Assessment Report
Bachelor of Science in Construction Engineering Technology
Montana State University
2013 – 2014 Academic Year

Department: Civil Engineering

Department Head: Jerry Stephens

Assessment Coordinator: Penny Knoll and Jerry Stephens

Date: Fall 2014, Reporting Period Academic Year 2013 – 2014

Program: BS Construction Engineering Technology

Background:

The following annual performance assessment of the Construction Engineering Technology Program at Montana State University was prepared in the context of the program Assessment Plan prepared by the CE Department in February 2010. Elements of this plan are introduced immediately below (note that the full assessment plan is available at http://www.montana.edu/provost/documents/assessment/documents/CETContImpPlan2010.pdf), followed by the results of the program performance assessment done for Academic Year 2013-2014.

The Construction Engineering Technology program at Montana State University has approximately 200 undergraduate students, and is accredited by the Accreditation Board for Engineering and Technology (ABET). More information on ABET's accreditation criteria and processes can be found at http://www.abet.org/.

Summary of Assessment Plan:

Mission Statement – Civil Engineering Department

Mission - Foremost, we will provide undergraduate education founded on a rigorous treatment of engineering fundamentals coupled with modern engineering tools. We see competency in mathematics, physical science, and engineering mechanics as crucial to our mission. We will provide graduate education opportunities in a majority of traditional civil engineering areas. The department will maintain sufficient breadth to provide post-baccalaureate education focused on professional practice. The department will provide graduate opportunities in a subset of focus areas coupled to vibrant research programs with sound external funding.

Vision - Montana State University's Department of Civil Engineering anticipates that the engineering and construction community will evolve quickly with several very fundamental precepts for success. Among these is the premise that the engineers and constructors of the

future will continue to rely on fundamental engineering science and contemporary computational tools to guide their choices. We therefore choose to focus on fundamental engineering basics and the application of modern engineering tools. Our civil and environmental engineering programs will be acknowledged for their strong emphasis and rigor in engineering science, design, and applications. Our construction programs will be acknowledged for their emphasis on engineering and management skills and the application of those skills to the construction industry. The emphasis of these programs will continue to be preparation of students for professional practice in the engineering and construction industries.

Incorporating our vision into the traditional mission of a land grant institution leads to a strong emphasis on undergraduate education. However, in making this a substantial portion of our mission, we must also look beyond the undergraduate classroom. To ensure a quality faculty, and up-to-date curricula, we must ensure a vibrant, broad-based graduate program at the master's level and a smaller subset of specialty areas at the doctorate level. A strong master's program also positions the department favorably for the possibility of future changes in professional degree requirements and is consistent with our vision for education at MSU. The graduate program is essential to attract good faculty and provide for their professional development, and to provide opportunities for students interested in study beyond the baccalaureate degree.

The Civil Engineering Department Mission and Vision Statements are published in the University Course Catalog and on the Department website.

Program Overview – Construction Engineering Technology

The following overview of the Construction Engineering Technology program is presented in the MSU Course Catalog:

The curriculum provides a well-rounded, four-year, technically specialized university education culminating in a Bachelor of Science degree in Construction Engineering Technology (CET). Knowledge of mathematics and physical sciences along with applied courses in business management, law, and human relations form a background to transform design, research and planning ideas into physical reality using contemporary construction practices. Faculty with industry experience instruct students in surveying, estimating, scheduling, quality control, safety, testing, and field analysis.

Graduates use their skills and abilities to construct transportation systems, utilities, buildings, dams, public health and environmental systems, irrigation, industrial facilities, municipal and public works, and also in surveying, mapping, and support of engineering design. Building, industrial, and heavy highway construction are emphasized with particular attention directed toward preparation for employment in management and supervisory positions in both field and office operations.

This curriculum provides the education necessary to work with engineers, architects, contractors, technicians, and owners. The student in this curriculum can be employed as field supervisor, estimator, scheduler, or superintendent; he or she may progress to the highest levels of management in the construction arena such as project and operations managers. Because effective communication is essential in carrying out management responsibilities, students in this curriculum are required to demonstrate good oral and written communication skills in their undergraduate studies. Other possible positions are employment with consulting engineers and architects in support activities involving plans and planning, acquisition of design data, surveying, construction inspection for quantity and quality control, sales engineering, plant expansion, and maintenance management activities.

Students planning to take the comprehensive examination on surveying fundamentals as the initial step to becoming licensed as a registered land surveyor should review the educational requirements for admission to this examination. Students who desire both the CET degree and land surveyor registration must complete a Land Surveying Minor.

