

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: BS General Science

College: College of Science and Engineering

Department: Physics, Astronomy, and Engineering

Program Level (check all that apply)

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

Date Plan Submitted: 08/22/2025

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

College Curriculum Committee Chairperson & Email: Will Flatley wflatley@uca.edu

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

- Purpose:
The BS in General Science program in the College of Science and Engineering provides students with a degree path encompassing a broader exposure in different scientific fields. It provides a flexible structure that can be an excellent preparation for professional schools. It also provides students who have reassessed their initial degree plans an efficient path to a degree in the sciences.
- Unit Mission Statement:
The mission of the Department of Physics, Astronomy, and Engineering is to provide UCA students with an exemplary education in, to advance knowledge and understanding of, and

to provide information and services to the public in the areas of physics, astronomy, and engineering.

2. Student Outcomes

- **GOAL 1:** Conduct an experiment to answer a scientific question.
 - **Learning Objective 1:** Students will design and perform an experiment to test a scientific hypothesis.
 - **Learning Objective 2:** Students will analyze the results of an experiment.

- **GOAL 2:** 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 scientific ideas orally.
 - **Learning Objective 2:** Students will effectively communicate scientific ideas in writing.

3. Assessment Cycle

- Assessment Cycle will be determined with assistance from the Office of Assessment. Assessments will be completed every four years. With two learning objectives assessed each year. The nature of this degree program will require that assessments are completed in courses taught in multiple departments. This is the reason for the extended cycle.

	Goal 1		Goal 2	
	LO 1	LO 2	LO 1	LO 2
Year 1				
Year 2				
Year 3				
Year 4				

4. Curriculum Map

	Option A				Option B			
	Goal 1		Goal 2		Goal 1		Goal 2	
	LO 1.1	LO 1.2	LO 1.1	LO 1.2	LO 1.1	LO 1.2	LO 2.1	LO 2.2
BIOL 1440	I	I	I	I	I	I	I	I
BIOL 1441	R	R	R	R	R	R	R	R
BIOL 2490	R	R	R	R	R	R	R	R
UD BIOL	A	A	A	A				
CHEM 1450	I	I	I	I	I	I	I	I
CHEM 1451	R	R	R	R	R	R	R	R
CHEM 2401	R	R	R	R	R	R	R	R
UD CHEM	A	A	A	A	A	A	A	A
PHYS 1410/1441	I	I	I	I	I	I	I	I
PHYS 1420/1442	R	R	R	R	R	R	R	R
PHYS 2430/2443	R	R	R	R	R	R	R	R
UD PHYS					A	A	A	A

I: Introduce, **R:** Reinforce, **A:** Apply

- Office of Assessment will provide examples and consultative services to meet this requirement.

5. **Assessment Methods and Measures (Formative and Summative recommended)**

- The following assignment (or a reasonable facsimile) will be used as the artifact for assessment of all four Learning Outcomes. The specific outcome assessed each year will follow the timeline established above. It is left intentionally vague to allow its use in any of the three disciplines: physics, chemistry, or biology.
- **Assignment Description**
 - You are tasked with independently designing and executing a scientific experiment to test a hypothesis of your own choosing, relevant to the subject matter of this course. This project will assess your ability to apply scientific reasoning, design methodologically sound experiments, interpret data, and communicate findings clearly and professionally.
- **Expectations**
 - Originality and Relevance: Your hypothesis should be original and relevant to the field.
 - Scientific Rigor: Your design should include control of variables, sampling methods, and valid analysis.
 - Communication: Written and oral communication should meet professional scientific standards.
- **Deliverables**
 - Experimental Proposal (**Learning Outcome 1.1**)
 - Research question and background (with citations)
 - Testable hypothesis
 - Description of experimental setup and procedure
 - Identification of variables and controls
 - Anticipated challenges and ethical/safety considerations
 - Execution and Documentation (**Learning Outcome 1.2**)
 - Conduct your experiment
 - Maintain a detailed lab notebook or log
 - Collect data systematically and ethically
 - Analyze data using techniques appropriate to the experimental design
 - Final Report: Submit a formal scientific paper including (**Learning Outcome 2.1**)
 - Abstract
 - Introduction (context, rationale, hypothesis)
 - Methods (replicable, detailed, justified)
 - Results (tables, figures, analysis)
 - Discussion (interpretation, limitations, future directions)
 - References (APA/ACS/IEEE/etc., depending on discipline)
 - Presentation (**Learning Outcome 2.2**)
 - Deliver a 7–10-minute professional presentation (with visuals) to the class, followed by Q&A.
- **Assessment rubrics for each of the Learning Outcomes:**

Experimental Proposal Rubric

Learning Outcome 1.1 – Students will design an experiment to test a scientific hypothesis

