Assessment Report
Bachelor of Science in Civil Engineering
Montana State University
2015 – 2016 Academic Year

Department: Civil Engineering

Department Head: Jerry Stephens

Assessment Coordinators: Joel Cahoon and Jerry Stephens

Date: Fall 2016, Reporting Period Academic Year 2015 – 2016

Programs: BS Civil Engineering, BS Civil Engineering – Bioresources Option

Background

The following annual performance assessment of the Civil Engineering Program at Montana State University was prepared in the context of the program Assessment Plan prepared by the CE Department in February 2011. The Civil Engineering Program at Montana State University has approximately 400 undergraduate students, and is accredited by the Accreditation Board for Engineering and Technology (ABET®).

ABET reaccreditation of the Civil Engineering Program (and its Bioresources option) is underway (these reviews are on a six year review cycle), with a program self-study having been submitted to ABET in summer of 2015, a site visit completed by an ABET program evaluator in Fall 2015, and issuance by ABET in Spring 2016 of a program audit form with initial results. A concern and associated weakness were identified related to the manner in which our Bioresources Option in Civil Engineering is referred to on our website and other locations, whereby it could be misconstrued to be a separate and distinct bioresources engineering program. All references to our Bioresources Option were reviewed, and if necessary, revised to clearly indicate that it is an option within our civil engineering degree program. A response to the program audit report was sent to ABET indicating the action taken in this regard. While a final statement of ABET's accreditation action for the civil engineering program was expected in August 2016, this statement was not received before the end of this assessment cycle.

Summary of Assessment Plan

<u>Program Educational Objectives</u>
The Civil Engineering Bachelor of Science Program is a traditionally structured program that provides graduates with a strong background in math, basic sciences and engineering mechanics, and prepares graduates to become registered professional engineers capable of practicing civil engineering in the areas of environmental, geotechnical, structural,

transportation and water resources engineering. The background of graduates who select the Bioresources option is focused on soil, water resources and environmental concerns.

The civil engineering baccalaureate educational program objectives were adopted in April of 2003. Program constituents reconsidered these objectives in 2006 and re-adopted them without revision at that time. Further assessment activities in 2014 resulted in some modifications to the program educational objectives, and these modifications are reflected in the current objectives as stated below. The educational objectives of the Civil Engineering Bachelor of Science Program describe what graduates can expect to accomplish during the first years after graduation.

All graduates can expect to be able to:

1. Enter the profession of Civil Engineering and advance in the profession to become registered professional engineers and leaders in the field of Civil Engineering.
2. Work on multi-disciplinary teams and effectively communicate with Civil Engineers of various sub-disciplines, architects, contractors, the public and public agents, scientists and others to design and construct Civil Engineering projects.
3. Begin to develop expertise in one of the sub-disciplines of Civil Engineering and engage in the life-long learning necessary to advance in the Civil Engineering profession.
4. Contribute to society and the Civil Engineering profession through involvement in professional related and/or other service activity.
5. Conduct their affairs in a highly ethical manner holding paramount the safety, health and welfare of the public and striving to comply with the principles of sustainable development.

Some graduates can expect to be able to:

6. Earn advanced degrees in Civil Engineering or other fields.

<u>Process for Evaluating CE Program Educational Objectives</u>

Each August prior to the start of the new academic year, the department holds a one day retreat. One of the agenda items at the retreat is the review of assessment data and the evaluation of program outcomes and objectives. At these retreats, the department head and/or program coordinator distributes recent and historical assessment data and a comparison of assessment results with metric goals. Annually the departmental External Advisory Committee evaluates the extent to which they believe MSU Civil Engineering graduates meet the program objectives on a scale of 0 (not at all) to 10 (completely), and the extent to which they believe each of them is suitable, similarly scaled from 0 (not at all suitable) to 10 (completely suitable).