Students are required to take the Constructor Qualification Examination Level I (CQE) administered by the American Institute of Constructors (AIC) which must be taken the semester that a student expects to graduate. Seniors are eligible to take the Fundamentals of Engineering (FE) examination administered by the National Council of Examiners for Engineering and Surveying (NCEES), which is required by the Montana Board of Professional Engineers and Land Surveyors to become a licensed professional engineer. Students who plan to take the FE examination are encouraged to take additional selected courses in calculus, dynamics, and thermodynamics.

Program Educational Objectives

The Construction Engineering Technology Bachelor of Science Program is a technically rigorous, production oriented, and construction specialty neutral program that prepares graduates to enter and advance to leadership positions in the construction industry.

CET Program Educational Objectives

The educational objectives of the Construction Engineering Technology 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 construction industry and advance toward leadership positions in the construction industry,
2. work on multi-disciplinary teams and effectively communicate with constructors, architects, engineers, the public and public agents, scientists and others to complete construction projects,
3. engage in the life-long learning necessary to advance professionally in the construction field,
4. contribute to society and the construction industry through involvement in professional related and/or other service activity, and

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. enter the surveying profession and become licensed to practice surveying; or
7. earn a Master of Construction Engineering Management degree from MSU or other graduate degrees.

The Construction Engineering Technology Program Objectives are published in the University Course Catalog and Civil Engineering Department website.

Assessment of Program Educational Objectives

Each August prior to the start of the new school year the department will hold a one day retreat. One of the agenda items at these retreats will be the review of assessment data and the evaluation of program objectives and outcomes. Prior to these retreats, the department head and/or program coordinator will prepare and distribute an Annual Program Assessment Report. The report will include recent and historical assessment data and a comparison of assessment results with metric goals. Annually the departmental External Advisory Committee will complete an evaluation of the extent to which they believe MSU Construction Engineering Technology 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). This Board is composed of representatives from the engineering consulting and construction industries.

If assessment results fall below metric goals, the faculty will be responsible for developing a strategy or strategies for improving these levels of achievement. A drop below metric goal levels for one exam or survey will not necessarily require action. However, several occurrences of scores below metric goal levels will require 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 will 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 Objectives assessment process outlined above is considerably less involved than that presented in the 2010 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.

Program Outcomes

The following describes the CE program outcomes and their related assessment process.

CET Program Outcomes

Consistent with ABET program criteria, graduates of the MSU Construction Engineering Technology program are expected to have:

a. An appropriate mastery of the knowledge, techniques, skills and modern tools of Construction Engineering Technology, and are capable of:
    a. Utilizing modern instruments, methods, and techniques to implement construction contracts, documents and codes
    b. Evaluating materials and methods for construction projects
    c. Utilizing modem surveying methods for construction layout
    d. Determining forces and stresses in elementary structural systems.
    e. Estimating material quantities and costs
    f. Employing productivity software to solve technical problems
    g. Producing and utilizing design, construction and operations documents
    h. Performing economic analyses and cost estimates related to design, construction, and maintenance of systems in the construction technical specialties
    i. Selecting appropriate construction materials and practices
    j. Applying principles of construction law and ethics
    k. Applying basic technical concepts for the solution of construction problems involving hydraulics and hydrology, geotechnics, structures, construction scheduling and management, and construction safety, and
    l. Performing standard analysis and design in structural elements.
b. An ability to apply current knowledge and adapt to emerging applications of mathematics science, engineering and technology
c. An ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes
d. An ability to apply creativity in the design of systems, components, or processes appropriate to construction
e. An ability to function effectively on teams
f. An ability to identify, analyze and solve technical problems
g. An ability to communicate effectively
h. A recognition of the need for and an ability to engage in lifelong learning
i. An ability to understand professional, ethical and social responsibilities
j. A respect for diversity and a knowledge of contemporary professional, societal and global issues
k. A commitment to quality, timeliness and continuous improvement

Processes to Assess CET Program Outcomes

The following tools are used to assess whether MSU CET Program Outcomes are being met.

Constructor Qualifications Exam (CQE)

A requirement for graduation is the Constructor Qualifying Exam – Level 1. This nationally normalized exam is taken by students when they are enrolled in the capstone class, ETCC 499R. The exam is given both during the fall and spring semester each year. Performances in exam topic areas are indicators of achievement of program outcomes. Exam topic areas and the program outcomes they address (indicated by letter(s) in parenthesis following each topic area) include:

- Engineering Concepts (a,b,c,d,f)
- Management Concepts (a)
- Materials, Methods & Plan reading (a)
- Bidding & Estimating (a)
- Budgeting/Costing & Control (a)
- Planning, Scheduling & Control (a)
- Construction Safety (a)
- Surveying and Project Layout (a)
- Project Administration (a,k)

The School Report for this exam, which is administered by the American Institute of Constructors (AIC) - Constructor Certification Commission, includes comparisons of MSU averages in each subject with national averages. The School Report also identifies minimum acceptable scores for each subject area. The School Reports for the CQE exam will be included in the Annual Program Assessment Report.