Criteria	Exemplary (5)	Proficient (4)	Satisfactory (3)	Needs Improvement (2-0)	Weight
Research Question & Background (with citations)	Research question is clear, focused, and significant. Background provides a thorough, well-organized review of relevant literature with accurate, properly formatted citations.	Research question is clear and relevant. Background includes relevant literature with mostly accurate citations.	Research question is present but may be vague or overly broad. Background covers limited sources or lacks depth; citations are incomplete.	Research question is missing, unclear, or irrelevant. Background is missing or inaccurate; no proper citations.	×1
Testable Hypothesis	Hypothesis is precise, clearly stated, and testable; aligns directly with research question and is grounded in background information.	Hypothesis is clear and testable; generally aligns with research question and background.	Hypothesis is present but may be vague, not easily testable, or weakly connected to research question.	Hypothesis is missing, unclear, untestable, or unrelated to research question.	×1
Description of Experimental Setup & Procedure	Detailed, step-by-step procedure that could be replicated; setup is well-described with clear diagrams or schematics; logical progression of steps.	Procedure is described clearly with enough detail for general understanding; diagrams/schematics present but could be improved.	Procedure has some detail but important steps or setup elements are missing or unclear.	Procedure is missing, incomplete, or too vague to understand.	×2
Identification of Variables & Controls	All variables (independent, dependent, controlled) are clearly identified and justified; controls are well-planned and relevant.	Most variables are identified with reasonable justification; controls are appropriate but may lack full explanation.	Some variables identified but classification may be incomplete or unclear; controls are weakly described.	Variables are not identified or incorrectly classified; no meaningful controls provided.	×1
Anticipated Challenges & Ethical/Safety Considerations	Anticipates realistic challenges and proposes thoughtful strategies to address them; identifies all relevant ethical and safety concerns with clear mitigation plans.	Identifies potential challenges with some strategies; notes most ethical/safety considerations.	Identifies a few potential challenges but offers limited solutions; minimal ethical/safety discussion.	No discussion of challenges or ethical/safety considerations.	×1

Total _____ / 30

Experimental Execution & Documentation Rubric

Learning Outcome 1.2 – Students will execute an experiment and document their work.

Criteria	Exemplary (5)	Proficient (4)	Satisfactory (3)	Needs Improvement (2-0)	Weight
Conduct Your Experiment	Experiment is conducted with exceptional attention to detail, following the planned procedure precisely; adjustments are well-reasoned and documented.	Experiment is conducted according to the planned procedure with minor deviations; adjustments are mostly appropriate and recorded.	Experiment is partially followed as planned, with significant deviations or omissions; limited documentation of changes.	Experiment is not conducted as planned; major steps are skipped or altered without justification; poor or no documentation.	×2
Maintain a Detailed Lab Notebook or Log	Lab notebook/log is complete, organized, and detailed enough for replication; includes dates, times, observations, and rationale for decisions.	Lab notebook/log is mostly complete and organized, with adequate detail to understand the experiment.	Lab notebook/log contains some relevant entries but lacks detail, organization, or completeness.	Lab notebook/log is incomplete, disorganized, or missing.	×1
Collect Data Systematically and Ethically	Data are collected consistently, accurately, and ethically; procedures minimize bias and ensure reliability; ethical considerations are clearly addressed.	Data are collected in a generally consistent and ethical manner; minor inconsistencies do not significantly affect results.	Data collection is inconsistent or lacks clear ethical consideration; reliability of data may be compromised.	Data collection is haphazard, unethical, or unreliable.	×1
Analyze Data Using Appropriate Techniques	Data analysis uses techniques fully appropriate to the design; results are interpreted accurately and connected to the research question.	Data analysis is mostly appropriate and accurate; minor errors do not affect overall conclusions.	Data analysis uses partially appropriate methods or contains errors that weaken conclusions.	Data analysis is inappropriate, incorrect, or missing; conclusions are unsupported by data.	×2

Total _____ / 30

Oral Presentation Rubric – Experimental Work

Learning Outcome 2.1 – Students will effectively communicate their experimental work in an oral presentation.

Criteria	Exemplary (5)	Proficient (4)	Satisfactory (3)	Needs Improvement (2–0)	Weight
Organization & Structure	Presentation is logically organized with a clear introduction, body, and conclusion; transitions are smooth and easy to follow.	Presentation is mostly organized with a clear structure; transitions are generally effective.	Presentation has some structure but may lack clear transitions or logical flow.	Presentation is poorly organized, hard to follow, or missing key structural elements.	×1
Content Accuracy & Depth	Content is accurate, thorough, and demonstrates deep understanding; addresses research question, methods, results, and conclusions clearly.	Content is accurate and complete with minor omissions; demonstrates good understanding.	Content is mostly accurate but lacks depth or omits key details.	Content contains significant errors or omissions; limited understanding demonstrated.	×1
Visual Aids (Slides, Figures, etc.)	Visuals are clear, professional, and enhance understanding; well-integrated into the presentation.	Visuals are generally clear and relevant; some minor formatting or integration issues.	Visuals are present but may be unclear, cluttered, or only loosely related to content.	Visuals are missing, poorly designed, or distracting.	×1
Delivery & Engagement	Speaker is confident, well-paced, and engages audience; speaks clearly with appropriate volume and tone; minimal reliance on notes.	Speaker is clear and mostly confident; pacing and engagement are generally good.	Speaker is sometimes unclear, too fast/slow, or shows limited audience engagement.	Speaker is difficult to hear/understand, reads excessively from notes, or does not engage audience.	×2
Response to Questions	Answers questions accurately, confidently, and thoughtfully; demonstrates deep understanding of topic.	Answers questions accurately and appropriately; demonstrates good understanding.	Answers are partially correct or lack depth; shows limited understanding.	Unable to answer questions appropriately or responds inaccurately.	×1

Total _____ / 30

Final Lab Report Rubric

Learning Outcome 2.2 – Students will effectively communicate scientific ideas in writing.