If assessment results fall below metric goals, the faculty are responsible for developing a strategy or strategies for improving these levels of achievement. A drop below metric goal levels for one survey will not necessarily require action. However, several occurrences of scores below metric goal levels requires corrective action. In the event that all scores exceed metric goal levels, the faculty may use assessment data to identify weaker areas of student performance and choose to develop strategies for improvement. The faculty strive to continually improve the program. While the whole faculty participates in strategy development, implementation of these strategies is

assigned to the curriculum committee, the program coordinator, the department head or department staff as appropriate for implementation.

Note that the program educational objectives assessment process outlined above is considerably less involved than that presented in the 2011 Assessment Plan. In 2012, ABET changed their procedural requirements relative to stringent assessment of program educational objectives. ABET removed the requirement for a program to demonstrate graduate attainment of program educational objectives; ABET now only requires periodic review of these Objectives to ensure they are consistent with the mission of the institution and needs of the profession. In response to this policy change, the Civil Engineering Department developed the evaluation process described above. Further note that while the 2011 Assessment Plan calls for the department head and/or program coordinator to prepare and distribute an Annual Program Assessment Report prior to this retreat, the decision was made two years ago to present assessment data at this retreat, and to prepare the annual Assessment Report thereafter, including proposed activities for continuous improvement for the next year.

Program Outcomes

The CE baccalaureate program Outcomes were approved by the CE faculty in August of 2006. At that time, the department adopted ABET Criterion 3 Outcomes (a-k) listed sequentially as Outcomes (1-11) below, and four additional outcomes, based on the ASCE Body of Knowledge, which are listed as Outcomes (12-15) below:

To satisfy the academic prerequisites for the professional practice of civil engineering, MSU civil engineering graduates will be able to:

1. apply knowledge of mathematics, science, and engineering
2. design and conduct experiments and analyze and interpret experimental data
3. design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
4. function as a member of a multidisciplinary team
5. identify, formulate and solve engineering problems
6. explain professional and ethical responsibility
7. compose and present effective written, verbal and graphical communications
8. draw upon a broad education to explain the impact of engineering solutions in a global, economic, environmental and societal context
9. explain the need for, and demonstrate the capacity for, life-long learning
10. explain contemporary issues as they relate to the solution of engineering practice
11. apply the techniques, skills and modern tools necessary for engineering practice
12. [MS Programs Only] synthesize/evaluate knowledge in a specialized areas related to CE
13. explain the elements of project management, construction and asset management
14. explain the fundamentals of business, public policy and administration
15. explain the role of the leader, leadership principle, and attitudes conducive to effective professional practice of civil engineering.

Processes to Assess CE Program Outcomes

The following are the primary instruments being used to assess whether student outcomes are being met:

Fundamentals of Engineering Exam

- All CE students are required to take the FE exam in order to graduate.
- The assessment process documents program performance in each topic area of the Civil Engineering discipline specific exam.
- Student performance in each topic area is compared to metric goals. Our goal is to exceed the national pass rate for civil engineering students taking the civil exam and for the MSU student performance to exceed the national performance in each subject area of the exam. Three consecutive cycles below the national pass rate overall, or three consecutive cycles of less than the national pass rate on a per-topic basis, identify concerns requiring discussion, comment, and appropriate action by the department.

Review of Student Work

- Representative student work from selected classes is collected. Faculty representatives and the External Advisory Committee review this work and assess student performance relative to program outcomes.
- Results are documented every third year and summarized in the Annual Assessment Report.

~~Student Interviews/Surveys~~

- For the past several years, the CE Department has obtained student input on its programs through a senior exit survey administered electronically by the central administration. For students from the College of Engineering, this survey has questions specifically configured to assist in outcomes assessment for engineering curriculums (although, outcomes a-k from the ABET – EAC general criteria were used for all programs). This survey is no longer being conducted. While graduating seniors are invited to visit directly with the department head to provide input on their program, typically no students avail themselves of this opportunity. Thus, the department is investigating alternate approaches to obtaining direct student perspective on our program and its outcomes. While conducting mandatory senior exit interviews is an attractive solution due to its simplicity and ease of implementation, there are some potential issues with this alternative. Notably, based on experience with such interviews which are mandatory in our Construction Engineering Technology program, interview input a) tends to focus on the concerns of individual students, b) tends to focus on program weaknesses, and c) can be difficult to objectively summarize. A written survey may overcome some of these limitations of the interviews.

