Academic Assessment Committee
CCSU
Central Connecticut State University

INTERIM Assessment Report (assessment results from AY 2015-16):

Geological Sciences Department

- **BS and BSED in Earth Science**
- **General Education**

Compiled By Kristine Larsen, with assistance from Mark Evans, Carol Ivers, Oluyinka Oyewumi, Jennifer Piatek, and Michael Wizevich

Overview

Department: Geological Sciences

Report Preparer: Kristine Larsen

Program Name and Level: Earth Science BS and BSED, Undergraduate

Program Assessment Question	Response
1) **URL**: Provide the URL where the learning outcomes (LO) can be viewed.	http://web.ccsu.edu/geolsci/GSCI-outcomes.shtml (link currently broken - we are working to remedy this situation)
2) **LO Changes**: Identify any changes to the LO and briefly describe why they were changed (e.g., LO more discrete, LO aligned with findings)	none
3) **Strengths**: What about your assessment process is working well?	Our process assesses a variety of important skills that our students are expected to achieve before graduation that will prepare them for both employment and graduate school.
4) **Improvements**: What about your assessment process needs to improve? (a brief summary of changes to assessment plan should be reported here)	1. As noted in Appendix A, revisions have been made to our programs, which will be assessed in the 2016-17 academic year cycle of assessment and beyond. A suggestion has been made to have a revised LO such as ***Societal and Environmental Impacts:*** *Students will be able to evaluate and appreciate the extent of human impact on Earth systems and environments, and understand the processes that create natural hazards, and the strategies that minimize their impact on society.* This will be discussed by the department for possible future implementation.
For Each Learning Outcome (LO) complete questions 5, 6 and 7 (you may add more rows if you have more than 5 LOs): **LO #1)** Scientific literacy: Students will be able to identify, analyze, and apply earth science concepts, principles, laws, and theories.	
5) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review and scoring rubric, licensure examination, , etc.)	GSCI 221 Mineralogy: "Unknown mineral" assignment: Students will learn about the procedure of identifying an unknown mineral, learn about mineral properties, and how to read scientific literature on minerals.
6) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO.	faculty
7) **Results**: Since the most recent full report, state the conclusion(s) drawn and what changes have been made as a result of the conclusion(s).	Conclusion: While the number of BSED majors was too small to have statistical significance, the vast majority of BS majors exceeded this expectation.
	Evidence: Conclusion based on table in Appendix A
	Changes: None needed at this time

<table>
<tr><td colspan="2">LO #2) Ability to do science: Students will be able to interpret, analyze, and apply the Scientific Method and other related inquiry related skills, as well as quantitative methods, in the earth science lab.</td></tr>
<tr><td>5) <u>Assessment Instruments</u>: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)</td><td>a) Scientific Method:

GSCI 221 Mineralogy: “Unknown mineral” assignment: Students will be given an unknown mineral that they need to test the properties of, look up those properties and try to identify the mineral based on those properties. They will come up with a first guess at to the identification. They will then prepare a sample for X-Ray diffraction, and run their sample. They will then use published comparison charts to completely identify the mineral.

b) Quantitative methods:

GSCI 221 Mineralogy: “Unknown mineral” assignment: Using their XRD data, students will need to calculate d-spacings of the crystal lattice.</td></tr>
<tr><td>6) <u>Interpretation</u>: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO.</td><td>faculty</td></tr>
<tr><td rowspan="3">7) Since the most recent full report, state the conclusion(s) drawn and what changes have been made as a result of the conclusion(s).</td><td>Conclusion:
a) While the number of BSED majors was too small to have statistical significance, it is seen that the BS majors overwhelmingly exceeded this outcome
b) While the number of BSED majors was too small to have statistical significance, it is seen that the BS majors overwhelmingly exceeded this outcome</td></tr>
<tr><td>Evidence: Conclusion based on table in Appendix A</td></tr>
<tr><td>Changes: None needed at this time</td></tr>
<tr><td colspan="2">LO #3) Communications: Students will be able to use oral and written communication to accurately and effectively convey earth science concepts.</td></tr>
<tr><td>5) <u>Assessment Instruments</u>: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)</td><td>a) Oral communication:

GSCI 360 Research in Earth Sciences: Presentation of research grant proposal (for BS students)