Criteria	Exemplary (5)	Proficient (4)	Satisfactory (3)	Needs Improvement (2-0)	Score
Abstract	Concise, complete summary of purpose, methods, results, and conclusions; engages reader and accurately reflects paper.	Summarizes most key aspects of the study; minor omissions or unclear phrasing.	Includes some elements but omits key components or is too wordy/unclear.	Abstract is missing, incomplete, or inaccurate.	
Introduction (Context, Rationale, Hypothesis)	Provides thorough background and rationale; clearly states research question and hypothesis; well-organized and engaging.	Provides adequate background and rationale; research question and hypothesis are clear.	Provides limited background or rationale; hypothesis may be vague or incomplete.	Lacks clear background, rationale, or hypothesis.	
Methods (Replicable, Detailed, Justified)	Methods are described in enough detail for replication; procedures are logically organized and justified; includes materials and equipment.	Methods are mostly complete and replicable; minor omissions or unclear descriptions.	Methods are partially described, lacking key details or justification.	Methods are incomplete, disorganized, or missing.	
Results (Tables, Figures, Analysis)	Results are clearly presented with well-formatted tables/figures; analysis is thorough and accurate; data presentation enhances clarity.	Results are presented with appropriate tables/figures; analysis is mostly accurate; some formatting or clarity issues.	Results are presented but lack clarity, detail, or accuracy; tables/figures may be incomplete or poorly formatted.	Results are unclear, inaccurate, or missing.	
Discussion (Interpretation, Limitations, Future Directions)	Interprets results insightfully, relating them to hypothesis and literature; discusses limitations; suggests realistic future work.	Interprets results appropriately; mentions some limitations and future directions.	Interprets results in a limited way; few connections to hypothesis or literature; minimal discussion of limitations/future work.	Lacks interpretation, limitations, or future directions.	
References (APA/ACS/IEE E/etc.)	All sources cited in proper format; comprehensive and relevant; no errors in style.	All sources cited; mostly correct format with minor errors.	Some sources missing or in incorrect format; several errors.	Few or no sources cited; incorrect or inconsistent format.	

Total _____ / 30

6. Data Collection and Review

- When will data be collected for each outcome?
Data will be gathered for each outcome using the rotation noted above. Each outcome will be assessed twice in a four-year cycle.
- How will data be collected for each outcome?
Artifacts related to each Learning Outcome will be requested for students in the program from faculty teaching upper division courses in the three disciplines.
- What will be the benchmark/target for each outcome?
The benchmark for the initial assessment will be 75% of students hitting 22/30 on the assessments they participate in.
- What individuals/groups will be responsible for data collection?
These artifacts will be collected by the Assessment Committee of the Department of Physics, Astronomy, and Engineering (ACPAE).

7. Participation in Assessment Process

- Who will participate in carrying out the assessment plan?
Faculty from the various upper division courses across the three disciplines as part of the program.

The ACPAE

- What will be their specific role/s?
 - Faculty from the various upper division courses
 - Provide the artifact necessary for the assessment of the Learning Outcomes
 - The ACPAE
 - Tracking of majors and the upper division courses they are enrolled in.
 - Collecting of artifacts for assessment
 - Assessment of the artifacts
 - Interpretation of the assessment and recommendations for improvements when indicated.

8. Data Analysis

- How will the data and findings be shared with faculty?
The ACPAE will prepare a report annually on the analysis of the assessments. This will be shared with the department during the first meeting of the department each school year. The report will include any recommendations of the committee driven by the data analysis.
- Who was involved in analyzing the results?
The ACPAE

9. Plan for Using Assessment Results to Improve Program

- How will you use the results to improve your program?
The ACPAE will prepare a report annually on the analysis of the assessments. This will be shared with the department during the first meeting of the department each school year. The report will include any recommendations of the committee driven by the data analysis. As to how they will be used, the specifics will depend on the results of the analysis.

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

The ACPAE will develop a post-graduate questionnaire that will be delivered every 5 years via email to alumni.

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11. What are the plans to evaluate teaching effectiveness?

- As courses in this program are taught across multiple departments. As such, teaching effectiveness will be assessed by the individual department chairs. Should there be an issue that is identified through the assessment process, the appropriate department chair will be contacted.

12. Submit Assessment Plan

- Send completed form electronically to assessment@uca.edu

For questions or concerns please contact:
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