Career Fair Employer Surveys

- Employers that participate in MSU Career Fairs complete a survey on student career preparedness, communication skills, and interview preparedness.
- Results are documented yearly and summarized in the Annual Assessment Report.

Departmental External Advisory Board

- Provides heuristic assessment of students' achievement of program outcomes. Further, completes an evaluation of the extent to which they believe MSU Civil Engineering graduates meet Program Outcomes on a scale of 1–very poor to 6 - excellent. The goal for this evaluation is that 80 percent of the responses are 4 – good or better.
- Provides input concerning department commendations and recommendations for improvement.
- Student performance related to each outcome is compared to metric goals.
- Results are documented and summarized in the Annual Report.

CE Faculty/Curriculum Committee

- Due to high degree of interest in student success and high degree of interaction between MSU CE faculty and program constituents, the CE faculty is well-informed about constituent issues/concerns with CE programs. Therefore, CE faculty input is invaluable in the continuous quality improvement efforts of the department.
- The department Curriculum Committee includes a representative from each of the sub-disciplines of civil engineering and construction engineering technology, the senior capstone class instructors, and the program coordinators. The department head and department academic advisor are ex-officio members of the committee.

Program Educational Objectives Assessment – Academic Year 2015 - 2016

As stated above, program objectives are evaluated each year by the Department's External Advisory Board and its faculty. The External Advisory Board, composed of representatives from the engineering consulting and construction industries, are asked as part of their annual meeting to assess a) the extent to which they believe MSU Civil Engineering graduates meet the Program Objectives (on a scale of 0 to 10), b) the extent to which they believe the Objectives are suitable for the program (again on a scale of 0 to 10), and c) if the Objectives need to be revised. On the quantitative assessment, the metric goal for this evaluation is an average score of 7 for each objective. The Civil Engineering faculty review the program objectives at the beginning of the year, and with due consideration of any recommendations from the External Advisory Board, revise them as appropriate.

The numerical results of the External Advisory Board review of the Civil Engineering Program Educational Objectives during the 2015-2016 academic year are presented in Table 1 below. The average External Advisory Board assessments rendered in spring of 2015 all exceeded a score of 7. That being said, all the program educational objectives continued to be strongly judged as suitable, but a lower level of attainment was assessed for the objectives related to multidisciplinary team work and involvement in professional activities (both at 7.6 out of 10). At the CE Department retreat in August (2015), the faculty reviewed the Program Educational Objectives and the External Advisory Board assessment of them. The Program Educational Objectives were re-affirmed by the faculty with no changes.

Table 1. Results of the External Advisory Board review of the Civil Engineering Program Objectives during the 2015-2016 academic year.

OBJECTIVE	Suitable? 2013	2014	2015	2016	Met? 2013	2014	2015	2016
All graduates of the Civil Engineering Program can expect to be able to:								
1. enter the profession of Civil Engineering and advance in the profession to become registered professional engineers and leaders in the field of Civil Engineering	9.6	9.4	9.4	10	8.5	9.4	9.1	9.2
2. work on multi-disciplinary teams and effectively communicate with Civil Engineers of various sub-disciplines, architects, contractors, the public and public agents, scientists and others to design and construct Civil Engineering projects	9.5	9	9.6	9.5	7.9	8.1	8.6	7.6
3. begin to develop expertise in one of the sub-disciplines of Civil Engineering and engage in the life-long learning necessary to advance in the Civil Engineering profession	8.9	9.6	9	9.8	8.5	9.1	8.6	9.4
4. contribute to society and the Civil Engineering profession through involvement in professional related and/or other service activity, and	8.8	9.5	8.8	8.7	8.4	8.8	8.5	7.6
5. conduct their affairs in a highly ethical manner holding paramount the safety, health and welfare of the public and striving to comply with the principles of sustainable development.	9.5	9.8	9.9	9.7	8.1	8.6	9.3	9
Some graduates of the Civil Engineering Program can expect to be able to:								
6. enter the surveying profession and become licensed to practice surveying;	7.5	4.8	-	-	6.9	6.3	-	-
7. begin careers in the construction industry; or	8	8.5	-	-	8.5	8.4	-	-
8. earn advanced degrees in Civil Engineering or other fields.	8.1	8.4	nv	7.8	8.8	8.5	nv	9