The metric goal for the pass rate one the CQE is that the pass rate for MSU students should exceed the national average pass rate. Further, the school average for each area score on the CQE should exceed the national average. Finally, none of the areas on the exam should be identified as an area of weakness by the AIC- Constructor Certification Commission. If the score in a particular subject area is less than the minimum acceptable score then the area is flagged as an area of weakness.

Capstone Project Review

Each semester, the program coordinator reviews students' capstone project reports, and debriefs each student team on the project. This capstone project review is an especially important assessment tool for program outcomes h, i, j, and k. The program coordinator will summarize these debriefs and the summary will be included in the Annual Program Assessment Report.

Senior Exit Interviews

Interviews with graduating seniors are conducted by the department head each semester. In these interviews small groups of graduating seniors are asked to reflect and comment on the strengths and weaknesses of the program. The department head will compile the results of these interviews and include the compilation in the Annual Program Assessment Report.

For the past several years, the CE Department has also 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 (in this case, Outcomes a-k in the MSU Construction Engineering Technology program). For each outcome, students are asked to indicate if their curriculum was highly effective, effective, neutral, ineffective, or completely ineffective in realizing it. These responses have been numerically represented using a scale of 0 – completely ineffective - to 4 – highly effective.

Department External Advisory Board

The Department External Advisory Board meets annually for a one-to-two day meeting. The External Advisory Board agenda includes review and evaluation of program objectives and outcomes. The External Advisory Board, composed of representatives from the engineering consulting and construction industries, is apprised of the faculty evaluation of the program objectives and outcomes and is tasked with performing their own independent evaluation of them. This evaluation consists of discussion and completion of an assessment of the extent to which they believe MSU Construction Engineering Technology 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. Their input will be included in the Annual Program Assessment Report.

Department Curriculum Committee

The Department Curriculum Committee while often responding to input from other assessment tools also provides direct heuristic input regarding achievement of program outcomes. The Curriculum Committee represents the faculty that interacts with students on a daily basis across all areas of the curriculum. There is no group that understands the nuances of student strengths and weaknesses relative to program outcomes better than the faculty. This input will be included in the Annual Program Assessment report.

As stated above for the Program Objectives assessment process, each August prior to the start of the new school year the department will hold a one day retreat. One of the agenda items at these retreats will be the review of assessment data and the evaluation of program objectives and outcomes. Prior to these retreats, the department head and/or program coordinator will prepare and distribute an Annual Program Assessment Report. The report will include recent and historical assessment data and a comparison of assessment results with metric goals.

If assessment results fall below metric goals, the faculty will be responsible for developing a strategy or strategies for improving these levels of achievement. A drop below metric goal levels for one exam or survey will not necessarily require action. However, several occurrences of scores below metric goal levels will require 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 will 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.

Program Objectives Assessment – Academic Yr 2013 - 2014

As stated above, Program Objectives are to be 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 Construction Engineering Technology 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 Construction Engineering Technology Program Objectives during the 2013-2014 academic year are presented in Table 1 below. Program Objectives 6 and 7, stating that some graduates should be able to enter the surveying profession and some graduates should be able to obtain graduate degrees, respectively, had average assessment ratings of less than 7 (the metric goal). Based on its review and discussion at the meeting, the External Advisory Board recommended deleting Objectives 6 and 7. The rational relative to eliminating Objective 6 was that the Department now has a Surveying Minor that establishes a clear path for CET students interested in pursuing surveying related careers. The rational relative to eliminating Objective 7 was that CET students have a myriad of career paths available to them that their degree supports. Isolating focus on these two paths (entering the construction industry and pursuing advanced degrees) no longer seemed appropriate.

At the CE Department retreat in August (2014), the faculty reviewed the program objectives and the External Advisory Board assessment of them. With some discussion, the faculty adopted the recommendation of the External Advisory Board and eliminated Objectives 6 and 7. The remaining Objectives were re-affirmed to be pertinent and important.

Program Outcomes Assessment – Academic Yr 2013 - 2014:

As summarized above, Program Outcomes each year are assessed using the following tools:

- Constructor Qualification Exam
- Capstone Project Review
- Senior Exit Interviews
- Department External Advisory Board
- Department Curriculum Committee

In addition to the above instruments, Career Services at MSU surveys employers that participate in the University's Career Fair relative to the abilities of program graduates.

