

UNIVERSITY OF CENTRAL ARKANSAS
ACADEMIC ASSESSMENT PLAN
Requirements, Template, and Example

Requirements

1. *Submit with New Program Proposal*
 - a. *Programs are encouraged to consult with the Office of University Assessment.*
 - b. *Contact information assessment@uca.edu*
2. *Send copy of Assessment Plan to the Office of University Assessment, Wingo 215.*
3. *Update the Program Assessment Plan based upon EAPR or Accreditation Cycles.*

Basic Information

Program Name: Biology B.S.

College: CNSM

Department: Biology

Program Level (check all that apply)

- ☐ Associate's
- ☒ Bachelor's
- ☐ Undergraduate Certificate
- ☐ Master's
- ☐ Doctoral
- ☐ Graduate Certificate

Date Plan Submitted: 8-15-20

College Dean & email: Dr. Stephen Addison saddison@uca.edu

College Curriculum Committee Chairperson & Email: TBD, contact Dayna Bilderback
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Department Chairperson & email: Dr. Brent Hill bhill@uca.edu

Department Curriculum Committee Chairperson & email: Dr. Kari Naylor kknaylor@uca.edu

1. Introduction (identify college, unit, and degree programs)

The Bachelor of Science Program in Biology, within the College of Natural Sciences and Mathematics, exists to provide students with an understanding of the breadth of biology from molecules and cells to organisms, communities, ecosystems, and evolution through classroom instruction and research opportunities. In addition, our program introduces students to the process of science through investigative laboratory courses.

2. Student Outcomes

- **GOAL 1:** Students will demonstrate fundamental understanding across the breadth of biological knowledge.
 - **Learning Objective:** Students will demonstrate fundamental understanding of biology in four areas: 1) cell biology, 2) molecular biology and genetics, 3) organismal biology, and 4) population biology, evolution and ecology.
- **GOAL 2.** Graduates will employ critical thinking to develop creative solutions to biological problems, as individuals or members of a team.
 - **Learning Objective:** Students will be able to design experiments to test hypotheses, carry out these experiments, and interpret results.
- **GOAL 3:** Our graduates will effectively communicate scientific ideas through publications, reports, and presentations in both public and scientific forums.
 - **Learning Objective 1:** Students will effectively communicate orally.
 - **Learning Objective 2:** Students will effectively communicate in writing.

3. Assessment Cycle

We will follow this general timeline:

- a. Collect data throughout the year, each year
- b. Analyze data at the end of the spring semester, in alternate years.
- c. Share results and discuss potential course/curriculum with the full department in the fall following the spring analysis.
- d. Implement any changes to the courses/curriculum along with adjustments to the assessment data collection methodology over the next two academic years.

We will submit our next report spring 2022. We are currently implementing changes from our spring 2019 assessment report but have been delayed by the work schedule changes implemented due to the COVID19 pandemic.

4. Curriculum Map

Courses I: introduce R: reinforce E: emphasize	GOAL 1. Learning Objective 1: Students will demonstrate fundamental understanding of biology in four areas:				GOAL 2. Learning Objective 1: Students will be able to design experiments to test biological hypotheses, carry out these experiments, and interpret results.	GOAL 3. Learning Objective 1: Students will effectively communicate orally.	GOAL 3. Learning Objective 2: Students will effectively communicate in writing.
	cell biology	molecular biology and genetics	organismal biology	population biology, evolution and ecology			
BIOL 1440 Principles of Biology I	I	I			I		I
BIOL 1441 Principles of Biology II			I	I	I		I
BIOL 2490 Genetics		E		R	I	I	I
BIOL 3402 Cell Biology	E	R			R	R	E
BIOL 3403 Ecology			E	E	E	R	R
BIOL 3190 Economic Botany Lab		R	R	R		R	R
BIOL 3305 Molecular Biology: Techniques and Controversies	Not taught since before 2012, this course is being designed unsure of how the content will align other than E for Molecular Biology and Genetics						
BIOL 3310 Neuroethology : The Neural Basis of Natural Behavior	R	R	R	R			E

