

WSU Five-Year Program Review

Response to External Review Team's Report Department of Earth and Environmental Sciences College of Science May 11, 2020

Process Summary:

The Department of Earth and Environmental Sciences prepared a self-study document during Fall semester 2019 that highlights the department's recent accomplishments and challenges, covering the period 2014-2019, with respect to curriculum, student learning and assessment, academic advising, faculty qualifications and professional development, staff and administrative support, facilities, and community/professional relationships. The department's previous program review was undertaken in 2012-2013. The self-study report (67 p.), executive summary, and faculty vitae were submitted to the Andrea Easter-Pilcher, Dean of the College of Science, and the Office of Institutional Effectiveness in December 2019. The department worked with Dean Easter-Pilcher to select a 4-person external review team to conduct a site visit during Spring semester 2020 and submit a report of their findings shortly thereafter. The team members were Michael Bunds (Utah Valley University), Wing Cheung (Palomar College), Lisa Collins (Santa Monica College), and Sue Harley (Weber State University). They visited the department on February 13-14, 2020, and submitted their final report (12 p.) on March 9, 2020. The faculty and staff of the Department of Earth and Environmental Sciences met several times (via Zoom) during the covid-19 campus closure to consider and discuss the review team's recommendations and to prepare this response.

Response to Identified Program Strengths:

We are very gratified that the review team's overall impression is that "the department meets or exceeds expectations; it has produced outstanding outcomes in areas such as engaging students in mentored research and obtaining external funding; has excellent initiatives underway involving curriculum and supporting faculty; and it has reacted extremely well to the most recent previous review" (2012-2013). The report goes on to identify the faculty and staff as principal program strengths. "The faculty of the Department of Earth and Environmental Sciences is excellent overall, and deserves commendation in several notable areas. It is evident from the faculty's curriculum vitae, feedback from students, and the Committee's interviews that the faculty as a whole are extremely dedicated to their educational mission, their students, their research, and WSU." The reviewers also noted that the department's administrative specialist and lab manager are an "integral part" of the departmental team and were impressed by the range of duties performed by these two individuals.

Action Plan: As a faculty, we will continue to focus our efforts on providing a high-quality education to our program majors and minors, teaching service courses for other programs on campus, and contributing to the general education of non-science majors. We will strive to continue our success in hiring and retaining highly qualified instructors and staff by providing a positive work environment, facilitating professional development, seeking increased compensation, and finding better ways to facilitate undergraduate research and reward faculty who support and promote this high-impact learning practice.

The second major strength identified by the review team is our various curricula (geology, applied environmental geoscience, Earth science teaching, interdisciplinary Environmental Science). “The EES department curriculum for majors is robust and teaches students the skills needed to succeed in their careers. A recent report from the National Associations of State Boards of Geologists (ASBOG) provided detailed information about the success of WSU students on the Fundamentals of Geology exam (93% pass rate for students from 1990-2016). The College of Science just proposed an interdisciplinary Environmental Science BS degree, and it was passed by Faculty Senate during our site visit. EES will be a key participant in offering courses, advising, and facilitating HIEEs for students in the new program.”

Action Plan: With respect to curricula, we are dedicated to regularly assessing our program-level outcomes and revising our courses and programs of study, as needed, to prepare students for employment and graduate studies. Our current curricula were carefully planned, develop key knowledge and skills, incorporate environmental and geospatial applications, and emphasize field-based learning. These will continue to be valued hallmarks of studying the Earth and environmental sciences at Weber State University. We are proud of our contributions to the development of the new interdisciplinary Environmental Science degree and excited to participate in its roll out for Fall semester 2020.

Response to Identified Areas for Improvement:

Areas for Improvement highlighted in the review team’s report largely parallel the major near-term challenges that we raised in our self-study report of December 2019:

1. Improved assessment of student learning in HIEEs. The department needs to better document and assess student learning and participation in undergraduate research (both mentored and course-based/CURE), formal internships, capstone courses (such as summer field camp), and study-abroad experiences.
2. Reevaluate curriculum assessment grid. With the curricular revisions that took effect in Fall 2019, each degree program may need its own curriculum grid (as opposed to the departmental grid now used across all degree programs).
3. Need for an instrument technician for the College of Science. The College administration and departments should hire a dedicated college-wide instrument specialist responsible for maintaining key equipment and training faculty and students for its safe and efficient use. Such a position would be very supportive of the University’s emphasis on HIEEs and workforce readiness.
4. Limited budget. Increased number of faculty, inflation, persistent need to update instructional technology, and the increasing cost of implementing HIEEs are straining the department’s static budget.