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.

Constructor Qualification Exam (CQE)

Pass rates for students from the MSU Civil Engineering Department on the CQE Exam over the past several years are presented in Figure 1. Pass rates for MSU CET students consistently exceed the national average pass rate; most recently in AY 2013-2014, 65 percent of the MSU CET students that took the exam passed it, compared to a national pass rate over this period of only 47 percent.

The comparative performance by specific topic area on the CQE over the past two years of MSU CET students relative to the national average is reported in Figure 2. Referring to Figure 2, MSU CET students performed better on all areas of the exam compared to the national average, with the ratios of percent of questions answered correctly by MSU students to the national averages all exceeding 1.0. Strongest performance was in the areas of engineering concepts (with ratios of 1.26 and 1.27 in 2012-2013 and 2103-2014, respectively) and geomatics (with ratios of 1.17 and 1.20 in 2012-2013 and 2103-2014, respectively); the performance ratios across other topic areas covered by the exam ranged from 1.02 to 1.11.

The comparative performance by specific topic area on the CQE over the past two years of MSU CET students relative to the minimum acceptable level of performance established by the AIC-Constructor Certification Commission is reported in Figure 3. In 2013-2014, MSU CET students performed above the minimum passing level of performance in all but two areas, Materials, Methods, Modeling and Visualization (ratio of 0.93, MSU score to Minimum Passing score), and Bidding and Estimating (ratio of 0.98, MSU score to Minimum Passing score). MSU performance in these areas was also nominally below the minimum acceptable level in 2012-2013. This consistent trend in nominally sub-acceptable performance will be investigated during the next academic year.

Capstone Project Review

The program coordinator was on medical leave over the summer and will complete this section of this report during Fall Semester 2014.

Senior Exit Interviews

At the end of both fall and spring semesters the department head met with graduating seniors in the Construction Engineering Technology program to collect their input on program strengths and weaknesses, as well as their suggestions on program changes.

General program strengths cited by the majority of students included the rigor of the engineering curriculum, the quality of instruction, and the commitment of the faculty to their success. Specific elements of the program positively viewed by the students included several instructors, i.e., Matt Blank in hydraulics, Doug Smith in surveying, Scott Smith in building information modeling, Steve Morrical in concrete, Anders Larsson in structures and Penny Knoll in the senior capstone class, as well as several courses, i.e., construction practice (ECIV 308), business finance (BFIN 322), and engineering economy (EGEN 325).

Primary program weaknesses generally stated by students were the absence of professional electives specifically in construction engineering, insufficient focus on and use of technical

graphics across the curriculum, and inadequate instruction in presentation preparation and delivery. While occasionally in the past students have voiced concerns about specific instructors in the program, no such concerns were stated this year by any student. Several students, however, expressed dissatisfaction with the manner in which the required college-wide multidisciplinary engineering design class (EGEN 310R) was being taught. Suggested program changes consisted of adding upper division courses in safety, concrete formwork and advanced Autocad, Considerable interest was expressed in the department's Land Surveying Minor, with the suggestion that required courses in the Minor be offered at least once a year (some of these courses are offered on a bi-yearly basis).

A summary of student responses to the centrally administered senior exit survey over the past four years by program outcome is presented in Figure 4. Average student outcome assessments generally range from 2.5 (somewhat effective) to 3.0 (effective). The lowest assessment in the current evaluation period (2013-2014) of 2.3/5 was for ability to function on multidisciplinary teams. In discussing these responses with the faculty and the External Advisory Board, this response could well result from known issues with how the college-wide course on interdisciplinary engineering design (EGEN 310R – which includes a significant interdisciplinary team project) is being taught. Concerns with this class were also expressed by the students during their exit interviews with the Department Head. The format of this class is being substantially revised for fall semester 2014.

Comments are also solicited on the senior surveys on program strengths and weaknesses. These comments are scrutinized by the faculty (at the annual retreat) and External Advisory Board (at the annual meeting) for repeated themes within the current year and across consecutive years. While several comments were received in Academic Year 2013 – 2014, no strong or repeated themes were evident.

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. The majority of the Board's input is obtained at the annual Board meeting by the CE Department Head and CET 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 Construction Engineering Technology 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 Construction Engineering Technology program outcomes over the last two years are presented in Table 2 below. The overall average rating improved from 4.3/6 to 5.0/6 from AY 2012-2013 to AY 2013-2014. The primary area that needs improvement is communications (specifically, based on the Board's discussion, with written communications) which was assessed at 4.0/6 in 2013-2104. (Note that at this point in time, all results are presented as a simple average of responses received, rather than in terms of percent of responses at or exceeding a particular rating.)