BIOL 3315 Women and Minorities in STEM	Currently no instructor, goals will change with the instructor						
BIOL 3360 Introduction to Marine Biology			R	R			
BIOL 3390 Economic Botany		R	R	R		R	R
BIOL 3410 Vertebrate Zoology			E	R		R	R
BIOL 3420 General Microbiology		R			E	R	E
BIOL 4195 Biology Colloquium					E	E	E
BIOL 4250 Scanning Electron Microscopy and Microanalysis					E	R	R
BIOL 4311 Pathophysiology			E			R	
BIOL 4320 Neurodevelopment and Pathology	R	R				R	E
BIOL 4330/5330 Cardiovascular Physiology	R		E			E	E
BIOL 4340 Immunology		R				R	R
BIOL 4351 General Pharmacology			E			R	
BIOL 4360 Endocrinology	R		R	R			
BIOL 4376 Virology		E				R	R

BIOL 4400 Histology	R	R	R			R	
BIOL 4401 Invertebrate Zoology			E	R	E		E
BIOL 4404 Plant Taxonomy			E	E		R	R
BIOL 4405 Developmental Biology	E	R			R	R	
BIOL 4406/5406 Mammalogy			E	R	R	R	R
BIOL 4407/5407 Ornithology			E	R	R	R	R
BIOL 4410 Biology of Lower Plants and Fungi	Currently no instructor, goals will change with the instructor, course will likely be deleted when we align electives this year						
BIOL 4412 Organisms in Extreme Environments	Currently no instructor, goals will change with the instructor, course will likely be deleted when we align electives this year						
BIOL 4413 Cancer Biology	Currently no instructor, course will be deleted						
BIOL 4414 Molecular Mechanisms of Aging	E	E		R	E	R	R
BIOL 4415 Evolution				E			
BIOL 4418 Biology of Reptiles			E	R	R		R
BIOL 4421 Pathogenic Microbiology		R			R	R	R
BIOL 4425 Experimental Neurobiology	R	R	R	R	R	R	R
BIOL 4428 Animal	R		R	R	E	R	R

Physiological Ecology							
BIOL 4430 Comparative Vertebrate Anatomy			R	E			
BIOL 4435 Animal Behavior				E	E	E	E
BIOL 4440 Entomology			E	R	R	R	R
BIOL 4442/5442 Restoration Ecology	Currently no instructor, goals will change with the instructor.						
BIOL 4445 Biometry					R	R	R
BIOL 4450 Plant Ecophysiology	R		E	R		R	R
BIOL 4455 Ichthyology (Biology of Fishes)		R	E	R		R	
BIOL 4460 Animal Physiology	E		R		E	R	R
BIOL 4461 Parasitology			R				
BIOL/ENVR 4465 Environmental Toxicology	R	R	R	R	E	E	E
BIOL 4470 Biology of Seed Plants			E	R	R	R	R
BIOL 4475 Advanced Cell Biology	E				E	R	E
BIOL 4480 History of Life				E			
BIOL 4530 Experimental Molecular Biology	R	E			E	R	R

BIOL 4V00 Field Studies in Biology – Field Ichthyology			E	R	E	E	E
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5. Assessment Methods and Measures (Formative and Summative recommended)

- **GOAL 1:** Students will demonstrate fundamental understanding across the breadth of biological knowledge.
 - **Learning Objective:** Students will demonstrate fundamental understanding of biology in four areas: 1) cell biology, 2) molecular biology and genetics, 3) organismal biology, and 4) population biology, evolution and ecology.
 - **Assessment Measure:** We recently did an in-depth analysis of the Major Field Test (MFT) for Biology and determined that this test does not directly assess a fundamental understanding of biology; instead, it assesses fact based content knowledge. This method of teaching and assessment is outdated and is not focused enough on conceptual understanding to be useful. The biology faculty consider “fundamental understanding” to mean that student learning will result in the ability to express an understanding of the major concepts of these topic areas by explaining the over-arching ideas correctly to others and the ability to interpret content in each area.
 - In response to our determination that the MFT exam is inadequate, we are currently identifying new assessments. Our preliminary plan is that we adopt Biology Measuring Achievement and Progression in Science (Bio-MAPS). According to <http://cperl.lassp.cornell.edu/bio-maps>, Bio-MAPS “is a suite of diagnostic assessments that aim to measure student understanding across a degree program and are aligned with the Vision and Change nationally-validated set of core biology concepts (AAAS, 2011), further elaborated in the BioCore Guide (Brownell *et al.*, 2014)”.
 - Our tentative plan is to implement the GenBio-MAPS (Couch et al., 2019) at the end of BIOL 1441, the Molecular Biology Capstone (Couch et al., 2017) at the end of BIOL 3402, and the EcoEvo-MAPS (Summers et al., 2018) at the end of BIOL 3403.
- **GOAL 2.** Graduates will employ critical thinking to develop creative solutions to problems, as individuals or members of a team.
 - **Learning Objective:** Students will be able to design experiments to test biological hypotheses, carry out these experiments, and interpret results.
 - **Assessment Measure:** A multi-week laboratory scientific investigation that requires students to formulate a testable hypothesis, design and perform a study to test an original hypothesis, analyze data collected, and interpret results.