Notes: Table 1 - Following this same assessment process, Program Educational Objectives 6 and 7 were eliminated in 2013-2014. Note that Program Educational Objective 8 (renumbered as program educational objective 6 following 2013-2014) was not included in the EAB survey in 2014-2015.

Program Outcomes Assessment – Academic Yr 2015 - 2016

As summarized above, program Outcomes each year are assessed using the following instruments:

1. Fundamentals of Engineering Exam
2. Review of Student Work
3. Student Interviews/Surveys
4. Department External Advisory Board
5. Career Fair Surveys
6. CE Faculty/Curriculum Committee

Assessment data and analysis from each of these instruments is presented below. This assessment data is presented to the faculty at the Department's annual retreat in August each year, at which time it is thoroughly discussed and action items established for the following academic year.

1. Fundamentals of Engineering Exam

Pass rates for students from the MSU Civil Engineering Department on the FE Exam over the past several years are presented in Figure 1. Pass rates for MSU CE students consistently exceed the national average pass rate. Topic area results are presented in Figure 2. Referring to Figure 1 and Figure 2, overall and by topic areas CE students almost without exception performed better

on the exam compared to the national average. Three consecutive cycles below the national pass rate overall, or three consecutive cycles of less than the national pass rate on a per-topic basis, trigger action. While there have been no issues relative to MSU's overall performance on the FE exam for many years, on a per-topic basis, performance does occasionally drop below the national per-topic average.

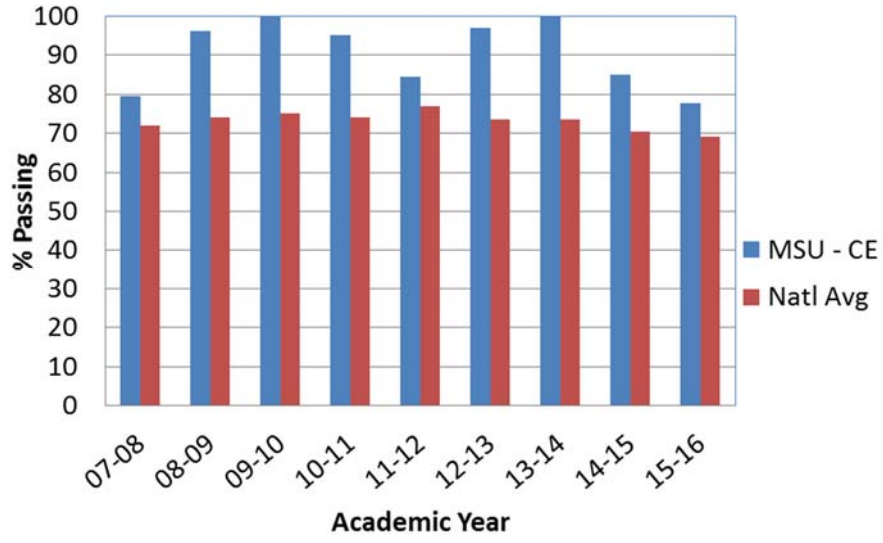

Figure 1. Overall FE exam pass rates.