The External Advisory Board was pleased that the Department intended to increase student exposure to basic computer based drafting and to introduce a course on building information modeling (BIM); both of which were suggested changes to the curriculum at the previous year's meeting.

Department Curriculum Committee

During the year, the department Curriculum Committee discussed and acted on the following items in the CET Program:

Action: Replace EGEN 116, CAD, 1 cr, with DDSN 101, CAD 1A, 2 cr
Rational: Respond to employer, External Advisory Board and student recommendations to increase students' knowledge of CAD

Action: Reduce ETCC 204, Applied Analysis and Technical Communication, 2 cr, to a single credit on Applied Analysis
Rational: Change made to accommodate increase in technical graphics curriculum content from 1 cr (EGEN 116) to 2 cr (DDSN 101), while maintaining university mandated total cap on degree program of 128 credits

Action: Allow students at their discretion to take GPHY 284, GIS Science and Cartography, instead of ERTH 101N, Earth System Sciences
Rational: ERTH 101N has been required to provide students with a basic science class that, among other things, gives them an appreciation of the underlying geology of the materials that much of the constructed environment is founded on and built from; at the other end of the spectrum is a need for students to understand the increasingly sophisticated science behind the tools used to map/document/track the features of the natural and built environments – namely geographic information systems, making GPHY 284 another and alternate basic science course that is very pertinent to construction practice

Action: Introduce new professional elective class, ECIV 309, 2 cr on building information modeling (BIM)
Rational: Respond to employer, External Advisory Board and student recommendations to increase exposure of students to CAD

Action: Add BMGT 410, Sustainable Business Practices, to the professional elective courses in the CET program
Rational: One of the greatest challenges in contemporary infrastructure design and construction is the development and implementation of sustainable practices; this class brings business considerations into the sustainability discussion, which is an essential element of engineering design and construction execution

Career Fair Employer Surveys

Montana State University annually hosts two career fairs, one each in the fall and spring semesters. Employers at the career fairs that employ MSU graduates are invited to participate in a survey of their on-the-job performance, with the survey questions closely related to target program outcomes. In reviewing this information relative to program outcomes assessment, it is important to note that survey participation is voluntary, responses are often incomplete, and the

graduate cohort being assessed is only broadly identified as construction or engineering. Performance is assessed numerically on a scale of 1 – to a very limited extent – to 5 – to a very great extent.

Results from the Career Fair Employer Surveys over the past few years are summarized in Table 4. Referring to Table 4, on the various attributes surveyed, the average employer assessment of graduate performance is nominally 4, which is above adequate (which is quantitatively assessed at 3) and below good/excellent (which is quantitatively assessed as a 5). Lowest performance was assessed on ability to communicate well in writing (~ 3.5/5), strong management/supervisory skills (~ 3.5/5), and capacity to function in a multi-cultural/global environment (~ 3.5/5).

The above information was shared with department faculty and the External Advisory Board, with the outcome that the cited attributes should be worked on over the next year. Further, in light of the various issues mentioned above with using career fair employer surveys as an assessment tool, the decision was made to investigate other methods to obtain employer feedback on graduate performance in practice.

Initial Action Items for Academic Year 2014-2015

- thoroughly review and suggest revisions as appropriate in the content and sequencing of the primary construction courses in the CET 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

  several years have passed since the last comprehensive review of this suite of classes, with such a review being particularly appropriate at this point in time as program staffing is expected to be relatively stable over the next few years following a period significant staff changes; in the short term, the lab in ECIV 308 will be increased from one to two hours per week, and the content and material in ECIV 492 will be more closely coordinated with ECIV 308
- work on improving the written communication skills of students. Specifically, working on central administration to increase the availability of the university's technical writing class, WRIT 221, to students in the CET curriculum, and increasing student written communication exercises across their civil engineering courses.
- 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.
- investigate avenues to increase student awareness of contemporary societal and global issues.
- review outcomes of curriculum changes summarized above.
- investigate if the credits required by the program for graduation (128 cr) can be reduced, in response to a College request to look at this issue.
- Investigate and ideally pilot a new approach to obtaining employer feedback on graduate performance in practice.