- This investigation will be presented (via oral presentations, lab reports, poster, or alternative method as best decided by instructor) and graded by the instructor using the UCA CORE and Biology-Critical Inquiry Rubric B (Scientific) (Appendix 1).
 - BIOL 3402 Cell Biology, BIOL 3403 Ecology, and BIOL 4195 Biology Colloquium will implement this assessment.
- **GOAL 3:** Our graduates will effectively communicate scientific ideas through publications, reports, and presentations in both public and scientific forums.
 - **Learning Objective 1:** Students will effectively communicate orally.
 - **Assessment Measure:** A project completed in BIOL 4195 Biology Colloquium will be presented via an oral presentation and assessed by the instructor using the UCA CORE and Biology-Communication Rubric A (Oral) (Appendix 2).
- **GOAL 3:** Our graduates will effectively communicate scientific ideas through publications, reports, and presentations in both public and scientific forums.
 - **Learning Objective 2:** Students will effectively communicate in writing.
 - **Assessment Measure:** A project completed in BIOL 4195 Biology Colloquium will be presented via a written assignment and assessed by the instructor using the UCA CORE and Biology-Communication Rubric B (Written) (Appendix 3).

6. Data Collection and Review

- When will data be collected for each outcome?
 - Every fall and spring semesters when the appropriate courses are taught.
- How will data be collected for each outcome?
 - Instructors for each course will collect the data (fill in rubrics or assign curriculum assessment) and send it to the Department of Biology Curriculum and Assessment chair for compilation.
- What will be the benchmark/target for each outcome?
 - **GOAL 1:** The benchmark has not been decided. We wish to implement a test run of the content assessment to identify the type of data we can use.
 - **GOAL 2 and 3:** The benchmark is 75% of the rubric points.
- What individuals/groups will be responsible for data collection?
 - The instructors of the courses and the Department of Biology Curriculum and Assessment committee

7. Participation in Assessment Process

- Who will participate in carrying out the assessment plan?
 - The faculty members in the Department of Biology
- What will be their specific role/s?
 - Instructors teaching the specific courses will collect the data, the Curriculum and Assessment Committee will analyze the data every other year and make recommendations to the faculty. The faculty will then vote on the recommendations and implement as needed.

8. Data Analysis

- How will the data and findings be shared with faculty?
 - The data and recommendations from the Department of Biology Curriculum and Assessment committee will be distributed electronically to the department followed by a presentation at a faculty meeting in the fall semester after data analysis carried out the previous spring.
- Who was involved in analyzing the results?
 - Department of Biology Curriculum and Assessment Committee
- How are results aligned to outcomes and benchmarks?
 - The Department of Biology Curriculum and Assessment committee will determine average scores (from two years of courses) for each assessment. There is one assessment or rubric for each Student Learning Outcome. If a benchmark is not met then we will proceed to Part 9.

9. Plan for Using Assessment Results to Improve Program

- How will you use the results to improve your program?
 - If we fall below our benchmark or close to our benchmark we will determine where the specific weaknesses lie. From there we will implement workshops or alter curriculum as needed. For example, from our MFT scores it was clear that we were not introducing, reinforcing, and expanding on certain content areas throughout our curriculum. In response, we initiated a Biology core (BIOL 1440, BIOL 1441, BIOL 2490, BIOL 3402, BIOL 3403) curriculum alignment process that is ongoing.

10. What are the plans to evaluate students' post-graduate success?

- We have implemented graduation surveys via UCA's Office of Institutional Research to determine direct employment rates and acceptance rates to post graduate and professional programs.

