonstrate knowledge and understanding of specific topics in the natural sciences.
2. Students will use information literacy skills to gain knowledge and understanding of specific topics in the natural sciences.
3. Students will have hands-on experience and working knowledge of current laboratory equipment to include: microscopes, centrifuges, measuring devices (for both mass and volume), gel platforms and gel imaging.
4. Students will employ verbal and writing skills to demonstrate knowledge and understanding of specific topics in the natural sciences.
5. Students will solve numeric problems and use statistics to analyze data.
6. Students will interpret graphical data.
7. Students will apply the scientific method and scientific reasoning to generate and evaluate hypotheses, experiments, data, and conclusions.
8. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program or to obtain immediate employment in the field of biology.

Assessment

Course-level assessments

Please see the **Curriculum Map** below for course-level assessments as they relate to the Biology Program learning outcomes

Validation

Validation of assessment measures occurs at the course level throughout the program (see individual COGs in Biology Program folder)

Results

See COG for each course required for completion of the Biology Program.

Follow-up

As courses evolve and are assigned to different instructors, the assessment measures for each course will be aligned with **Biology Program**

Outcomes.

In progress or planned: In order to track how successfully Biology Program graduates transfer to 4-year colleges, a survey will be developed and mailed to each HCC graduate. When enough data is collected to provide statistically meaningful data, the data will be analyzed to determine the rate of successful transfer.

Budget Justification

- Printing and mailing surveys with pre-stamped return envelopes (program outcome #8)
- No other budget concerns are associated with the Biology Program Outcomes.

Curriculum Map

Program Outcome	How does this course assess this program outcome?		
	Bio101/113	Bio102/114	Bio201
1. Students will use technology and information literacy skills to gain knowledge and understanding of specific topics in the natural sciences.	<ul style="list-style-type: none"> • Students use technology to complete 15 homework assignments that consist of guided learning activities through an interactive website supplied by the publisher of the text book. Homework assessments are worth 13% of their course grade. • Students use electronic media tutorials online, or in the Science Learning Center, to successfully complete 2 lab assignments. • Students use MS excel to analyze experimental data in 6 	<ul style="list-style-type: none"> • Students use technology to complete 15 homework assignments that consist of guided learning activities through an interactive website supplied by the publisher of the text book. Homework assessments are worth 13% of their course grade. • Students access course information online through the Blackboard Learning System in order to earn a minimum passing course grade. • Students use electronic media tutorials online, or in the Science 	The approach for this element has not yet been determined

	<p>lab assignments.</p> <ul style="list-style-type: none"> • Students access course information online through the Blackboard Learning System in order to earn a minimum passing course grade. 	<p>Learning Center, to successfully complete 2 lab assignments.</p> <ul style="list-style-type: none"> • Students apply information literacy skills to research and compose a comprehensive term paper, "Ecological Study of a Local Stream" 	
<p>2. Students will demonstrate knowledge and understanding of specific topics in the natural sciences.</p>	<ul style="list-style-type: none"> • Students will complete 15 homework assignments, 4 exams, ~15 online quizzes, and a Common Final Exam. These assessment tools consist of a variety of question types and difficulties. These assessments account for 65% of the final grade. • Students complete 5 lab reports and 13 lab quizzes. These lab assessments are worth 35% of the final course grade 	<ul style="list-style-type: none"> • Students will complete 15 homework assignments, 4 exams, ~15 online quizzes, and a Common Final Exam. These assessment tools consist of a variety of question types and difficulties. These assessments account for 65% of the final grade. • Students complete 14 lab quizzes, together with other lab assessments, are worth 35% of the final course grade. • Students will research and compose a comprehensive term paper, "Ecological Study of a Local Stream" 	<p>Students will complete 15 laboratory exercises, 4 exams, roughly 5 quizzes and a pre/post course evaluation of their understanding of natural sciences as it pertains to cell biology.</p>
<p>3. Students will have hands-on experience and working knowledge of current laboratory equipment to include: microscopes, centrifuges, measuring devices (for both mass and volume), gel platforms and gel imaging.</p>	<p>Successful performance and completion of lab activities requires the use microscopes, centrifuges, measuring devices (for both mass and volume), gel platforms and gel imaging.</p>	<p>Successful performance and completion of lab activities requires the use microscopes, centrifuges, measuring devices (for both mass and volume), gel platforms and gel imaging.</p>	

