

Program Review: Department of Earth and Environmental Sciences
Dean's Response
June 2020

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College of Science

I would like to thank the program evaluation team (Dr. Sue Harley, Dr. Lisa Collins, Dr. Wing Cheung, and Dr. Michael Bunds) for their critical assessment of the College of Science (COS), Department of Earth and Environmental Sciences (EES) at Weber State University. I would also like to recognize Dr. Rick Ford (Department Chair) and the faculty members in EES for their comprehensive self-study and their thoughtful response to the review team's detailed report.

I have thoroughly reviewed the departmental self-study, the program review team's report and the EES response to the review team's report. The review team highlighted many exceptional features of the earth and environmental sciences program and also delineated a few areas of concern. The dean's response provides commentary on observations made by the program evaluation team as well as the EES faculty response. The dean's response follows the organizational structure used by the program evaluation team in their program review report.

Standard A. Mission Statement:

The review team was impressed by the clearly defined program outcomes which are mapped to key courses that all undergraduate majors complete. The map identifies the specific courses in which skills are introduced, reinforced, and/or assessed. I concur and would like to thank the faculty involved in the development of these mapping strategies. The review team also commended the experiential, hands-on learning strategies that are being utilized by all members of this department. The dean recognizes that inquiry-based, active learning practices are embedded in the culture of this department to the great benefit of their students. The review team commented that the students themselves, "found the research experiences and field work led to deeper understanding of material and concepts learned in the classroom." Positive student response to active learning strategies is certainly supported in the pedagogical literature. I applaud and fully support these teaching and learning strategies as the most effective means to improve student retention and success, especially of first generation students and underrepresented minorities in the sciences and mathematics.

The most critical recommendation from the review team was that the faculty develop a comprehensive assessment of the impact of undergraduate research experiences. The department agreed that they needed to better assess undergraduate research as well as other kinds of HIEE experiences including internships, summer field camps, course-based undergraduate research (CURES) and study abroad experiences. I agree and support expanding this recommendation (as the department did) to all consistent HIEE experiences. Indeed, this particular recommendation goes well beyond this department. Assessments of HIEEs should be occurring regularly and with some standardization across the college and the university. A key piece of the university mission is to "provide excellent educational experiences through extensive personal contact among faculty, staff and students in and out of the classroom." Data-driven documentation of the positive impact of HIEEs on recruitment, retention and time to graduation of our WSU students would justify the additional costs (dollars and faculty time) that these practices demand.

Standard B. Curriculum: The team was impressed by the “robustness” of the departmental curriculum for majors and the comprehensive coverage of skills that students need to succeed in their future careers. The team was also impressed that a recent report from the National Associations of State Boards of Geologists, “provided detailed information about the success of WSU students on the Fundamentals of Geology exam (93% pass rate for students from 1990-2016). I am impressed with those scores as well. Kudos to the faculty and to their students! The team also notes the genial cooperation among faculty in terms of sharing materials and collaborating with each other to ensure consistency and excellence in the GE classes. I commend the faculty for working together to improve our GE courses for the benefit of WSU students.

In an interesting development, the entire group of students (N=20) who met with the review team stated that they were concerned that calculus and therefore calculus-based physics were not a required part of the curriculum. The EES Advisory Council (EESAC) on the other hand, does not want to see calculus in the curriculum fearing a loss of majors. The EESAC’s view is that the absence of calculus in the EES curriculum would not hinder any of the students in terms of future careers. The program review team however, recommended that calculus be added to the BS EES degree for students targeting graduate school and be kept out of the BA degree for workforce – oriented students. The department does not agree with adding calculus to the required curriculum and would prefer to advise students into calculus who are intending to go to graduate school. I concur with the program review team’s recommendation to add calculus to the BS EES degree for the following reasons: 1) This seems to be a natural and rational separation of the BS and BA degrees. 2) An EES BS degree which requires calculus may allow the interdisciplinary Associates of Applied Science (AAS) degree to move forward. The interdisciplinary AAS degree (Departments of Chemistry & Biochemistry, Physics, and EES) is apparently mired down due to inconsistencies in the math requirements across the three physical sciences departments. A strong recommendation of the review team was that the EES department continue striving to create the AAS degree with the physics and chemistry departments. I fully support this recommendation from the review team and believe that the AAS degree could be a game-changer in terms of recruitment, enrollment and retention in the physical sciences in general and recruitment, enrollment and retention of first generation students and URM students in the physical sciences in particular. These discussions will continue during the upcoming fall term.