AST 278 Observational Astronomy: Demonstrated ability to communicate astronomical knowledge clearly and factually correctly to the general public during capstone public observing sessions.
OR
GSCI 290 Field Methods: Oral assignment (TBD) (for BSED students)</td></tr>
</table>

	b) Written communication: Upper level data: GSCI 360 Research in Earth Sciences: Written research grant proposal (BS students) AST 278 Observational Astronomy: Written research paper on a particular constellation. OR GSCI 290 Field Methods: Written assignment (TBD) (BSED students)
6) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO.	faculty
7) Since the most recent full report, state the conclusion(s) drawn and what changes have been made as a result of the conclusion(s).	Conclusion: Students met or exceeding our requirements for the GSCI 360 assignment at a higher level than in previous years. This will be monitored carefully over the next few years to see if it is a trend. There were no BSED students enrolled in these courses in this academic year.
	Evidence**:** Conclusion based on table in Appendix A
	Changes: Assessments for GSCI 290 still need to be developed.

LO #4) Technology literacy: Students will be able to select and accurately use appropriate tools, equipment, and technologies in the earth science lab.	
5) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	GSCI 221 Mineralogy: "Unknown mineral" assignment: Students will be given an unknown mineral that they need to test the properties of, look up those properties and try to identify the mineral based on those properties. They will come up with a first guess at to the identification. They will then prepare a sample for X-Ray diffraction, and run their sample. They will then use published comparison charts to completely identify the mineral.
6) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO.	Faculty
7) Since the most recent full report, state the conclusion(s) drawn and what changes have been made as a result of the conclusion(s).	a) Conclusions: While the number of BSED majors was too small to have statistical significance, it is seen that the BS majors overwhelmingly exceeded this outcome
	Evidence: Conclusion based on table in Appendix A
	Changes: None needed at this time.
LO #5) Research: Students will be able to locate, interpret, analyze, and/or conduct and present earth science research.	
5) **Assessment Instruments**: For each LO, what is the source of the data/evidence, other than GPA, that is used to assess the stated outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	GSCI 360 Research in Earth Sciences: Written research grant proposal OR GSCI 221: Students will research their mineral using reference books and journal articles to make sure they have the correct identification. They will then write a 2-3 page final report on their mineral.
6) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO.	Faculty
7) Since the most recent full report, state the conclusion(s) drawn and what changes have been made as a result of the conclusion(s).	Conclusion: Students met or exceeding our requirements for the GSCI 360 assignment at a higher level than in previous years. This will be monitored carefully over the next few years to see if it is a trend.
	Evidence**:** Conclusion based on table in Appendix A
	Changes: None needed at this time

Appendix A: Majors Assessment Plan

In the previous (2014-15) report it was noted that several planned assessments had not worked due to instrument failure and that new assessment tools were still in development for other LOs. Unfortunately that is still the case for one of the two choices available for BSED students (GSCI 290 oral/written presentation). There is an additional challenge in assessing BSED students, the low number of students enrolled in this program. Changes have been made to the BSED curriculum as well as the BS curriculum that will yield additional assessment information in future years. This will necessitate changes in assessment tools going forward, but should enhance our ability to collect meaningful information on student mastery of LOs.

Outcome MAJORS (BS and BSED)	BS	BSED
Scientific literacy	GSCI 221 Mineralogy "Unknown mineral" assignment [Process and reading scientific literature] *N = 12 BS/2 BSED* *BS:* *Exceeded: 83.3%* *Met: 0.0%* *Failed: 16.7%*	GSCI 221 Mineralogy "Unknown mineral" assignment [Process and reading scientific literature] *N = 12 BS/2 BSED* *BSED:* *Exceeded: 100%* *Met: 0%* *Failed: 0%*
Ability to do science: Scientific Method	GSCI 221 Mineralogy "Unknown mineral" assignment: [Testing properties; X-ray diffraction sample; mineral identification] *N=12 BS/2 BSED* *BS:* *Exceeded: 83.0%* *Met: 0.0%* *Failed: 16.7%* *Failed: 0%*	GSCI 221 Mineralogy "Unknown mineral" assignment: [Testing properties; X-ray diffraction sample; mineral identification] *N=12 BS/2 BSED* *BSED:* *Exceeded: 100%* *Met: 0%* *Failed: 0%*

