

PROGRAM ASSESSMENT REPORT
East Central University

Program Name: Biology

College/School Name: College of Health and Sciences

Academic Year Assessed: 2020-2021

Assessment Report Requirements:

1. **Program Goals, Student Learning Outcomes (SLO), and Criteria:** At *minimum*, your Program Assessment Plan should have 2 overarching goals and 3 major outcomes derived from the goals that assess the core of your program. Each SLO must have at least 2 criteria and each criterion must have at least one instrument.
2. **Assessment Across Program:** Your SLOs and criteria must assess a majority of your students each year and assess from early in the program to the end.
 - Assessing through the program gives you the ability to identify weak points for improvement.
3. **Instruments:** Attach ALL Instruments listed in your assessment plan in the APPENDIX at the end of the Plan/Report.
4. **Instruments Using Direct/Indirect Measures:** Your Program Assessment Plan should include both direct and indirect measures of learning, with direct measures in the majority.
5. **Validation through External Instruments:** *If possible*, use an external instrument as a direct measure (e.g., ETS/MFT, ACAT, NCLEX, OSAT) to validate your local direct measures.
 - *The Office of Institutional Effectiveness pays for external testing.*
6. **Analysis of Data by Faculty:** All faculty integral to the Program will meet to discuss and analyze the data at the end of the academic year to determine what the collected data says about the program's performance during the current year and how that new knowledge will translate into proposed actions/changes in the coming year(s).
7. **Completion of Template:** *You are required to complete all sections of this report template.* Follow the directions as written. Contact the Assessment Coordinator before modifying the template to match the specific elements of your program assessment plan.
8. **File Name:** Use the following format to name this file before uploading:
 - Program Name Degree Level Asmt Report AY XXXX-XX
 - e.g., Art BFA Asmt Report AY 2020-21
 - e.g., Ed Leadership MEd Asmt Report AY 2020-2021
9. **Upload to Teams:** Complete your plan/report using the template and upload it to your Team channel. Email your Vice President and the Assessment Coordinator to let them know you have finished. *IF you make further changes to your report in Teams, notify your Vice President and the Assessment Coordinator via email.*

See Glossary of Terms for further explanation:

UGRP_ECU Unit Assessment Team >> General channel >> Files.

PROGRAM ASSESSMENT REPORT
East Central University

Assessment Plan, Data, and Analysis

Mission Statements & Goals

EAST CENTRAL UNIVERSITY MISSION STATEMENT:

We educate and empower students to understand and transform our world.

PROGRAM GOAL(S): The mission of the Biology Program is to prepare our students for professions in the life sciences by building biological understanding, enhancing applications of that knowledge and increasing scientific literacy.

Goal 1: Students will apply biological concepts.

Goal 2: Students will demonstrate scientific literacy.

ASSESSMENT ACROSS THE PROGRAM STATEMENT:

Provide a short narrative describing how you assess across your program – noting the points where you assess early-, mid-, and end-program.

The Biology Program is assessed using a national standard, an in-house across concentrations exam, a self-reporting survey and evaluating communication. Students' ability to apply knowledge (Goal 1) is assessed for entry-level students in General Biology, using the in-program exam across all sections and instructors. End-program students are assessed using the national standard and the in-program exam. Our students' scientific literacy (Goal 2) is assessed through oral and written communication, as well as a self-evaluating survey.

EXTERNAL INSTRUMENT AVAILABILITY FOR PROGRAM:

If YES, provide name of instrument *and* whether instrument is currently used for assessment.

If NO, state No.

Yes, ETS Major Field Test for Biology, currently used (1 semester)

STUDENT LEARNING OUTCOME 1:

STUDENTS WILL DEMONSTRATE AT LEAST AN AVERAGE ABILITY TO APPLY BIOLOGICAL CONCEPTS.

Criterion 1.1: On average students will score above the mean on a nationally standardized biology exam.

