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| **Assurance of Student Learning Report****2023-2024** |
| *Ogden College of Science and Engineering* | *Department of Biology* |
| *Medical Laboratory Science (5004)* |
| *Kerrie McDaniel, Program Coordinator; Kerrie McDaniel, Doug McElroy, Assessment Coordinators* |
| ***Is this an online program***? [ ]  Yes [x]  No | Please make sure the Program Learning Outcomes listed match those in CourseLeaf . Indicate verification here [x]  Yes, they match! (If they don’t match, explain on this page under **Assessment Cycle)** |

**\*\*\* Please include Curriculum Map as part of this document (at the end), NOT as a separate file.**

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| ***Use this page to list learning outcomes, measurements, and summarize results for your program. Detailed information must be completed in the subsequent pages. Add more Outcomes as needed.*** |
| **Program Student Learning Outcome 1:**  Graduates will demonstrate a level of biological content knowledge appropriate to their degree level. |
| **Instrument 1** | Biology Assessment Exam |
| **Based on your results, check whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Program Student Learning Outcome 2:**  Graduates will demonstrate an understanding of research ethics and the responsible conduct of research. |
| **Instrument 1** | CITI Responsible Conduct of Research Course modules |
| **Based on your results, check whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Assessment Cycle Plan:**  |
| During 2023-24 and consistent with it’s five-year assessment plan, the Department of Biology Program Review/Assessment Committee (the ‘Committee’) and faculty (1) assessed 2022-23 artifacts for all SLOs and analyzed results from those assessments; and (2) developed and approved recommendations for program improvements based on assessment findings. These follow-up actions will be undertaken during the 2024-25 academic year, and be fully implemented by Fall 2025. |

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| **Program Student Learning Outcome 1** |
| **Program Student Learning Outcome**  | **Graduates will demonstrate a level of biological content knowledge appropriate to their degree level.** |
| **Measurement Instrument 1**  | **Biology Assessment Exam**The Biology Assessment Exam is an instrument, newly developed in 2020-21, designed to assess content knowledge within the program discipline. The exam is constructed around 14 vignettes, 2 each representing the six major areas of emphasis in our core curriculum (Cells, Metabolism, Genetics, Ecology, Evolution, Diversity); in 2022-23, the assessment exam was expanded to also include 2 vignettes addressing topics related to molecular biotechnology, immunology, and microbiology.These major areas are literally the elements introduced in our required introductory course sequence (BIOL 120/121 and BIOL 122-123), and reinforced in our restricted elective core choices at the 200-level (BIOL 222/223, 224/225, or 226/227) and 300-level (BIOL 319/322 or 327/337 and BIOL 315 or 316). Free elective courses at the 300- and 400-levels provide students the opportunity to further master these topics in more specific contexts aligned with their individual professional interests. Within each area of emphasis, there are 2 vignettes that are associated with 9 multiple-choice questions. Three (3) questions each test student content knowledge at the introductory, developing, and mastery level. In each area, several questions require interpretation of tables and/or figures, and assess students’ ability to apply the scientific process. This exam design allows for redundant assessment of knowledge by area of emphasis as well as mastery level; in addition, it provides the ability to carry out a meta-analysis of higher-order knowledge and skills such as correct interpretation of data and application of the scientific process.The exam is given either electronically or in-person as part of BIOL 493/494, our required capstone experience course sequence that is taken by students during their clinical year after being accepted and matriculating to medical technology school. |
| **Criteria for Student Success** | Students will score at least 50% or higher, with the score on Introductory-level items at least 60%. |
| **Program Success Target for this Measurement** | At least 75% of students will attain the criterion level of success. | **Percent of Program Achieving Target** | 100.0% of students attained the criterion level of success, with 100.0% meeting the sub-criterion. The sample size was 1. |
| **Methods**  | Given that the assessment instrument has been utilized through only 2 assessment cycles (and modified in-between in accordance with follow-up activities derived from analysis of the 2020-21 assessment results), we cannot draw too many conclusions or implications from patterns in the scores within and among content areas. The sample size is also extremely small (n = 1). Across all mastery levels, the % correct responses ranged from 33.3% to 77.8%; there was no clear pattern with respect to BIOL 120/121 vs. 122/123 content. Performance on the new module related to biotechnology, immunology, and microbiology was 55.6%, which was solid; this is not surprising, as these topics are more specialized and targeted at students in 5004 and in our Molecular Biotechnology program.Across all content areas, student performance on introductory-level questions was 61.9%, 42.9% on intermediate-level items, and 61.9% on mastery-level items. |
| **Based on your results, highlight whether the program met the goal Student Learning Outcome 1.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| **Results and Conclusions:** The2021-22 follow-up activity incorporating the new module into the assessment instrument was fulfilled, and met the intent. Our assessment results suggest it would be appropriate and valid to evaluate the extent to which key topics from BIOL 120/121 and BIOL 122/123 and other foundational courses (which form the basis of the assessment exam) are clearly scaffolded across the curriculum.**Actions:**1. The Committee analyzed 2022-23 assessment results and develop recommendations for program improvement to bring to program faculty. (Spring 2024)2. Program faculty reviewed and approved specific program improvement actions to be undertaken based on assessment findings. (Spring 2024).**Follow-Up:**1. The Committee will work with program faculty to evaluate the degree to which the coverage of important topics in foundational courses is adequate and aligned to promote student learning and success in subsequent courses. (Fall 2024).**Next Assessment Cycle:**2024-25 academic year |