Ability to do science: Math	GSCI 221 Mineralogy "Unknown mineral" assignment: [calculate d-spacings of the crystal lattice] *N=12 BS/2 BSED* *BS:* *Exceeded: 91.7%* *Met: 8.3%* *Failed: 0%*	GSCI 221 Mineralogy "Unknown mineral" assignment: [calculate d-spacings of the crystal lattice] *N=12 BS/2 BSED* *BSED:* *Exceeded: 100%* *Met: 0%* *Failed: 0%*
Oral communication	GSCI 360 Research in Earth Sciences: Presentation of research grant proposal *N = 13* *Exceeds = 69%* *Meets= 23%* *Fails=8%*	AST 278 Observational Astronomy: Demonstrated ability to communicate astronomical knowledge clearly and factually correctly to the general public during capstone public observing sessions. *No BSED students were enrolled in AST 278 in 2015-16* OR GSCI 290 Field Methods: Oral assignment (TBD) N=0 An assignment was not developed in time to be included in the Fall 2015 section of the course.

Written communication	GSCI 360 Research in Earth Sciences: Written research grant proposal *N=13* *Exceeds=61%* *Meets=39%* *Fails=0%*	AST 278 Observational Astronomy: Written research paper on a particular constellation. *No BSED students were enrolled in AST 278 in 2015-16* OR GSCI 221: Students will research their mineral using reference books and journal articles to make sure they have the correct identification. They will then write a 2-3 page final report on their mineral. *N= 2* *Exceeded: 100%* *Met: 0%* *Failed: 0%*
Technology literacy (tools both electronic and manual)	GSCI 221 Mineralogy "Unknown mineral" assignment: [Testing properties; X-ray diffraction sample; mineral identification] *N=12* *Exceeded: 83.0%* *Met: 0.0%* *Failed: 16.7%*	GSCI 221 Mineralogy "Unknown mineral" assignment: [Testing properties; X-ray diffraction sample; mineral identification] *N=2* *Exceeded: 100%* *Met: 0%* *Failed: 0%*

Research	GSCI 360 Research in Earth Sciences: Written research grant proposal *N=13* *Exceeds=61%* *Meets=39%* *Fails=0%*	GSCI 221: Students will research their mineral using reference books and journal articles to make sure they have the correct identification. They will then write a 2-3 page final report on their mineral. *N= 2* *Exceeded: 100%* *Met: 0%* *Failed: 0%*

Strengths: The program (as revised) uses a variety of lecture and laboratory courses to assess student learning, although we have endeavored to limit it to one course/assessment per LO (with the exception of BSED students who have a choice as to whether to take AST 278 or GSCI 290) in order to make the comparisons fair.

Improvements: With new available equipment and facilities that have come on line since the above data was gathered (the well field and the 3-d imaging "sandbox") new assessments will be developed for future assessment cycles.

General Education Summary:

1. Summary only required for departments contributing to the General Education Curriculum.
2. If department contributes to more than one LO, complete one table for each LO.
3. If department has not conducted any assessment on GE but your faculty have contributed artifacts to the Multi-State Collaborative, please indicate which faculty have provided artifacts (item 7).
4. URL for the list of approved general education courses and LO/objectives: http://ccsu.smartcatalogiq.com/en/current/Undergraduate-Graduate-Catalog/Undergraduate-General-Education-Program

Department: Geological Sciences

General Education LO Assessed: SU1. Explain how scientists think, work, and evaluate the natural and social world

Report Preparer: Kristine Larsen

General Education Question	Response
1) **Courses**: General Education course(s) taught and the LO(s) the course aligns with	AST 209 Stellar and Galactic Astronomy: SU1
2) **Assessment Instruments**: What data/evidence, other than GPA, is used to assess the stated CCSU General Education outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Capstone activity
3) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO	Instructor
4) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn b. The changes that were or will be made as a result of those conclusion(s)	Conclusion: Students were largely able to demonstrate that they had met expectations for this assignment.
	Changes: None were made.
5) **Strengths**: List ways in which your assessment process is working well.	The majority of students appear to be challenged, based on feedback from instructor who fielded many questions from students while they were working on this assignment. Since it is based on an authentic scientific scenario, it was deemed an appropriate measure of student mastery of this LO.
6) **Improvements**: List ways in which your assessment process needs to improve (a brief summary of changes to assessment plan can be reported here).	Students still need to be prodded to complete the project and each year between 5-10% of students refuse to do it. Students do not see it as relevant to the course overall. A new capstone will be designed for Spring 2017.