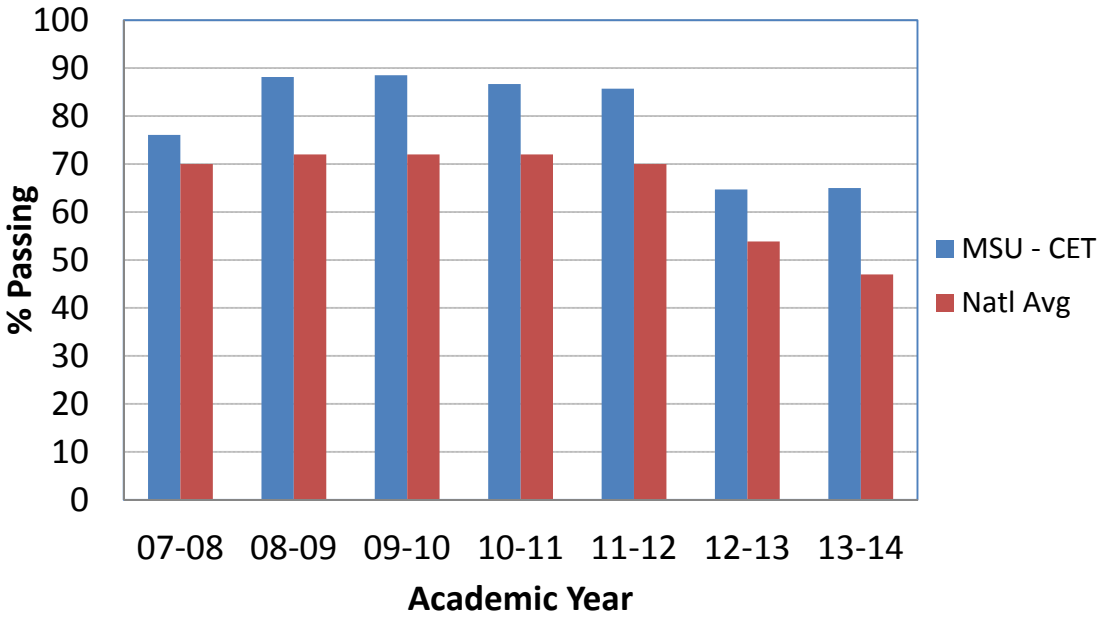

Figure 1. CQE Results, CET Program, Acad Yrs 07-08 to 13-14.

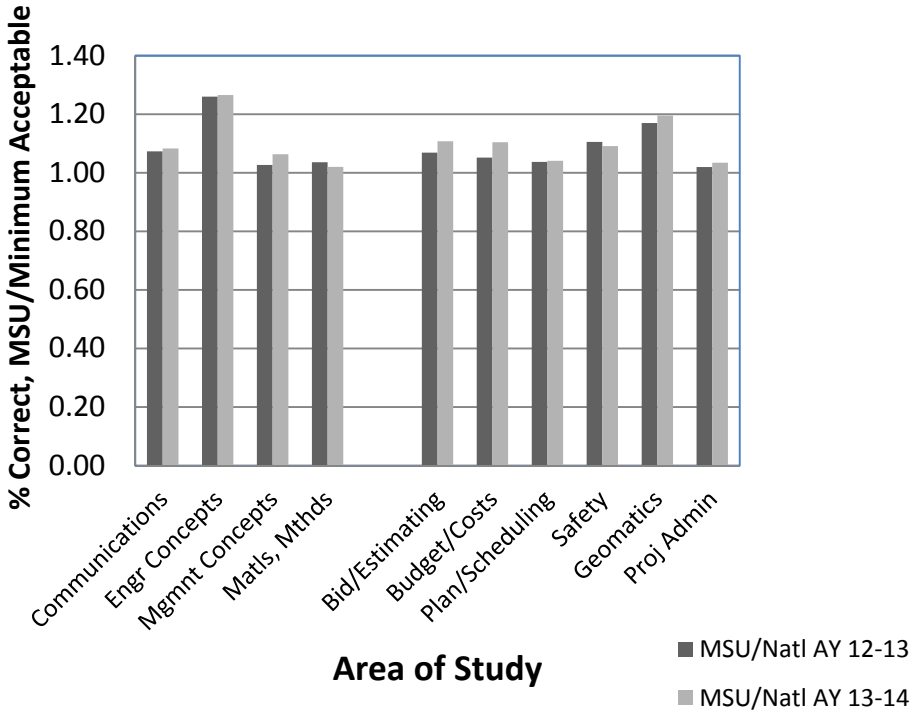

Figure 2. CQE Results, CET Program vs National Average, Acad Yrs 12-13 and 13-14.