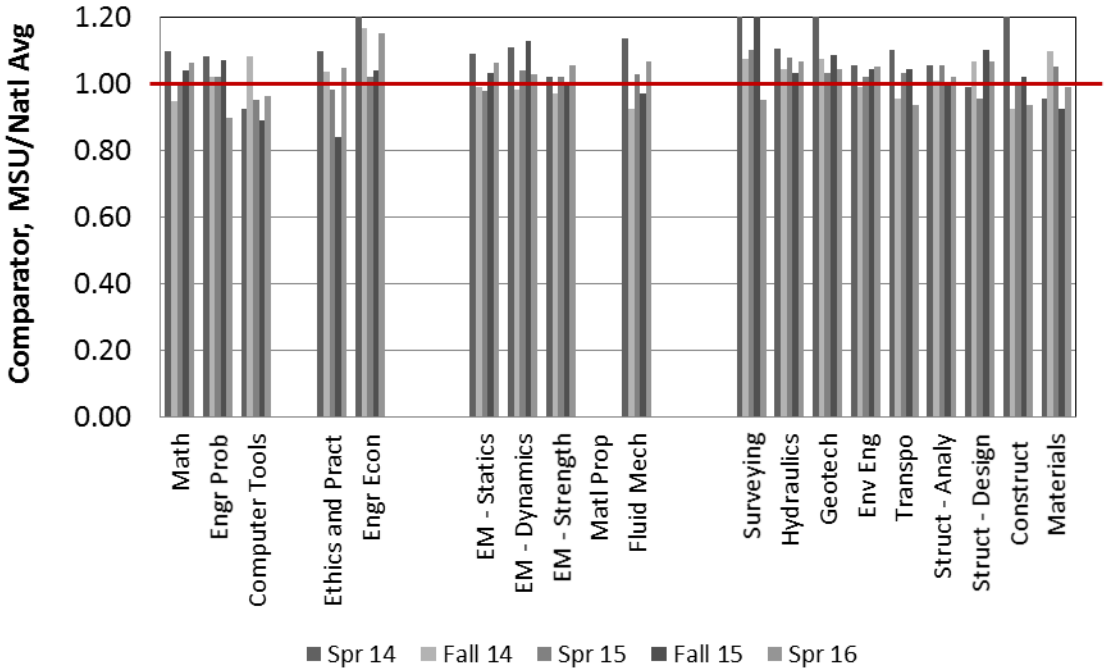

Figure 2. Topic specific results of the FE Exam.

That being said, student performance has only dropped below the national average for three consecutive exam cycles for a single topic - computer tools. We do not specifically include instruction in classical computer programming in our curriculum - our faculty intentionally removed this topic during the 2000-2006 ABET review cycle and has no intention of reinstating it. Programming is only taught in our required curriculum in ECIV 202, Applied Analysis, and in the context of using Excel and Matlab. Thus, performance of our students on the computer topic area is as expected and does not raise any concerns.

2. Review of Student Work

The Civil Engineering program assessment plan calls for review of a portfolio of student work by the CE Department Curriculum Committee and by two members of the CE Department External Advisory Board. Course materials and student work associated with the following classes was provided to the Board this assessment cycle:

Posted on secure EAB website

SRVY 230 – Surveying
ECIV 320 - Geotechnical Engineering
ECIV 405 - Planning and Scheduling
ECIV 443 - Air Pollution Control

Note that this suite of classes is similar but not identical to those suggested in the department's assessment plan, with the intent of introducing the External Advisory Board to a broader spectrum of classes over time. While the assessment plan calls for a subset of the External Advisory Board to review student work, electronic media has allowed this work to be readily shared with and reviewed by all members of the Board using a secure Board website.

The Board was positively impressed with the content and organization of these classes, the nature of the attendant assignments/projects/exams, and the expectations on student performance (as evidenced by the manner in which they were graded).

Additionally the External Advisory Board heard presentations from students participating in the primary student organizations in the department (ASCE, AGC, EWB, ITE) on their activities during the year. The students were complemented on these activities and the quality of their presentations on them.

3. Student Interviews

Historically, senior exit interviews occurred on two levels – departmental and college. At the departmental level, senior exit interviews consist of optional one-on-one visits between the graduating student and the Department Head. Students are alerted to the opportunity to engage in these open forum discussions as part of ECIV 499. Students rarely take advantage of the opportunity, and when they do they often focus the discussion on personnel rather than curriculum or facilities. Occasionally, constructive feedback is generated in the process and the Department Head passes this to the faculty at the annual faculty retreat if it is appropriate. No such input was received during this evaluation period.