7) Our department has not assessed its contribution to the General Education curriculum but our faculty are contributing to the Multi-State Collaborative. Please list faculty names.	Larsen has contributed as well as what is appended here.

Interim reports: append clearly labeled supporting data tables, organized by LO

Department: Geological Sciences

General Education LO Assessed: SU 2a: Use techniques such as controlled observation, experiment

Report Preparer: Kristine Larsen

General Education Question	Response
1) **Courses**: General Education course(s) taught and the LO(s) the course aligns with	AST 209 Stellar Astronomy: SU2a
2) **Assessment Instruments**: What data/evidence, other than GPA, is used to assess the stated CCSU General Education outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Spectra Lab Exercise
3) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO	Instructor
4) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn	Conclusion: Students largely met the expectations, although relatively fewer exceeded than in the previous year.
b. The changes that were or will be made as a result of those conclusion(s)	Changes: Faculty will review oral and written instructions to students.
5) **Strengths**: List ways in which your assessment process is working well.	The laboratory assignment integrates a number of different scientific techniques, such as observation, inference, and drawing conclusions. They are authentic experiences.
6) **Improvements**: List ways in which your assessment process needs to improve (a brief summary of changes to assessment plan can be reported here).	Unknown until review of oral and written instructions given to students is completed.
7) Our department has not assessed its contribution to the General Education curriculum but our faculty are contributing	Larsen has contributed as well as what is appended here.

to the Multi-State Collaborative. Please list faculty names.	

Department: Geological Sciences

General Education LO Assessed: SU2b: Use techniques such as mathematical analysis of data, and production and interpretation of graphical and tabular data presentation.

Report Preparer: Kristine Larsen

General Education Question	Response
1) **Courses**: General Education course(s) taught and the LO(s) the course aligns with	AST 209 Stellar and Galactic Astronomy
2) **Assessment Instruments**: What data/evidence, other than GPA, is used to assess the stated CCSU General Education outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Blackbody Radiation and Wien's Law lab exercise
3) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO	Instructor
4) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn	Conclusion: All students either met or exceeded expectations.
b. The changes that were or will be made as a result of those conclusion(s)	Changes: None needed at this time
5) **Strengths**: List ways in which your assessment process is working well.	The laboratory assignment integrates a number of different scientific techniques, such as inference and drawing conclusions, as well as graph analysis and mathematical analysis. They are authentic experiences.
6) **Improvements**: List ways in which your assessment process needs to improve (a brief summary of changes to assessment plan can be reported here).	None at this time
7) Our department has not assessed its contribution to the General Education curriculum but our faculty are contributing to the Multi-State Collaborative. Please list faculty names.	Larsen has contributed as well as what is appended here.

Department: Geological Sciences

General Education LO Assessed: **SU3.** Demonstrate knowledge and appreciation of the natural and social world.

Report Preparer: **Kristine Larsen**

General Education Question	Response
1) **Courses**: General Education course(s) taught and the LO(s) the course aligns with	GSCI 102 Earth and the Human Environment
2) **Assessment Instruments**: What data/evidence, other than GPA, is used to assess the stated CCSU General Education outcomes? (e.g., capstone course, portfolio review, licensure examination, etc.)	Climate Change across the Solar System essay
3) **Interpretation**: Who interprets the evidence? (e.g., faculty, Admn. assistant, etc.). If this differs by LO, provide information by LO	Instructor
4) **Results**: Since the most recent full report, list: a. The conclusion(s) drawn	Conclusion: Students largely met the expected goals for this learning outcome.
b. The changes that were or will be made as a result of those conclusion(s)	Changes: None required at this time
5) **Strengths**: List ways in which your assessment process is working well.	The assessment assignment was based on students' ability to synthesize information drawn from outside of the textbook, and compare climate change on Earth and other bodies in the solar system. Students were sufficiently challenged but largely met that challenge.
6) **Improvements**: List ways in which your assessment process needs to improve (a brief summary of changes to assessment plan can be reported here).	A few of the weaker students may require additional encouragement to complete the assignment.
7) Our department has not assessed its contribution to the General Education curriculum but our faculty are contributing to the Multi-State Collaborative. Please list faculty names.	Larsen has contributed as well as what is appended here.