Action Plan: The department faculty will work during the next academic year (2020-2021) to address issues 1 and 2 above. We will work with the Dean of the College of Science to address issues 3 and 4 above.

Responses to Review Team's Recommendations:

The review team's report contains 25 recommendations across Standards A-H. Some of the recommendations listed in different standards significantly overlap, such that we will list an action plan for 17 distinct recommendations, paraphrased from the review team's report. Overlapping recommendations are consolidated and discussed below in the most pertinent standard.

• Standard A – Mission Statement:

1. *The review team recommends that the EES department review their mission statement as it may be too ambitious given the required teaching load of the faculty.*

Action Plan: We revised our vision statement to read: *To be a (replacing **the**) premier undergraduate Earth and environmental science program in Utah and the Intermountain West, focusing on student success, access, community engagement, and the training of the next generation of geoscientists, environmental scientists, geospatial professionals, and Earth science educators.*

• Standard B – Curriculum:

2. *The review team recommends the department explore adding calculus to the Geology BS degree for students targeting graduate school.*

Action Plan: We think that adding the first semester of calculus (MATH 1210) to the requirements for the BS in geology would be detrimental to recruiting students to this major, given the large number of students at WSU who must begin their mathematics preparation with developmental courses. Only 10-15% of our graduates go on to attend graduate school; most are interested in securing an entry-level STEM job with their bachelor's degree. We will continue to use the department's robust advising to encourage students to push themselves beyond the basic math requirements for their degree, especially if they aspire to attend graduate school in the sciences. The efficacy of this approach can be seen in fact that four of the nine (44%) Spring 2020 geology graduates completed calculus I (MATH 1210), exceeding the MATH 1050/1060 requirements for their degree.

3. *The review team recommends that the department continue its work on developing an associate of applied science (AAS) degree in physical science, in conjunction with the Departments of Physics and Chemistry & Biochemistry.*

Action Plan: Preliminary cross-departmental discussions were completed during Fall 2019, and will be continued when conditions and priorities permit. Differences in the required supporting mathematics courses make it difficult for these three departments to collaborate on an associate degree. Thus, the possibility of developing an associate of applied science (AAS) in geology or applied geoscience (to connect with recommendation 4) has been discussed and will be explored further in the future.

4. *The review team recommends that the department explore a curriculum track within the existing Geology BS degree for students interested in industry, which would include classes in soils, geotechnical sampling and testing (new class), and engineering geology. On a related issue, the*

department should explore the feasibility of developing a certificate or associate degree in geotechnical careers made up of lower-division courses.

Action Plan: Our Geology BS degree does not have tracks or emphases, but electives can be used to complete a concentration in applied geoscience courses. We will consider developing a new course on geotechnical sampling and laboratory analyses or strengthening the coverage of those topics in an existing course, most likely Engineering Geology (GEO 4100). The suggestion that we develop a certificate in applied geoscience is intriguing. We will consider this, along with other possible certificates that would develop specific workforce skills. Additional resources (laboratory and field equipment, faculty time) will likely be needed to implement this recommendation.

5. *The review team recommends that the department inform students that they can complete some of the support-course requirements (chemistry, math, physics) at neighboring institutions (e.g. SLCC) in order to stay on track for time to graduation. These requirements should be completed quickly, while ensuring students attain the appropriate/necessary background in these subjects for academic and workforce success.*

Action Plan: We will continue to advise students to complete their required support courses (mathematics, chemistry, and physics) early in their degree program, and will advise them of the options available to them to do so. We have strong advising relationships with the Departments of Mathematics, Chemistry & Biochemistry, and Physics, and we also work with the Registrar's Office to facilitate the timely articulation of transfer courses and credits from USHE institutions and beyond.

6. *The review team recommends that the department and the University reexamine the Signature Assignment requirement for general education classes.*

Action Plan: This issue is not actionable at the department level. However, individual faculty are encouraged to discuss concerns about the Big Question and Signature Assignment requirements with the College of Science representative on Faculty Senate's General Education Improvement and Assessment Committee (GEIAC).