Population/Course: Biol4881 Senior Seminar students

Instrument/Measurement (copy/paste instrument in Appendix): ETS Major Fields Test (Appendix A links to example questions)

Standard: The average of all students should be a score above 152 (SD 13.1, the ETS MFT national average)

PROGRAM ASSESSMENT REPORT
East Central University

Data Table 1: Student average scores on ETS Major Fields Test by Semester/Year

Academic Year	Range of Scores	Mean of Scores	Percent Pass Rate	n
2020-2021	120-174	142.8 (11.6)	NA	25
2019-2020	ND	ND	ND	ND
2018-2019	ND	ND	ND	ND
2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: No data due to new assessment implementation.

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	On average students did not score above the mean of the (ETS_MFT) nationally standardized biology exam, resulting in our standard not being met .
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	Our students scored on average within one standard deviation of the national mean.
3. Discuss possible reasons why the unit performed as it did this year.	The criterion goal was set based on goals for our students to perform at a national level.
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	At this time, longitudinal trends are not applicable.
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	At this time, the department would prefer to have additional data in order to make longitudinal decisions.

Criterion 1.2: On average senior level students will show an improvement in percent number of correct questions compared to entry-level students in a freshman biology core course, using a program-developed multiple-choice exam.

Population/Course: Biol1114 General Biology students; Biol4881 Senior Seminar students or Biol Science Teaching Methods

Instrument/Measurement (copy/paste instrument in Appendix): Program assessment exam ([Appendix B](#) shows example questions)

Standard: (average % Biol4881-average %Biol1114)>0

Data Table 2: Student progression in biological understanding assessed through matched examination in freshmen then graduating senior level courses.

Academic Year	Range of Scores	Mean of Scores	Percent Pass Rate	n
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PROGRAM ASSESSMENT REPORT
East Central University

2020-2021	ND	ND	ND	ND
2019-2020	ND	ND	ND	ND
2018-2019	ND	ND	ND	ND
2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: No data due to new assessment implementation. See Appendix B for more details.

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	NA
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	NA
3. Discuss possible reasons why the unit performed as it did this year.	NA
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	NA
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	NA

STUDENT LEARNING OUTCOME 2:

STUDENTS WILL BE ABLE TO CRITICALLY EVALUATE SCIENTIFIC LITERATURE.

Criterion 2.1: Students will successfully write a critical review paper.

Population/Course: Biol4881 Senior Seminar students

Instrument/Measurement (copy/paste instrument in Appendix): Critical Review Paper assignment (Appendix C links to the Critical Review Paper Rubric)

Standard: 90% of students will successfully (higher than 80% based on Critical Review Paper Rubric) write a critical review paper.

Data Table 3: Student performance in evaluation of scientific literature as assessed by scores on submitted critical review paper submitted in Senior Seminar.

Academic Year	Range of Scores	Mean of Scores	Percent Pass Rate	n
2020-2021	73-95	88.2 (4.5)	96	25
2019-2020	50-100	90.3 (12)	90	20
2018-2019	62-95	85.4 (9.7)	79	14
2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: No data due to new rubric assessment
Last revised 7/22/2021 Roberson

PROGRAM ASSESSMENT REPORT
East Central University

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	Student performance was met for the latest assessment year.
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	The standard was met 2/3 times used.
3. Discuss possible reasons why the unit performed as it did this year.	The rubric is fairly detailed, allowing students to tailor their papers and understand expectations more easily; thus, most students scored above 80%.
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	There are three semesters (one for each academic year) of data in which the rubric was used by one of the instructors. The other semesters were not using the Critical Review Paper Rubric and so are not included here. While the standard was met two of the three semesters, the instructor believes there may have been inflation due to peer evaluation (using the same rubric) being averaged with the instructor's score. In addition, the lowest % pass rate was seen the first time the current rubric was used and so some editing was required to make it more easily understood by students.
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	The Critical Review Paper Rubric will be used by all future instructors and will omit peer evaluations in the overall assessment of the standard.

Criterion 2.2: Students will successfully demonstrate critical evaluation of the scientific literature through oral communication.

Population/Course: Biol4881 Senior Seminar students

Instrument/Measurement (copy/paste instrument in Appendix): Critical Review Paper Presentation assignment (Appendix D links to the evaluation rubric)

Standard: 90% of students will score higher than 80% based on Critical Review Paper Presentation Rubric

Data Table 4: Student performance in evaluation of scientific literature as assessed by oral presentation in Senior Seminar.