<p>4. Students will employ verbal and writing skills to demonstrate knowledge and understanding of specific topics in the natural sciences.</p>	<p>Students are assessed through essay questions embedded in 8 lab reports and 13 lab quizzes.</p>	<p>Students will research and compose a comprehensive term paper, “Ecological Study of a Local Stream”</p>	<ul style="list-style-type: none"> • Students will have to use verbal skills to participate in weekly laboratory activities. • Writing skills will be evaluated through testing and preparation of a laboratory notebook
<p>5. Students will solve numeric problems and use statistics to analyze data.</p>	<p>Numerical problems are embedded in lab quizzes, assignments, and labs.</p>	<ul style="list-style-type: none"> • Numerical problems are embedded in lab quizzes, lab assignments, and exams • Students solve numerical problems to earn a minimum passing grade on the comprehensive term paper, “Ecological Study of a Local Stream” 	<p>Numerical problems are embedded in lab quizzes, assignments, and labs.</p>
<p>6. Students will interpret graphical data.</p>	<ul style="list-style-type: none"> • Students complete 10 graphing assignments in which they are required to graphically display data and interpret results and conclusions indicated by their graphed data. • Students evaluate graphed data on class exams, lab quizzes, and the Common Final Exam. 	<p>Students complete 3 graphing assignments in which they are required to graphically display data and interpret results and conclusions indicated by their graphed data.</p>	<p>The approach for this element has not yet been determined</p>
<p>7. Students will apply the scientific method and scientific reasoning to generate and evaluate hypotheses, experiments, data, and conclusions.</p>	<p>Students apply the Scientific Method to problem solving by completing 8 lab activities. They use deductive reasoning to generate hypotheses. Students test hypotheses by conducting valid controlled experiments.</p>	<p>Students apply the Scientific Method to problem solving by completing 4 lab activities and to complete a comprehensive “Ecological Study of a Local Stream”. They use deductive reasoning to generate hypotheses.</p>	<p>Students will be required to complete a laboratory notebook for each laboratory session and use the scientific method to describe the experiment performed, its results, any data collected and any conclusions</p>

	Lab write-ups require students to analyze data and draw valid conclusions while considering the impact of possible errors on their results.	Students test hypotheses by conducting valid controlled experiments. Students analyze data and draw valid conclusions while considering the impact of possible errors on their results.	drawn.
8. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program or to obtain immediate employment in the field of biology.	A plan to track and survey graduates of the Biology Program, after the first year of Program completion and again after completion of the Biology Program, will be piloted in Spring 2015	A plan to track and survey graduates of the Biology Program, after the first year of Program completion and again after completion of the Biology Program, will be piloted in Spring 2015.	The Biotechnology program currently tracks each of its graduates through the use of surveys and email questionnaires.

How does this course assess this program outcome?			
Program Outcome	BIO205	CHM103	CHM104
1. Students will use technology and information literacy skills to gain knowledge and understanding of specific topics in the natural sciences.	<ul style="list-style-type: none"> Students use the internet, current news media, journals and their on-line textbook site to complete 7 written homework assignments. Students access course information online through the Blackboard Learning system in order to follow assignments and earn a passing course grade. 	Students use Mastering Chemistry, a web-based interactive tutorial and self-assessment tool, to complete homework assignments that practice the concepts presented in the textbook and lecture. These assignments are worth 7.5% of the course grade.	<ul style="list-style-type: none"> Students use Mastering Chemistry, a web-based interactive tutorial and self-assessment tool, to complete homework assignments that practice the concepts presented in the textbook and lecture. These assignments are worth 7.5% of the course grade. Students use MSEXcel to plot and analyze data collected in lab and present their graphs in lab reports.
2. Students will demonstrate	<ul style="list-style-type: none"> Students must successfully complete 4 lecture exams, 4 lab 	Student knowledge and understanding of topics in the	Student knowledge and understanding of topics in the

knowledge and understanding of specific topics in the natural sciences.	<p>exams, a common final exam, and lab quizzes which account for 60% of the student's course grade.</p> <ul style="list-style-type: none"> • Students solve for two bacterial unknowns as part of their lab grade. • The lecture exams, quizzes and assignments account for 60% of the student's grade. • Students document the of results of 21 different lab excercises in a lab notebook which accounts for 10% of their final lab grade. 	first semester of general chemistry are assessed by completion of a Nationalized Final Exam provided by the American Chemical Society (ACS) . This is worth 15% of the course grade.	first semester of general chemistry are assessed by completion of a Nationalized Final Exam provided by the American Chemical Society (ACS) . This is worth 15% of the course grade.
3. Students will employ verbal and writing skills to demonstrate knowledge and understanding of specific topics in the natural sciences.	<ul style="list-style-type: none"> • Students are assessed through essay questions as part of each of the 8 major written tests (4 in lab, 4 in lecture) • Students are graded on their 7 written homework assignments . 	<ul style="list-style-type: none"> • Students answer short essay questions on quizzes, lecture exams, and lab exams. • Students compose written answers to questions embedded within lab reports. 	<ul style="list-style-type: none"> • Students answer short essay questions on quizzes, lecture exams, and lab exams. • Students compose written answers to questions embedded within lab reports.
4. Students will solve numeric problems and use statistics to analyze data.	Numerical problems are imbedded in lab tests, assignments, labs and lecture tests.	Students solve numeric problems in lab reports, exams, and homework problems. Lab assessments are worth 25% of the course grade and lecture assessments are worth 60% of the course grade.	Students solve numeric problems in lab reports, exams, and homework problems. Lab assessments are worth 25% of the course grade and lecture assessments are worth 60% of the course grade.
5. Students will interpret graphical data.	<ul style="list-style-type: none"> • Graphic data obtained from class lab results are displayed , discussed and interpreted throughout the lab portion of the semester. 	<ul style="list-style-type: none"> • Problems in Mastering Chemistry assignments require students to demonstrate graphical interpretation. 	<ul style="list-style-type: none"> • Problems in Mastering Chemistry assignments require students to demonstrate graphical interpretation. • Students use MSEXcel to plot and analyze data collected in lab and present their analysis in lab