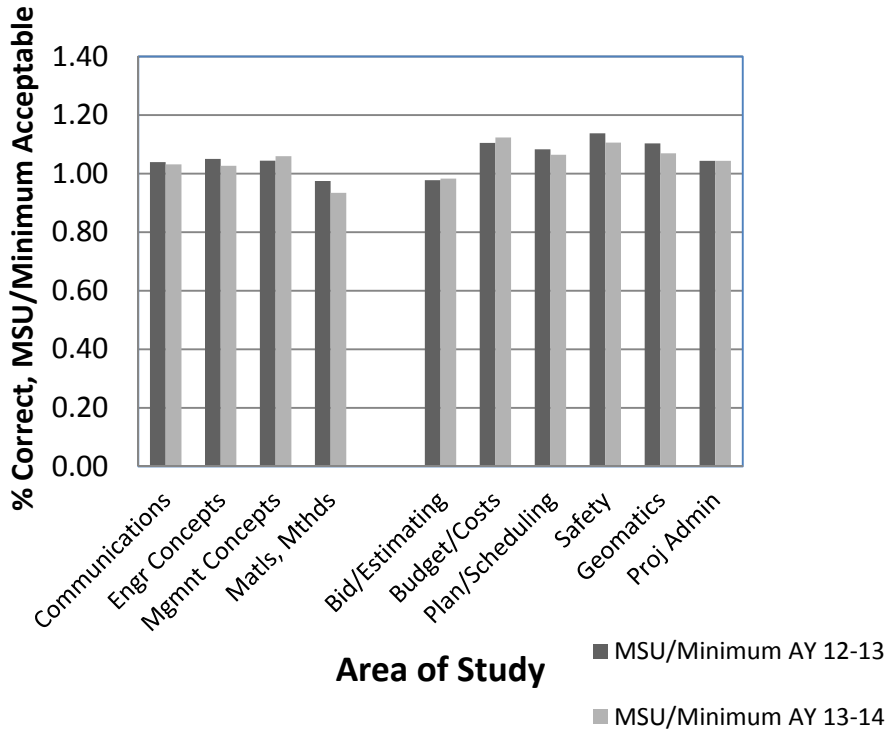

Figure 3. CQE Results, CET Program vs Minimum Pass Score, Acad Yrs 12-13 and 13-14.

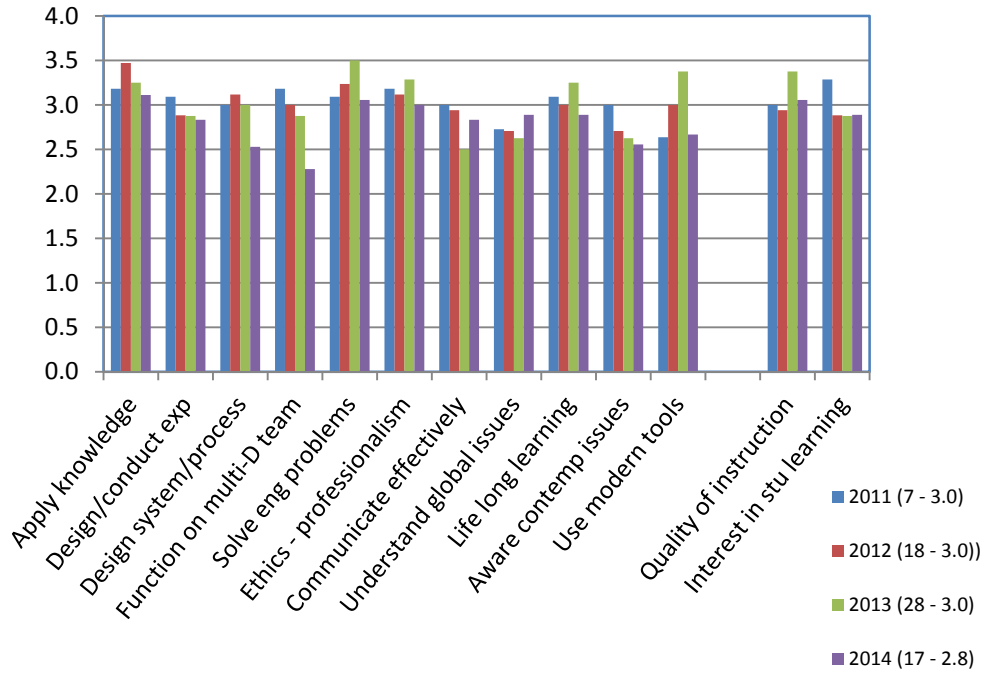

Figure 4. Student Survey Results, CET Program, Acad Yrs Ending 11, 12, 13 and 14.

Table 1. Ext Advisory Brd, Assessment of CET Program Objectives, Acad Yrs 12-13 and 13-14.