Academic Year	Range of Scores	Mean of Scores	Percent Pass Rate	n
2020-2021	79-96	90.3 (5)	96	25
2019-2020	89-99	93.9 (3.4)	100	20
2018-2019	85-96	91.9 (3.8)	100	14

PROGRAM ASSESSMENT REPORT
East Central University

2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: No data due to new rubric assessment

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	Student performance was met for the latest assessment year.
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	The average score was 90% indicating that most students did well according to the rubric.
3. Discuss possible reasons why the unit performed as it did this year.	The rubric is fairly detailed, allowing students to tailor their papers and understand expectations more easily; thus, most students scored above 80%.
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	There are three semesters of data in which the rubric was used by one of the instructors. The other semesters were not using the Critical Review Paper Presentation Rubric and so are not included here. While the standard was met all three semesters, the instructor believes there may have been inflation due to peer evaluation (using the same rubric) being averaged with the instructor's score.
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	The Critical Review Paper Presentation Rubric will be used by all future instructors and will omit student evaluations in the overall assessment of the standard

STUDENT LEARNING OUTCOME 3:
STUDENTS WILL PARTICIPATE IN SIGNIFICANT RESEARCH EXPERIENCES.

Criterion 3.1: Students participating in research will communicate their work.

Population/Course: Students participating in an undergraduate research experience at ECU within the Biology Program, specifically students enrolled in BIOL4983/499X Independent Study and other non-enrolled biology majors performing original research for at least one semester in the Biology Program.

Instrument/Measurement: Bibliographic list of scientific communications

Standard: 60% of students (non-redundant) will communicate their research to an audience outside the research laboratory group.

Data Table 5: Student research presentation participation. (This is a new assessment, so there is only one year of data.

PROGRAM ASSESSMENT REPORT
East Central University

Academic Year	Range of Scores	Mean of Scores	Percent Pass Rate (student participation %)	n
2020-2021	n/a	n/a	48%	52
2019-2020	ND	ND	ND	ND
2018-2019	ND	ND	ND	ND
2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: ND=No data due to new assessment implementation. (n/a) not able to be calculated in this context since data is a yes or no per student participant.

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	Not Met
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	The department did not meet the criterion of 60% of students communicating their work in a public forum.
3. Discuss possible reasons why the unit performed as it did this year.	While the number of students communicating their work was high, there were many students that wanted just an introductory experience in research without moving to the final level of public communication of results. The department is concerned that the covid pandemic may be an inhibiting factor in students making their presentations/publications. There is hope that the stunt in presentation/publication participation will accelerate. In addition, the department has only one academic year of data. There is concern also that these numbers seen in the 2020-2021 academic year do not accurately reflect the student research participation.
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	n/a This is a new assessment and there are not currently data prior to this year. While estimates could be retroactively obtained there are some concerns about consistency and redundancies. As such trends will be analyzed this upcoming years' reports.
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	The department is going to obtain a second year of data to determine if the 2020-2021 academic year is an anomaly.

Criterion 3.2: After an initial introductory period of research, students gain confidence in their scientific thinking capabilities.

PROGRAM ASSESSMENT REPORT
East Central University

Population/Course: Students participating in an undergraduate research experience at ECU within the Biology Program past one semester of experience compared to those with at least one year of at least 10/hrs per week dedicated to research. More specifically, students enrolled in BIOL4983/499X Independent Study and also other non-enrolled biology majors performing original research for at least one semester in the Biology Program

Instrument/Measurement: Scientific Engagement Survey (Appendix E)

Standard: Students will on average report an enhancement to confidence of their scientific thinking abilities. Survey is on a 5-point Likert scale with 5 being the most confident. We compare the difference between Experienced to an Intermediate level of research experience. (Experienced-Intermediate)>0.

Data Table 6: Student self-evaluation of confidence in scientific thinking ability across experience level. See Appendix F for scores averages based on each category, limited research (1 semester) compared to experienced students.