The department (and the dean) is intrigued by the recommendation to explore developing a certificate or associate degree in geotechnical careers made up of lower division courses. The department will explore this idea further.

The review team expressed concerns with the GE Signature Assignments and recommends that the department and the university reexamine this strategy. The team comments that faculty are told that they have flexibility in developing the Signature Assignments, but that the standardized rubric heavily favors an essay assignment. The review team suggests that these GE Signature Assignments add fuel to faculty burnout. The team also states that it is not “entirely clear how these assignments are positively impacting student learning.” I agree with the team that the Signature Assignment needs continuing discussion (which is occurring).

Standard C. Student Learning Outcomes and Assessments:

The review team commends the department for the recent careful and deliberative revision of the curriculum program outcomes and learning outcomes in light of the Future of Undergraduate Geoscience Education initiative which was sponsored by the National Science Foundation. I concur and

would like to thank Dr. Ford and other faculty members for their assiduous attention to this aspect of curriculum development and learning outcomes assessment. The team and the dean appreciate the new curriculum map that was developed for core courses which identifies 9 learning outcomes. The map delineates in which core courses outcomes are introduced, emphasized, and/or reinforced as well as when they are assessed. The team does recommend that the department ensure that the number of assessments of student learning outcomes is uniform across the degree programs. The team also recommends that the department identify how the learning outcomes are to be assessed, and pursue their goal of developing an assessment instrument for their HIEEs. The dean concurs with these recommendations. As mentioned previously, the assessment of HIEEs, is a strategy that the entire CoS and the university could be engaged in. The department faculty members are also interested in assessing whether student participation in undergraduate research (mentored or CUREs), leads to an increase in EES graduates attending graduate school. Assessing this question would be very interesting for all departments across the CoS. I would like to note that EES is not alone with respect to deficiencies in assessment. I recommend communicating with the chairs of other departments to identify ways that departments can work together to improve assessment, and possibly to also identify ways that the dean's office might better support assessment efforts.

Finally, the team comments (again) that there is general concern among the faculty that eventually student outcomes on the Big Questions and Signature Assignments will be used as a component of faculty teaching evaluation. This may need to be addressed by the university.

Standard D. Academic Advising:

The review team and the dean commend the department for the excellent newsletter which keeps students, staff, faculty, and the dean's office up to date in terms of department events, Town Halls, critical information etc. All students who met with the review team commented that the faculty, "were very approachable for advice on careers, internships, and projects." Students seem to be very satisfied with the advising that they have received. However, in response to a hint of concern from the review team, the department has determined that they will now have three different advisors, each of which will oversee one of three academic areas within the department. I appreciate the flexibility the department has shown in their immediate recognition, discussion and response to this concern from the review team.

Standard E. Faculty:

The review team notes that EES faculty are, "extremely dedicated to their educational mission, their students, their research, and WSU." They noted also that EES students were extremely positive about the excellent undergraduate research mentoring which they received from the faculty. The review team recognized that overall the department has outstanding faculty. I concur with this assessment of EES faculty. Approachable, engaged faculty members are key components of student retention and success. I would like to thank the EES faculty and the chair for their outstanding efforts in these areas.