At the college level, for the past several years, the CE Department has obtained student input on its programs through a senior exit survey administered electronically. For students from the College of Engineering, this survey had questions specifically configured to assist in outcomes assessment for engineering curriculums (in this case, Outcomes 1-11 in the MSU Civil Engineering program). Beginning this assessment cycle, this survey is no longer being conducted. Rather, at the university level an exit survey is being conducted electronically across a subset of graduating seniors. Visiting with the survey administrator, the survey questions no longer specifically address ABET outcomes, and the number of participants from specific engineering programs is expected to be too small to be statistically significant.

Moving forward, the department needs to decide how it intends to obtain input on our program outcomes from a student perspective. Two approaches have been discussed, mandatory exit interviews with the department head (as is done in the department's Construction Engineering Technology program) and/or department administered exit surveys similar to those previously conducted by the central administration. While mandatory exit interviews appear attractive in the simplicity of their implementation and effectiveness, based on our experience with our CET program, they are not systematic in scope and content, as they tend to follow a path dictated by individual student experience and concern. Further, the exit interviews appear to have a tendency to focus on program weaknesses, and to a lesser extent, on its strengths. Finally, summarizing the input from the exit interviews is a subjective process. Thus, the department needs to consider if it wants to continue with some form of written survey of its graduating seniors to obtain more thorough, consistent and objective information on their perception of their preparation to achieve our program objectives.

4. Department External Advisory Board

The Department's External Advisory Board meets annually to review from a professional practice perspective almost all aspects of the Department's programs. Some of their roles in outcome assessment have already been described above as the results from various assessment instruments have been presented and discussed. The majority of the Board's input is obtained at the annual Board meeting by the CE Department Head and CE Program Coordinator. This information is then disseminated as appropriate to Department faculty and committees.

Program Outcomes are directly evaluated each year by the Department's External Advisory Board. The External Advisory Board is asked to assess the extent to which they believe MSU Civil Engineering graduates meet the program outcomes (on a scale of 1–very poor, to 6 - excellent). The goal for this evaluation is that 80 percent of the responses are 4 – good or better.

The numerical results of the External Advisory Board review of the Civil Engineering program outcomes over the last four years are presented in Table 2 below. The overall average rating for this past year is 4.8/6 which was deemed acceptable. This rating is slightly below the composite rating from 2014-2015 of 5.1, but it is very consistent with the composite ratings from 2012 - 2013 and 2013 – 2014 of 4.7/6 and 4.8/6, respectively. A single assessment below 4 was received, for the ability of students to explain the fundamentals of business, public policy and public administration (score of 3.7/6). As always is the case, future scores on this topic will be monitored to determine if a negative trend of less acceptable performance has developed.

Table 2. Assessment of program outcomes by the EAC.

OUTCOME	Out of 6 2013	2014	2015	2016	Change
1. apply knowledge of mathematics, science, and engineering	5.4	5.8	5.6	6.0	1.07
2. design and conduct experiments and analyze and interpret experimental	4.4	4.8	5.3	4.8	1.00
3. design a system, component, or process to meet desired needs within	4.4	5	5.1	4.7	0.97
4. function as a member of a multidisciplinary team	4.9	5.2	5.3	4.8	0.93
5. identify, formulate and solve engineering problems	5.4	5.7	5.8	5.3	0.94
6. explain professional and ethical responsibility	5.1	4.7	5.4	4.8	0.95
7. compose and present effective written, verbal and graphical	3.7	3.8	4.3	4.0	1.02
8. draw upon a broad education to explain the impact of engineering	4.7	4.5	5.0	4.8	1.01
9. explain the need for, and demonstrate the capacity for, life-long learning	4.8	4.7	5.1	5.0	1.03
10. explain contemporary issues as they relate to the solution of	4.5	4.8	4.9	5.0	1.06
11. apply the techniques, skills and modern tools necessary for engineering	5.1	5	5.3	5.5	1.07
12. synthesize and evaluate knowledge in a specialized area related to civil	4.8	5.2	5.6	4.7	0.90
13. explain the elements of project management, construction and asset	4.7	4.7	4.6	4.5	0.96
14. explain the fundamentals of business, public policy and administration	3.7	4.2	4.0	3.7	0.93
15. explain the role of the leader, leadership principle, and attitudes	4.2	4.7	4.8	4.0	0.88
Average	4.7	4.8	5.1	4.8	0.99