Academic Year	Range of Scores	Difference of Scores	Percent Pass Rate	n
2020-2021	1-4	1	n/a	8
2019-2020	ND	ND	ND	ND
2018-2019	ND	ND	ND	ND
2017-2018	ND	ND	ND	ND
2016-2017	ND	ND	ND	ND

NOTE: Percent Pass rate (n/a) not able to be calculated in this context and does not apply when the scores, standards/instrument relates to outcome as an average metric. This is a new assessment instrument and ND=datapoints prior to this survey being implemented.

Analysis Table: A response is required for each question in the table.

Analysis Question	Analysis Response
1. Was your standard met or not met for the year?	The standard was met.
2. Whether met or not met, explain how your unit performed in relation to the standard (relate the data in the table to the standard).	There was some higher variability with the confidence level of students with only one semester of experience. This is expected as research experience varies student to student and lab to lab. Students that continued on past one semester reported on average higher confidence although within the same range. Although the sample size is low, this is a full participation in the survey from researchers and expected to remain low due to faculty time/effort/funding restrictions.
3. Discuss possible reasons why the unit performed as it did this year.	On average students that were experienced in research reported greater confidence (4) in their scientific thinking ability compared to those with limited experience (3). Students with no experience, interestingly, reported a fairly high level of confidence in their abilities (average of 3.6, not

PROGRAM ASSESSMENT REPORT
East Central University

	reported in table above). This can be explained by the Dunning-Kruger effect.
4. Look at the 5-year data trends and discuss those. Note if data seem to be increasing/decreasing with time and if so, reasons why.	Since this is the first data year, we expect some variability in values especially due to a small sample size of experienced researchers.
5. Using your analysis responses, make specific data-driven decisions about your unit. If no actions or changes are needed, state that. Copy/paste the #5 response to Current Actions and/or Changes (end of template)	Department goals include mentoring students with longevity in mind. We currently have one semester of data as it is a new instrument.

Summary Table of Student Learning Outcomes/Criteria/Instruments				
Student Learning Outcomes	Criteria/Instrument (modify table to fit your plan)	Direct/Indirect Measure	Met	Not Met
SLO1: Apply Biological Concepts	1.1: ETS-MFT	Direct		Not met
	1.2: Quiz	Direct	ND	ND
SLO2: Critically Evaluate Literature	2.1: Paper	Direct		Met
	2.2: Presentation	Direct		Met
SLO3: Research Experience	3.1: Research Communication	Direct		Not met
	3.2: Self-Evaluation	Indirect		Met

Student Information for this Academic Year	
Total, <i>unduplicated</i> number of students assessed this academic year	77
Program census for Fall	289
Program census for Spring	233
Total number of Fall Program graduates	23
Total number of Spring/Summer graduates	21
Mean major GPA of Fall graduates	3.3
Mean major GPA of Spring/Summer graduates	3.55

NOTE: With the exception of the unduplicated number assessed (yellow), student information is provided by Office of Institutional Effectiveness and is made available in your Teams folder. For help with determining unduplicated number, contact the Assessment Coordinator.

Faculty Meeting: List meeting date(s) and a roster of those in attendance.

Program assessment is new; however, was constructed by committee during several meetings. Program meeting will occur after report received.

Sharing with Stakeholders:

PROGRAM ASSESSMENT REPORT

East Central University

1. Stakeholders for this Program include: [list all within and without the ECU community] Stakeholders for the Biology program include current and past students (44 graduating seniors, 77 assessed students at beginning and end program-level), faculty teaching currently enrolled students (9 faculty, 3 adjuncts), industry (OUHSC, OMRF, Cytovance, IMMYlabs), non-profit organizations (Nature Conservancy), government agencies (USDA, and EPA) and grant administrators employing students/alumni (McNair, NASA, LS-OKAMP (NSF), INBRE(NIH)), and professional/graduate school programs that our past students matriculate into (OUHSC, OSU, UCO, OU-Med, Dartmoth, OSU-COMM).

2. Current program assessment reports are available on the website of the Office of Institutional Effectiveness:
https://myecu.ecok.edu/ICS/Institutional_Reporting/Assessment_Reporting_and_Outcomes.jnz
This link will change Fall 21 since MyECU is being phased out – I will let you know what to change it to.

SUMMARY OF LAST 5 YEARS' ACTIONS/CHANGES/REVIEWS & UPDATES

For instructions see *Glossary of Terms Pgm Asmt* in Teams.