As did previous review teams (notably the program review teams in 2019 for the Departments of Microbiology, Physics and Botany), this review team noted that the workload, especially for new faculty is exceptionally heavy. The team expressed concern that faculty will not be able to sustain the perceived workload needs. As the 2019 program review teams recognized, this review team also was clearly impressed by the "remarkable work" of the tenure-track faculty members, but felt that, with the large number of initiatives (e.g., pedagogy, new curriculum, assessment, and seeking and implementing external funding), the CoS risks burnout of faculty. The EES program review team notes that 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 discussions 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.” The committee noted also that, initiatives, led by the dean’s office and the CoS leadership team, including embedding release/reassigned time in proposals for external funding, and modifying the current workload calculations would lead to more appropriate workloads for many faculty in EES and across the College. The review team commended and was in strong support of these “bold” steps towards improving work/life balance for faculty.

The review team also recommended that EES improve assessment and provide teaching feedback opportunities for adjunct faculty. The Department is putting together a plan for assessment of their adjunct faculty.

Standard F. Program Support:

The program review team recognized EES administrative specialist, Marianne Bischoff and lab manager, Sara Summers as clearly being significant assets to the EES department. The team was very impressed with their wide-range of duties and their performance excellence. I absolutely concur with the assessment of these two individuals. The team also recommended that EES hire student workers to assist the administrative specialist and the lab manager. The department notes in their response, that the dean’s office provides access to the services of a pooled/rotating “admins assistant.” The department also noted that they would be hiring student support.

The team also strongly recommended that WSU consider increasing departmental budgets (which have been flat for many years). The department vigorously agrees with this recommendation, but acknowledges that this is a university-wide conversation. The dean’s office does provide significant support for faculty and student travel, support for undergraduate research, and diverse supplies as we are able to do so. In 2019 and spring 2020, the dean’s office provided funding support to EES (for retooling labs in support of instrumentation to be used in research) was over \$30,000. Having said this, I certainly agree with the review team that departmental budgets need a long overdue increase.

The most significant recommendation in this Standard however, is that the CoS hire a, “dedicated college-wide, instrument specialist who is responsible not only for maintaining, but also training and assisting students and faculty in the use of the frequently used equipment.” The faculty in EES all fully support this staff-line request and they provided excellent justification in their self-study. The CoS leadership team (dean, associate dean and department chairs) has been discussing this identified need since I became dean in August of 2018. During the strategic planning sessions in the fall of 2018 and again in 2019, this line was not deemed a priority line by the CoS leadership. However, during our strategic planning sessions in the spring of 2020, this line increased in priority to be the #1 staff-line need in the College.

Standard G. Relationships with External Communities:

The review team noted that the EES advisory board is an active board and is a significant strength for the department. They also noted that a member of the EES board sits on the CoS board. I have restructured the CoS advisory boards so that a member of each departmental advisory board sits on the overall CoS Advisory Council. The program review team also noted that the EES board members were extremely positive about the quality of the EES graduates. The dean concurs and suggests that the outstanding undergraduate research mentoring efforts (including support of internships) that occur in this

department, facilitates outstanding graduates. The review team recommends that the EES faculty develop a systematic assessment plan for HIEEs (as mentioned previously in this report) including internships. They would like to see assessment tools that will allow supervisors to provide quantitative feedback on the quality of the department's students. The EES response regarding assessments has been captured in other Standards. The review team also recommended that EES provide additional opportunities for students to interact with employers. During the spring of 2020, EES taught a course, "GeoScience and Society" Seminar" which focuses on the array of potential careers available to EES graduates.

Standard H. Program Summary:

The review team commends the department for providing clear evidence that they have been responsive to the previous program review. Many of the previous program review team recommendations were tied to space and facilities and the move to Tracy Hall Science Center has largely taken care of those issues. Other issues have been resolved by EES.

The review team notes again the workload issues of faculty members and recommends that the "highly productive faculty" would benefit from reassigned time embedded into external grants, and help with laboratories, computing facilities and analytical equipment. The review team recommends again (in their summary) that the College hire an instrument specialist. The team also 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 practices." The department and I support these recommendations and have responded in detail earlier in this report. I appreciate and commend the EES faculty for being committed to mentoring undergraduate research and for consistently providing the HIEEs that we know improves the retention of our CoS students.