Objective	Met (0 -10)	Suitable (0-10)	Ratio Met/Suitable
All graduates of the Construction Engineering Technology Program can expect to be able to:	12-13/13-14	12-13/13-14	12-13/13-14
1. enter the construction industry and advance toward leadership positions in the construction industry	8.8/9.3	9.8/9.7	0.90/0.96
2. work on multi-disciplinary teams and effectively communicate with constructors, architects, engineers, the public and public agents, scientists and others to complete construction projects	7.9/8.1	9.4/9.3	0.84/0.88
3. engage in the life-long learning necessary to advance professionally in the construction field	8.5/8.9	9.1/9.4	0.93/0.94
4. contribute to society and the construction industry through involvement in professional related and/or other service activity, and	7.8/9.0	8.5/9.0	0.91/1.00
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.	8.1/9.0	9.4/9.6	0.87/0.94
Some graduates of the Construction Engineering Technology Program can expect to be able to:			
6. enter the surveying profession and become licensed to practice surveying; or	7.1/6.0	7.0/4.6	1.02/1.31
7. earn a Master of Construction Engineering Management degree from MSU or other graduate degrees	8.0/8.0	6.9/6.7	1.16/1.19
Average	8.0/8.3	8.6/8.3	0.94/1.00

Table 2. Ext Advisory Brd, Assessment of CET Program Outcomes, Acad Yrs 12-13 and 13-14.

OUTCOME	2013	2014	Change
1. an appropriate mastery of the knowledge, techniques, skills and modern tools of Construction Engineering Technology, and are capable of:			
a. utilizing modern instruments, methods, and techniques to implement construction contracts, documents and codes	4.2	5.0	1.19
b. evaluating materials and methods for construction projects	4.2	5.4	1.29
c. utilizing modern surveying methods for construction projects	4.2	5.2	1.24
d. determining forces and stresses in elementary structural systems	4.0	4.8	1.19
e. estimating material quantities and costs	4.4	5.2	1.18
f. employing productivity software to solve technical problems	3.8	4.3	1.12
g. producing and utilizing design, construction and operations documents	4.0	4.8	1.19
h. performing economic analyses and cost estimates related to design, construction and maintenance of systems in the construction technical specialties	4.0	4.8	1.19
i. selecting appropriate construction materials and practices	4.4	5.2	1.18
j. applying principles of construction law and ethics	3.4	5.0	1.47
k. apply basic technical concepts for the solution of construction problems involving hydraulics and hydrology, geotechnics, structures, construction scheduling and management, and construction safety, and	4.2	5.3	1.25
l. performing standard analysis and design of structural elements	4.4	4.8	1.08
2. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technolgy	4.4	5.6	1.27
3. an ability to conduct, analyze and interpret experiments and apply experimental results to improve processes	4.5	5.0	1.11
4. an ability to apply creativity in the design of systems, components or processes appropriate to construction	4.3	5.2	1.21
5. an ability to function effectively on teams	5.2	5.4	1.04
6. an ability to identify, analyze and solve technical problems	4.8	5.4	1.13
7. an ability to communicate effectively	4.2	4.0	0.95
8. a recognition of the need for and an ability to engage in life-long learning	4.3	4.8	1.12
9. an ability to understand professional, ethical and social responsibilities	4.8	5.0	1.04
10. a respect for diversity and a knowledge of contemporary professional, societal and global issues	4.3	4.6	1.07
11. a commitment to quality, timeliness and continuous improvement	4.5	5.6	1.24
Average	4.3	5.0	1.16

Table 3. Career Fair Employer Survey of Graduate Performance.

Question	Construct Mean Fall 2011	Construct Mean Spr 2012	Construct Mean Fall 2012 Spr 2013	Engineer Mean Fall 2012 Spring 2013
A.) Adequate knowledge in appropriate field	4.2	3.8	3.9	3.6
B.) Ability to apply knowledge in practice	4.1	4	4.1	4.1
C.) A desire to continue learning	4.5	4.1	4.0	3.9
D.) Capacity to work with minimum supervision	4.3	3.9	3.9	3.9
E.) Ability to communicate verbally	4	3.9	3.9	3.8
F.) Ability to communicate well in writing	3.4	3.7	3.7	3.5
G.) Capacity for co-operation and teamwork	4.3	3.3	4.0	4.0
H.) Capacity to make decisions	3.9	3.6	3.7	3.8
I.) Strong management/supervisory skills	3.7	3.1	3.4	3.5
J.) Ability to access and use information	4.2	3.6	3.9	3.9
K.) Ability to think creatively	4	3.6	3.8	3.8
L.) Resourcefulness	4.2	3.7	3.8	4.0
M.) Capacity to function in multicultural/global env	3.9	4	3.6	3.5
N.) Capacity to act ethically	4.5	4	4.1	4.0
Totals:	4.1	3.8 (13)	3.8 (11)	3.8