Academic Year	Summary of Actions/Changes from Report
2020-2021	PROGRAM CREATED AN ASSESSMENT COMMITTEE TO REVISE GOALS, SLOS & CRITERIA
2019-2020	NO ACTION TAKEN
2018-2019	NO ACTION TAKEN
2017-2018	A RIGOROUS MICROSCOPE AND ECOLOGY TESTING BEGUN
2016-2017	CLARIFY WHO STAKEHOLDERS ARE

Academic Year	Summary of Annual Reviews of Dean and/or UAC (Reviews found in Teams folder; UAC does not review annually)	Updates in Response to Reviews
2019-2020	INSTRUMENTS NOT FULLY CAPTURING STUDENTS PARTICIPATING	REVISE ASSESSMENT
2018-2019	INSTRUMENTS NOT FULLY CAPTURING STUDENTS PARTICIPATING	REVISION DISCUSSED, NO ACTION TAKEN
2017-2018	INSTRUMENTS NOT FULLY CAPTURING STUDENTS PARTICIPATING	REVISION DISCUSSED, NO ACTION TAKEN
2016-2017	INSTRUMENTS NOT FULLY CAPTURING STUDENTS PARTICIPATING	REVISION DISCUSSED, NO ACTION TAKEN
2015-2016	SUGGESTIONS REWORDING OF CRITERIA/INSTRUMENTS; DETAILS ON SLO3	REVISION TO REPORT

PROGRAM ASSESSMENT REPORT
East Central University

APPENDIX

Copy/paste screenshots or narrative of blank instruments (rubrics, surveys, data report requests, prepared spread sheets, etc) here.

Appendix A. Example questions from ETS Major Field Report

https://www.ets.org/Media/Tests/MFT/pdf/mft_samp_questions_biology.pdf

Appendix B. Example questions from Program Assessment Quizzes

https://docs.google.com/document/d/16xq1TP4roasJDzcUkm_TYouAdUKeADtv/edit?usp=sharing&ouid=100915843428479891169&rtpof=true&sd=true

Appendix C. Rubric for Critical Review Paper

Rubric below is in full but is also provided to instructors as a part of their Blackboard shells.

https://docs.google.com/spreadsheets/d/1_Dq_yBF3P6uVt_D0nyZZuP7NeNdf9h3cbmzPKnUjsEg/edit?usp=sharing

Appendix D. Rubric for Critical Review Paper Presentation

Rubric below is in full but is also provided to instructors as a part of their Blackboard shells.

https://docs.google.com/spreadsheets/d/1S-tj3NCz34bKuO0SU_1xzUsjx8ZHh6klhh2RBs-d7yE/edit?usp=sharing

Appendix E. Scientific Engagement Survey

<https://docs.google.com/forms/d/1dCM24MuFSZezFTriUgF047ekMYAYsenYDOS1tqzrnQ/edit>

The survey is quite extensive; however, the following two questions will be used to assess Goal 2, Outcome 2, Criterion 2.

PROGRAM ASSESSMENT REPORT

East Central University

Compared to the average college student, where the average student is at the 50th percent, rate your confidence about your level of skill according to the following scale.

	Bottom 10%	Below average	Average	Above average	Top 10%
Math skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Writing skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public speaking...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientific thinki...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Microscopic skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Steril techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communicatin...	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 1. Screenshot of one of the survey questions deployed in the Scientific Engagement Survey that will be used during the evaluation process.

Have you participated in research while attending ECU? *

No, I have not participated in any research experience

Yes, during one academic semester (typically~10hr/wk)

Yes, during multiple academic semesters (typically ~10hr/wk)

Yes, during a summer research program (typically full-time for at least 5 weeks)

Figure 2. Screenshot of one of the survey questions deployed in the Scientific Engagement Survey that will be used during the evaluation process.

Appendix F. Student self-evaluation of confidence in scientific thinking ability across experience level.

Level	Intermediate	Experienced
n	6	2
Mean score +/- 1 SD	3 (0.98)	4 (0.7)
Min score	1	3
Max score	4	4

PROGRAM ASSESSMENT REPORT
East Central University