			reports.
6. Students will apply the scientific method and scientific reasoning to generate and evaluate hypotheses, experiments, data, and conclusions.	<ul style="list-style-type: none"> Students employ the scientific method in growing, testing and identifying unknown bacteria using microscopic, colonial and biochemical methods. They write up a report outlining their methods, results and conclusions. They are evaluated on 3 specific unknowns during the semester. 	<ul style="list-style-type: none"> Students apply scientific reasoning in several lab exercises which require students to solve for a unknown and report their findings in lab reports. 	<ul style="list-style-type: none"> Students apply scientific reasoning in several lab exercises which require students to solve for a unknown and report their findings in lab reports.
7. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program.			
8. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program or to obtain immediate employment in the field of biology.			

	How does this course assess this program outcome?		
Program Outcome	CHM203/204	PHY201	PHY202
1. Students will use technology and information literacy skills to gain knowledge and understanding of	Students will demonstrate information literacy skill to research and compose papers on environmental and human health issues.	Electronic devices are used for data is collection in lab and then use computer programs such MSEXcel and MSword to analyze and present	Electronic devices are used for data is collection in lab and then use computer programs such MSEXcel and MSword to analyze and present

specific topics in the natural sciences.		experimental data collected in 10 lab reports.	experimental data collected in 10 lab reports.
2. Students will demonstrate knowledge and understanding of specific topics in the natural sciences.	<ul style="list-style-type: none"> • Students complete In-class exams with combination of multiple-choice, short answer, problem solving and essay questions. • Students complete formal written laboratory reports assessed with a grading rubric. • Students will complete the American Chemical Society (ACS) standardized final exam. 	Students are assessed for their knowledge of specific topics by completing 10 lab reports, 8 assignments, 2 lab exams, 4 lecture exams.	Students are assessed for their knowledge of specific topics by completing 10 lab reports, 8 assignments, 2 lab exams, 4 lecture exams.
3. Students will employ verbal and writing skills to demonstrate knowledge and understanding of specific topics in the natural sciences.	<ul style="list-style-type: none"> • Students complete essay questions on in-class exams. • Students complete formal written laboratory reports assessed with a grading rubric. • Students complete written laboratory mid-term and final exams. 	Students use verbal and writing skill to complete 10 lab reports which demonstrate their understanding of specific topics in physics.	Students use verbal and writing skill to complete 10 lab reports which demonstrate their understanding of specific topics in physics.
4. Students will solve numeric problems and use statistics to analyze data.	Laboratory reports demonstrate students' ability to solve numerical problems (ie. calculating % yield) when analyzing data.	Students complete 10 lab reports, 8 assignments, 2 lab exams, 4 lecture exams which include numeric problems.	Students complete 10 lab reports, 8 assignments, 2 lab exams, 4 lecture exams which include numeric problems.
5. Students will interpret graphical data.	Students interpret graphical data to produce lab reports and on exams.	Students create and interpret graphs of experimental data to complete 7 lab reports and 2 lab exams.	Students create and interpret graphs of experimental data to complete 5 lab reports, 2 lab exams.
6. Students will apply the scientific method and scientific reasoning to generate and evaluate	Students demonstrate how they've applied scientific methodology in lab reports.	Students apply the scientific method to solve scientific problems and complete 10 lab	Students apply the scientific method to solve scientific problems and complete 10 lab

hypotheses, experiments, data, and conclusions.		reports, and 2 lab exams.	reports, and 2 lab exams.
7. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program.			
8. Students will be eligible to successfully transfer credits earned in the biology program to a 4 year college degree program or to obtain immediate employment in the field of biology.			