The External Advisory Board also had the opportunity to directly review selected student work, as was commented on above.

5. Career Fair Employer Surveys

Montana State University annually hosts two career fairs, one each in the fall and spring semesters. Employers that participate in these career fairs complete a survey on our students' preparedness a) to enter the workforce and b) to interview with their company. Performance is assessed numerically on a scale of 1 (corresponding to "to a very limited extent"), to 5 (corresponding to "to a very great extent). The action trigger for this assessment tool is three consecutive reportings with a category average below 3.5.

Survey responses most pertinent and appropriate in assessing student outcomes are:

1) Career Preparedness
2) Verbal Communication
3) Nonverbal Communication

Results from the career fair employer surveys for the two career fairs during the 2015 – 2016 academic year were not available at the time this report was prepared. This information will be added to this report when it becomes available.

6. CE Faculty/Curriculum Committee

Department curriculum committee discussions/actions during the 2015-2016 academic year that resulted from the action items generated in the 2014-2015 assessment cycle included:

- Continue to work on improving the written communication skills of students.
  Individual professors continued to increase their focus on writing assignments within their various classes. Additionally, a professional technical editor was brought into the first capstone class (ECIV 489) to work with the students on their capstone proposals.

- Continue to examine the extent to which content concerning contemporary societal and global issues is represented in the curriculum, the possibility of shortcomings in that regard, and corrective action if warranted.

  While the primary mechanism to improve integration/treatment of contemporary societal and global issues in/with engineering into our curriculum is through ECIV 401, professional practice, the faculty were reminded to look for opportunities to do so across the curriculum.

- Participate in the COE-wide reinventing the curriculum effort.

  The COE Curricular Renewal Committee met during the Fall Semester 2015 and developed recommendations for program changes which were presented to the college at-large at the end-of-the-semester. To a large extent, the committee discovered that current curriculums within the college were doing a good job meeting program needs, with general suggestions to:

  teach design in a more integrated manner,
  offer students more opportunities to practice communication skills,
  incorporate modern tools and best pedagogical practices in the classroom,
  encourage interdisciplinary experiences,
  enable students to graduate with the fewest number of credits required, and
  teach required courses every semester, as resources permit.

  Without exception, the department supports and already has, or is working toward implementation of these suggestions.

- Continue to support and review the results of the significant revision of the College of Engineering's interdisciplinary engineering design course, EGEN 310, relative to achievement of course objectives and student satisfaction with course conduct.

  At the annual retreat in August of 2016, the primary instructor/coordinator of EGEN 310 made a presentation on the changes that had been implemented in the class over the past couple of years. These changes include having specific sections of the class populated by students from particular engineering majors, and increased oversight of secondary instructors to better ensure students of a consistent, high quality experience in the class. The EGEN 310 instructor/coordinator indicated that these and other changes have had a positive impact on the class and student's perception of it. That being said, anecdotal input received by various department faculty about the class still is negative in nature, although some of these comments are believed to be from students that had the class prior to/during the current round of changes. Exit interviews/surveys next year are expected to more clearly reflect the experience of students in the revised class. Thus, this action item should be continued into next year.

- Review the department's environmental engineering course offerings in the context of our new hires in environmental engineering.