11. What are the plans to evaluate teaching effectiveness?

- Teaching effectiveness is determined for the department as a whole, via achieving the above benchmarks related directly to student learning. Additionally, our Chair provides a formal assessment of teaching effectiveness as part of our annual faculty evaluations.

12. Appendices-Required....Curriculum Maps by Program, Assessment Tools (examples: Rubrics, Surveys, Tests, etc.), any other important materials/documentation

Appendix 1 Goal 2 Objective 1 Rubric

UCA CORE and Biology-Critical Inquiry Rubric B (Scientific) SLO 2 rubric for poster presentations to assess critical inquiry

Specific Skill or Knowledge Area Related to the Goal	Student Learning Outcomes				
	4	3	2	1	0
Define Problem/Question	Communicates comprehensive, contextual understanding of the problem/question.	Compares problem/question statements to determine which best summarizes the problem.	Composes a basic, accurate problem/question statement.	Recognizes an applicable problem/question statement.	Assign a zero for performance that does not meet a score of one (1).
Propose Hypotheses	Communicates a hypothesis reflecting a comprehensive understanding of the problem/question.	Develops a hypothesis that links variables.	Composes a testable hypothesis from a scenario.	Recognizes a testable hypothesis.	
Identify Methodology	Proposes complex, multi-level strategic approaches for appropriately solving the problem or addressing the question.	Devises a complete appropriate strategic plan including controls to address the problem/question.	Distinguishes between valid options to select the best strategic plan to address the problem/questions.	Recognizes appropriate strategic steps that address the problem/question.	
Data Analysis	Data are processed correctly and statistical tests were correctly applied to the data.	Data are collected and formatted, but statistical treatment is marginal OR a different application would have been more effective.	There is little evidence of correct data assimilation nor any appropriate statistical techniques applied to the data OR improper interpretations were made of the test(s) results.	There is little evidence of correct data assimilation nor or any appropriate statistical techniques applied to the data AND improper interpretations were made of the test(s) results.	
Evaluate Results	Articulates a comprehensive evaluation of results including next steps. Results are discussed in the context of pertinent, peer-reviewed literature.	Produces an accurate interpretation of data including a consideration of sources of error. An attempt is made to incorporate peer-reviewed literature but could be more relevant.	Selects the best interpretation of results. But no attempt is made to relate findings to existing peer reviewed literature.	Recognizes an accurate interpretation of results. But evaluation is incomplete and no attempt is made to relate findings to existing peer reviewed literature.	

* Biology supplemented where BOLD.

Overall, has this student demonstrated appropriate knowledge and skills for this level in this discipline? ___ Yes ___ No
 ___ This student did not turn in an acceptable response to the assignment (e.g., failed to turn in a paper, plagiarized, etc.)

Appendix 2 Goal 3 Objective 1 Rubric

UCA CORE and Biology-Communication Rubric A (Oral) SLO 3 rubric for poster presentations to assess oral communication

Specific Skill or Knowledge Area Related to the Goal	Student Learning Outcomes				
	4	3	2	1	0
Central Message	Central message is compelling, reinforced, and strongly supported.	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not reinforced.	Central message can be deduced, but is not explicitly stated.	Assign a zero for performance that does not meet a score of one (1).
Organization	Organizational pattern is clear and consistent, polished, and makes the content cohesive. Thoroughly but concisely presents main points of introduction, hypotheses, methods, results, and conclusions.	Organizational pattern is clear and consistent. Adequately presents main points of introduction, hypotheses, methods, results, and conclusions.	Organizational pattern is partially developed. Presents main points of introduction, hypotheses, methods, results, and conclusions, but not sufficiently.	Organizational pattern is poorly developed and unclear. Does not adequately present main points in 2 or more areas: introduction, hypotheses, methods, results, and/or conclusions.	
Supporting Material/Evidence	Employs timely and relevant material to provide effective support in a way that reflects a thorough understanding of the topic/thesis. Has interesting variety and enhances the speaker's arguments and credibility	Selects sufficient and relevant supporting materials, but lack in analysis, comparisons, or credible authorities. Has sufficient variety and generally supports the speaker's arguments and credibility	Uses some supporting materials with limited or incomplete explanations, examples, and/or descriptions. Has little variety and partially supports speaker's arguments and credibility	Insufficient or inappropriate supporting materials. Is insufficient and minimally supports speaker's arguments and credibility	
Context and Audience	Demonstrates a thorough understanding of the context, uses compelling language appropriate to the audience.	Demonstrates adequate consideration of the context and uses thoughtful language given the audience.	Demonstrates some awareness of the context and uses mundane language given the audience.	Demonstrates minimal attention to the context and uses unclear language given the audience.	