• Standard C – Student Learning Outcomes and Assessment:

7. *The review team recommends that the department proceed with their stated goal of developing/adopting an assessment instrument for HIEEs -- including tracking students' participation in (i.) undergraduate research (course-based or individually mentored), (ii.) formal internships, (iii.) summer field camp (and other immersive field experiences), and (iv.) study-abroad experiences.*

Action Plan: Several members of the review team shared assessment instruments that their institutions are using for high-impact educational experiences. We will evaluate them during Fall semester 2020, with the goal of having a fully developed documentation and assessment plan in place by January 2021.

8. *The review team recommends that the department and the University measure the time and effort required for HIEEs that faculty are adopting.*

Action Plan: This recommendation is related to the much broader issue of faculty workload and the administrative support for active-learning pedagogies and high-impact educational experiences. Individual faculty are already tracking and documenting their undergraduate-research activities (see Appendix H in the self-study report) and we fully recognize the time needed to design and implement a creative and effective HIEE. In American higher education today, time is the most precious and scarce resource that faculty need to manage. We will continue to encourage faculty to discuss workload concerns with the department chair and/or other faculty mentors – and we are committed to a healthy work-life balance for all faculty and staff.

9. *The review team recommends that the department review the quality and quantity of the information they are getting from their new assessment/curriculum grid, related to the curriculum changes that took effect in Fall 2019.*

Action Plan: The current assessment plan and curriculum grid is used for all of our degrees: Geology; Applied Environmental Geoscience; and Earth Science Teaching. The curricular changes that took effect in Fall 2019 may warrant a separate curriculum grid for each degree. We will study this issue during Fall semester 2020 with the goal of having a revised curriculum grid(s) in place by January 2021.

• Standard D – Academic Advising:

10. *The review team recommends that the department keep a close watch over student and faculty feedback and adjust the new advising system if necessary.*

Action Plan: We interpret this recommendation as stating some mild concern about our plan to centralize department-level advising between two faculty members. We discussed this issue and have modified our plan such that: (i.) the department chair will provide initial advising for all majors and advise the Applied Environmental Geoscience majors; (ii.) another senior faculty member will advise the Geology, Earth Science Teaching, and Environmental Science (new interdisciplinary degree) majors; and (iii.) a third senior faculty member will advise students enrolled in the Geospatial Studies minor and the Geospatial Analysis Certificate. We will incrementally bring the department’s junior faculty into formal advising roles. They are already providing important informal advising and mentoring with respect to job applications, undergraduate research, and applying to graduate programs.

• Standard E – Faculty:

11. *The review team encourages the department and the College to continue to support the junior faculty, and to clearly communicate evaluation guidelines and, in particular, expectations for successfully obtaining tenure.*

Action Plan: The PPM sections related to faculty evaluation and the College of Science’s tenure document will be discussed during a department meeting early in Fall semester 2020. Although not noted in the program review report, the College of Science has been proactive with respect to discussing workload concerns and mentoring junior faculty. Dean Easter-Pilcher has designated a

liaison for tenure-track faculty and this person facilitates open and frank conversations between the junior faculty and administration about expectations and concerns. EES, and the college as a whole, are committed to clear and accurate communication of tenure expectations and faculty evaluation guidelines and procedures.

12. *The review team recommends that the department do a better job assessing the teaching of its adjuncts and in providing them with feedback and mentoring opportunities.*

Action Plan: We know this is an issue. We are fortunate to have a number of highly qualified and long-serving adjunct instructors. We will continue to invite adjunct instructors to a department-wide meeting at the beginning of the academic year. The department chair may be able to hold a Zoom conference with each adjunct to review student evaluations from the previous semester and to set goals for the upcoming semester. Classroom visits for teaching observations will be planned as time permits.

• **Standard F – Program Support:**

13. *The review team recommends that the department and the College consider funding student positions to help the departmental administrative specialist and lab manager with routine tasks.*

Action Plan: We are already doing this to some extent. In addition, our administrative specialist has access to the services of a pooled/rotating “admins assistant” supported by the dean’s office. We have started the process to update the job description for student teaching/lab assistants and look to hire several for Fall 2020. Our administrative specialist will work with our lab manager to develop a new scheduling calendar for the student TAs, which will allow faculty to schedule the student TAs as needed.