Interim reports: append clearly labeled supporting data tables, organized by LO

Appendix B: General Education Narrative:

The General Education assessment for the department was overhauled in 2013-2014. The resulting assessment structure and resulting data is listed below for 2015-2016 as well as 2013-14 and 2014-15. *Exceeded* expectations is defined as a grade of A or A- on the assignment, *met* expectations is defined as a grade of B+ through C- on the assignment, and *failed* to meet expectations refers to grades below C- and assignments not turned in by the student.

LO	Assessment	Data
SU1. Explain how scientists think, work, and evaluate the natural and social world	AST 209 Stellar Astronomy: Capstone lab assignment	*2015-16:* *N=31* *Exceeds: 54.8%* *Meets: 32.2%* *Fails: 13%* *2014-15:* *N=29* *Exceeds: 31%* *Meets: 45%* *Fails: 24%* *2013-14:* *N = 27* *Exceeds: 51.9%* *Meets: 29.6:* *Fails: 18.5%*
SU2a. Use techniques such as controlled observation, experiment	AST 209 Stellar Astronomy: Spectra Lab Exercise	*2015-16:* *N=31* *Exceeds: 29%* *Meets: 58%* *Fails: 13%* *2014-15:* *N=32*

		Exceeds: 84.5% *Meets: 12.5%* *Fails: 3%* *2013-14:* *N = 28* *Exceeds: 78.6%* *Meets: 17.8%* *Fails: 3.6%*
SU2b. Use techniques such as mathematical analysis of data, and production and interpretation of graphical and tabular data presentation.	AST 209 Stellar Astronomy: Blackbody Radiation and Wien's Law Lab Exercise	*2015-16:* *N=31* *Exceeds: 77.4%* *Meets: 22.6%* *Fails: 0%* *2014-15:* *N=32* *Exceeds: 44%* *Meets: 47%* *Fails: 9%* *2013-14:* *N = 28* *Exceeds: 60.7%* *Meets: 35.7%* *Fails: 3.6%*
SU3. Demonstrate knowledge and appreciation of the natural and social world.	GSCI 102 Earth and the Human Environment: Climate Change across the Solar System essay	*2015-16:* *N=38* *Exceeds= 10.5%* *Meets=73.7%* *Fails=15.8%*

		2014-15: *N=42* *Exceeds= 10%* *Meets=69%* *Fails=21%* *2013-14: GSCI 131 Environmental Geology: Geology and the Environment term paper* *N = 57* *Exceeds: 86%* *Meets: 14%* *Fails: 0%*

The percentage of students who "failed" the AST 209 capstone - due to students electing not to hand in the assignment –is still unsatisfactory. Since it is only worth 5% of the course grade, some students may not have taken the assignment seriously. In the Spring 2015 and 2016 semester the instructor endeavored to better impress upon the students the importance of completing this assignment, but a number still chose to not hand it in. This included students who were otherwise doing very well in the course. A new capstone is being developed for Spring 2017

Strengths:

Improvements: Prior to 2014-15 a different assessment tool was used for SU3, the GSCI 131 Environmental Geology: Geology and the Environment term paper. The instructor of GSCI 131 was not satisfied with the level of depth of the assignment, which resulted in an unusually high "exceeded" percentage among students (see above). It was decided to change the assessment of this LO to a similar essay assignment in GSCI 102 Earth and the Human Environment, a course that solely serves nonmajors. The results are dramatic. The number of "exceeds" has dropped precipitously and is more in line with an assignment that honestly challenges students to apply their understanding. While the number of "fails" is unfortunately high, this is often due to students' simply choosing not to do the assignment. Therefore, students who did the assignment were usually successful in demonstrating that they met the learning outcome in this area. No further improvements are planned at this time.

Weaknesses: Results for the AST 209 Spectra lab were surprisingly lower that average this year. Written and oral instructions will be revisted.