Verbal and Nonverbal Delivery	Delivery makes the presentation compelling and speaker appears polished and confident.	Delivery makes the presentation interesting and speaker appears comfortable.	Delivery makes the presentation understandable but speaker appears tentative.	Delivery is understandable but speaker appears uncomfortable.	
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*** Biology supplemented where BOLD.**

Overall, has this student demonstrated appropriate knowledge and skills for this level in this discipline? ___Yes ___No
 ___This student did not turn in an acceptable response to the assignment (e.g., failed to turn in a paper, plagiarized, etc.)

Appendix 3 Goal 3 Objective 2 Rubric

UCA CORE and Biology-Communication Rubric B (Written) Rubric for poster presentations to assess written communication

Specific Skill or Knowledge Area Related to the Goal	Student Learning Outcomes				
	4	3	2	1	0
Central Message	Central message is compelling, reinforced, and strongly supported.	Central message is clear and consistent with the supporting material.	Central message is basically understandable but is not reinforced.	Central message can be deduced, but is not explicitly stated.	Assign a zero for performance that does not meet a score of one (1).
Organization	Organizational pattern is clear and consistent, polished, and makes the content cohesive. Thoroughly but concisely presents main points of introduction, hypotheses, methods, results, and conclusions.	Organizational pattern is clear and consistent. Adequately presents main points of introduction, hypotheses, methods, results, and conclusions.	Organizational pattern is partially developed. Presents main points of introduction, hypotheses, methods, results, and conclusions, but not sufficiently.	Organizational pattern is poorly developed and unclear. Does not present main points of introduction, hypotheses, methods, results, and conclusions.	
Supporting Material/Evidence	Employs timely and relevant material to provide effective support in a way that reflects a thorough understanding of the topic/thesis. Cites all data obtained from other sources. APA citation style is accurate.	Selects sufficient and relevant supporting materials, but lack in analysis, comparisons, or credible authorities. Cites most data obtained from other sources. APA citation style is accurate.	Uses some supporting materials with limited or incomplete explanations, examples, and/or descriptions. Cites some data obtained from other sources. Citation style is either inconsistent or incorrect.	Uses insufficient or inappropriate supporting materials. Does not cite sources.	
Context and Audience	Demonstrates a thorough understanding of the context, uses compelling language appropriate to the audience.	Demonstrates adequate consideration of the context and uses thoughtful language given the audience.	Demonstrates some awareness of the context and uses mundane language given the audience.	Demonstrates minimal attention to the context and uses unclear language given the audience.	
Control of Syntax and Mechanics	Demonstrates clear and fluid control of syntax and mechanics that skillfully communicates meaning to readers and is virtually error-free.	Uses syntax and mechanics that generally conveys meaning to readers with	Exhibits substantive errors in syntax and mechanics which, at times, impedes	Shows a serious pattern of error in syntax and mechanics that interferes with meaning.	

		clarity. The language has few errors.	the clarity of the work.		
Visual Presentation	Overall visually appealing; not cluttered; colors and patterns enhance readability. Uses font sizes/variations that facilitate the organization, presentation, and readability of the research. Graphics (e.g., tables, figures) are engaging and enhance the text. Content is clearly arranged so that the viewer can understand order without narration.	1 criteria to receive a 4 is missing or inadequate.	2 criteria to receive a 4 are missing or inadequate.	3 criteria are missing or inadequate	

*** Biology supplemented where BOLD.**

Overall, has this student demonstrated appropriate knowledge and skills for this level in this discipline? ____Yes ____No
 ____This student did not turn in an acceptable response to the assignment (e.g., failed to turn in a paper, plagiarized, etc.)

13. Submit Assessment Plan

- Send completed form electronically to assessment@uca.edu

For questions or concerns please contact:
Dr. Jacob Held 450-5307 jmheld@uca.edu
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