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| **Program Student Learning Outcome 2** |
| **Program Student Learning Outcome**  | **Graduates will demonstrate an understanding of research ethics and the responsible conduct of research.** |
| **Measurement Instrument 1** | **CITI Responsible Conduct of Research Course Modules**The Collaborative Institutional Training Initiative (CITI) is a web-based ethics training course for responsible conduct in research that has been adopted by the WKU IRB, IACUC, and IBS Committees as a prerequisite certification to be attained by any investigator seeking approval for a research project through one or more of these committees. All PIs, Co-PIs, and Faculty Sponsors are required to complete CITI RCR training and receive certification (based on a minimum score of 80%) across all course training modules. These module educate and evaluate researchers on up-to-date issues and standards of research ethics, research integrity, and researcher conduct.The Physical Science RCR Course used to assess this SLO consists of 7 individual modules: (1) Research Misconduct; (2) Data Management; (3) Authorship; (4) Peer Review; (5) Mentoring; (6) Conflicts of Interest; and (7) Collaborative Research. Within each module, participants review a multimedia presentation and several seminal articles related to the topic. At the end, participants demonstrate competency through a five-question multiple choice test, with test items randomly drawn from a larger question pool.Completion of CITI RCR training is required of all students enrolled in BIOL 489, our required program capstone course that is taken by students during their final semester at WKU prior to graduation. Students are required to submit (1) a Completion Certificate indicating that they have attained a minimum score of 80% across all course modules, and (2) individual module scores (percentage of questions answered correctly) from their first attempt. |
| **Criteria for Student Success** | Students will attain the required minimum score for certification, with at least 60% correct answers on each module from their first attempt. |
| **Program Success Target for this Measurement** | At least 75% of students will attain the criterion level of success. | **Percent of Program Achieving Target** | 100.0% of students attained the criterion level of success. The sample size was 1. |
| **Methods**  | Students performed well across all seven modules that make up the assessment instrument, demonstrating a solid understanding of research ethics gained through completion of the CITI training course. However, comments from students included such statements as ‘I had no idea that…’ and ‘I wish I had known this earlier.’ These suggest that it would be beneficial for student learning and professional development to gain exposure to research ethics earlier in the curriculum. In so doing, the program could also enhance learning in this regard by scaffolding a series of increasingly-advanced levels of CITI training at various points thoughout the curriculum; this will both expand and deepen students’ exposure to research ethics issues. |
| **Based on your results, circle or highlight whether the program met the goal Student Learning Outcome 2.** | **[x]  Met** | **[ ]  Not Met** |
| **Results, Conclusion, and Plans for Next Assessment Cycle (Describe what worked, what didn’t, and plan going forward)** |
| **Results and Conclusions:**  The2021-22 follow-up activity scaffolding relevant CITI modules into our core and restricted-elective curriculum is in process. Our assessment results suggest it is appropriate to ontinue with this plan.**Actions:**1. The Committee analyzed 2022-23 assessment results and develop recommendations for program improvement to bring to program faculty. (Spring 2024)2. Program faculty reviewed and approved specific program improvement actions to be undertaken based on assessment findings. (Spring 2024).**Follow-Up:**1. Require all students in BIOL 225 and 227 to complete the Basic Biosafety Course. (Fall 2024)2. Require all students in BIOL 322 and 337 to complete the NIH rDNA Guidelines Course or similar, appropriate CITI course. (Fall 2024)**Next Assessment Cycle:**2024-25 academic year |

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| **CURRICULUM MAP TEMPLATE** |  |  |
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| **Program name:** | 5004 Medical Laboratory Science |  |
| **Department:** | Biology |  |
| **College:** | Ogden |  |
| **Contact person:** | Kerrie McDaniel |  |
| **Email:** | Kerrie.mcdaniel@wku.edu |  |
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| **KEY:** |  |  |  |
| **I = Introduced** |  |  |  |
| **R = Reinforced/Developed** |  |  |  |
| **M = Mastered** |  |  |  |
| **A = Assessed** |  |  |  |
|  |  |  | **Learning Outcomes** |  |
|  |  |  | **LO1:** | **LO2:** |
|   |  |  | Graduates will demonstrate a degree of biological content knowledge appropriate to their degree level. | Graduates will demonstrate an understanding of research ethics and responsible conduct of research. |
| **Course Subject** | **Number** | **Course Title** |   |   |
| BIOL | 120/121 | Biological Concepts: Cells Metabolism and Genetics Lecture/Lab | I | I |
| BIOL | 122/123 | Biological Concepts: Evolution, Diversity, and Ecology Lecture/Lab | I | I |
| BIOL | 226/227 | Microbial Biology and Diversity Lecture/Lab | R | R |
| BIOL | 224/225 | Animal Biology and Diversity Lecture/Lab | R | R |
| BIOL | 319/322 | Introduction to Molecular and Cell Biology Lecture/Lab | R | M |
| BIOL | 327/337 | Genetics Lecture/Lab | R | M |
| BIOL | 328 | Immunology | R | A |
| CHEM | 120/121 | College Chemistry I Lecture/Lab |   |   |
| CHEM | 222/223 | College Chemistry II Lecture/Lab |   |   |
| CHEM | 340/341 | Organic Chemistry Lecture/Lab |   |   |
| MATH | 116/117 | College Algebra and Trigonometry |   |   |
| BIOL | 407 | Virology | M |   |
| BIOL | 411/412 | Cell Biology Lecture/Lab | M |   |
| BIOL | 446/447 | Biochemistry Lecture/Lab | M |   |
| BIOL | 470 | Pathogenic Microbiology | M |   |
| BIOL | 492 | Internship in Medical Lab Science | A |   |
| BiOL | 493 | Internship in Medical Lab Science | A |   |
| BIOL | 494 | Internship in Medical Lab Science | A |   |