  As discussion of the department's environmental engineering course offerings moved forward, this discussion increasingly turned toward bigger picture possibilities, notably phasing out the Bioresources Option in the civil engineering program and replacing it with an ABET accredited undergraduate environmental engineering

degree. The decision was made to formally investigate creating an environmental engineering undergraduate degree at MSU, and the upper administration was notified of the department's intent in this regard. ABET criteria for environmental engineering programs were reviewed, as well as the structure of such programs offered at other institutions. A draft program curriculum was developed by an ad hoc committee of the environmental and water resource engineering faculty.

- Investigate increased emphasis on sustainability in the curriculum, in anticipation of ABET changes that have been identified for the next assessment cycle.
  While several curriculums have explicitly adopted sustainability as a foundational element of their programs, our approach has and will continue to be to actively integrate sustainability into existing course content. The direction ABET criteria will move in the future remains somewhat uncertain.

- Continue to review our graphics course offerings.
  The state-of-the-practice relative to the nature and role of technical graphics in the design and execution of engineering/construction projects continues to evolve, meriting research on what other academic programs are doing in these regards. A faculty member was tasked with investigating what other curriculums are doing. In looking at other programs, the nature and degree of focus of our curriculum on technical graphics is reasonable, i.e., a total of three required course credits, covering hand graphics and computer aided graphics, with a three credit upper division elective class on BIM. Further, our basic computer aided graphics class uses AutoCAD as a teaching platform, and in both academia and industry, the question remains unanswered if we should instead use Civil3D or even Revit as this platform. Certainly many institutions now teach BIM. In any event, it may appropriate to combine our 1 credit EGEN 115 hand graphics class with our 2 credit DDSN computer aided drafting class, to more optimally coordinate material between these classes.

- Consider updating our program assessment plan. This plan was developed in 2011; since that time accreditation requirements, program objectives and outcomes, and available data on student performance have changed.
  While updating our program assessment plan is increasingly merited, this task was deferred for at least another year. Despite changes in program attributes and available assessment tools, the plan still well supports its fundamental purpose.

Department curriculum committee discussions that merit consideration as action items in the 2015 – 2016 academic year include:

- Continue thorough review and suggest revisions as appropriate in the content and sequencing of the core construction courses in the curriculum:
  ECIV 307 Estimating and Bidding
  ECIV 308 Construction Practice
  ECIV 404 Heavy Construction Equipment and Methods
  ECIV 405 Scheduling and Packaging
  ECIV 492 Reno Preparation Class

ETCC 499 Capstone

This ongoing activity of the department's construction faculty, with the full endorsement of the curriculum committee, has been more thoroughly discussed in the Construction Engineering Technology program assessment, as of the classes listed above, only ECIV 308 is required in the civil engineering degree program. Nonetheless, considerable effort has gone into reviewing the content and sequencing of these classes, all of which with the exception of ETCC 499, are electives in the civil engineering curriculum. Input in these regards was actively solicited from both the Montana Contractor's Association and the department's External Advisory Board. This review includes looking at the content and sequencing of material within and between these classes, as well as bigger picture curriculum needs, e.g., added upper division construction classes. Notably, the Washington Foundation has given permission to use proceeds from their endowment with the department to develop and deliver two new upper division construction classes. Approval to teach one of these classes starting Spring 2017 has been received, i.e., Sustainability in Construction, ECIV 406.

Action Items for Academic Year 2016-2017

Based on the above observations and discussions at the August 2016 department retreat, action items for the 2016 – 2017 academic year include:

- Continue to work on improving the written communication skills of students.
- Continue to review the significant revision of the College of Engineering's interdisciplinary engineering design course, EGEN 310, relative to achievement of course objectives and student satisfaction with course conduct.
- Continue research and development of an ABET accredited undergraduate environmental engineering program, culminating in a program proposal to be submitted to the university program approval process
- Continue to review our graphics course offerings.
- Continue to review the core construction curriculum (most of which are electives in the CE curriculum), including enhancing this curriculum through the addition of two upper division construction classes (one of which specifically will be ECIV 406, Sustainability in Construction, to be first taught in Spring 2017).
- Review and revise our program assessment plan. This plan was developed in 2011; since that time accreditation requirements, program objectives and outcomes, and available data on student performance have changed.