14. *The review team recommends that the department seek an increase in its basic operational budget to offset increased costs related to growth in faculty, implementation of HIEEs, inflation, and other factors.*

Action Plan: This is a persistent and ongoing issue, as noted in our self-study report. The Department of Earth and Environmental Sciences does a remarkable job with a very modest annual operating budget that partially meets program needs. This budget is used to cover general operating expenses (e.g. phones, laboratory/instructional supplies, office supplies, copying, etc.), pay hourly wages for student workers, partly support conference travel (much of faculty travel has been covered by external grants), and partly support equipment/software purchases and maintenance. While the budget has remained flat for many years, the costs associated with field trips, lab equipment and consumables, software licenses, and conference travel have not. One way of covering the additional costs associated with HIEEs would be to establish course fees that truly offset the real costs above those of a “regular” course. To date, we have been reluctant to do so out of concern for our students’ financial limitations. We will continue to advocate for the resources necessary to support the Department’s, College’s, and University’s goals of engaging students in HIEEs and having productive scholars sharing disciplinary research and collaborating with colleagues at the regional and national level.

15. *The review team recommends that the College of Science, perhaps in collaboration with another college, hire a dedicated college-wide instrument specialist.*

Action Plan: EES strongly agrees with this recommendation, which was discussed at a May 2020 meeting of the College of Science’s leadership team (dean and department chairs). At that meeting, it was agreed that this college-wide position would be the top priority, with respect to new positions, for the college. The case for such a college-wide position was made in our self-study document, which also describes the variety of high-end analytical equipment this technician would be responsible for and how the safe and efficient use of this equipment is related to student success and faculty productivity. Should this position be funded and filled, EES is committed to working with and supporting this individual, as he or she works to support undergraduate research and faculty teaching and research.

• Standard G – Relationships with External Communities:

16. The review team recommends that the department consider providing additional opportunities for students to interact with employers and working geoscientists (seminars with guest speakers, Earth Science Career Day, National Earth Science Week, etc.).

Action Plan: During Spring 2020, EES offered for the first time a new course (GEO 4990) titled “Geoscience and Society Seminar.” This required course features substantial small-group interaction and information about the broad array of Earth science careers. This year students met with 12 different professionals from the Intermountain region, each representing a different aspect of applied Earth science work. In addition, the department’s discussion of this recommendation led to fruitful brainstorming about other ways to move forward, including bringing in representatives from local/regional graduate programs as well. Other ideas generated will be further considered during future department meetings. One issue that was noted during our discussion is the persistent problem in getting majors to attend these types of extracurricular activities. WSU’s non-traditional students are very busy multi-tasking in their roles as student, spouse, parent, caregiver, employee, and /or employer. Our required workforce-focused seminar (GEO 4990) largely overcomes this obstacle.

• Standard H – Program Summary:

17. *The review team recommends that the College continue to pursue modification of the credit-hour-equivalent calculator so that it more accurately reflects the time that faculty spend teaching and implementing high-impact educational experiences HIEEs.*

Action Item: WSU has established a number of criteria that define high-impact educational experiences (HIEEs <https://weber.edu/weberthrives/HIEE.html>), including:

- Significant investment of time and effort by students over an extended period of time.
- Interactions with faculty, staff and peers about substantive matters.
- Frequent, timely, and constructive feedback.

It must be recognized that these important impact strategies also require faculty to spend more time in developing, teaching, assessing, and/or mentoring a HIEE compared to a “regular” course. The University’s present method of calculating and assigning faculty workload simply does not reflect this reality.

While not strictly actionable at the department level, we will continue to work with our dean and faculty colleagues from across campus to address this issue. We are confident that progress can be made.

Summary:

We would like to thank each member of our external review team for their thoughtful and thorough evaluation of our department and its programs. We agree with most of their recommendations and will strive to implement those that are actionable at the department level, as funding and resources allow. We are confident that doing so will help to improve recruitment, retention, teaching and learning, student success, and faculty scholarship and service within the Department of Earth and Environmental Sciences.

End May 11, 2020