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

Department: Civil Engineering

Department Head: Jerry Stephens

Assessment Coordinator: Joel Cahoon and Jerry Stephens

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

Program: 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. 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/CivilEngrDeptAssessmentPlan2011V2.pdf), followed by the results of the program performance assessment done for Academic Year 2013-2014.

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). More information on ABET's accreditation criteria and processes can be found at http://www.abet.org/.

Summary of Assessment Plan:

Mission Statements

College of Engineering

Mission - The College of Engineering at Montana State University will serve the State of Montana and the nation by

a) fostering lifelong learning,
b) integrating learning and discovery,
c) developing and sharing technical expertise,
d) empowering students to be tomorrow's leaders.

Vision - The College of Engineering at Montana State University will be an outstanding collaborative community that achieves excellence in learning, innovation, discovery, and knowledge transfer. To realize this vision, the college will

a) leverage shared interests and talents among faculty and students in order to create knowledge across disciplinary lines,
b) effectively and efficiently balance breadth with depth in undergraduate education in order to prepare students for the global workforce,
c) be a leader in innovation and discovery in our identified focus areas,
d) successfully integrate research and innovation into the learning experience of both undergraduate and graduate students,
e) be recognized for the level of knowledge transfer to industry, governments, and citizens in the state of Montana.

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.

Program Educational Objectives

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 Bio-Resources option is focused on soil, water resources and environmental concerns.

CE Baccalaureate Program Objectives

The civil engineering baccalaureate educational program objectives were adopted in their current form in April of 2003. Program constituents reconsidered these objectives in 2006 and re-adopted them without revision at that time. 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. Enter the surveying profession and become licensed to practice surveying.
7. Begin careers in the construction industry.
8. Earn advanced degrees in Civil Engineering or other fields.

Process for Evaluating Achievement of CE Program 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 outcomes and objective. 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 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 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 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.

Program Outcomes

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

CE Baccalaureate Program Outcomes

The CE Baccalaureate Program Outcomes were approved by the CE faculty in August of 2006. At that time, the CE faculty decided to adopt outcomes consistent with ASCE Body of Knowledge (BOK) and new ABET program criteria for CE programs.

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 instruments are used to assess whether MSU CE Program Outcomes are being met.

1. 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.
    - Results are documented yearly and summarized in the Annual Assessment Report.
2. Student Portfolio Review
    - Representative student work from the following classes is collected. This work comprises the student portfolios that are reviewed.
        CE 332, Engineering Hydraulics
        CE 401, Professional Practice & Ethics
        CE 457, Senior Project I
        CE 458, Senior Project II
    - A team consisting of 3 members of the department curriculum committee and 2 members of the departmental External Advisory Committee reviews the portfolios and assesses student performance relative to program outcomes.
    - Student performance related to each outcome is compared to metric goals.
    - Results are documented every third year and summarized in the Annual Assessment Report.
3. Student Interviews
    - Department Head or appointee conducts interviews with students.
    - Each student provides input concerning department commendations and recommendations for improvement.
    - Results are documented yearly and summarized in the Annual Assessment Report.
4. Departmental External Advisory Committee
    - 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.
    - Results are documented yearly and summarized in the Annual Assessment Report.
5. Student performance related to each outcome is compared to metric goals
    - Results documented and summarized in the Annual Report.
6. 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.

- Department faculty retreat conducted annually to review assessment data and add the heuristic insight of the CE faculty to this data while making program improvement decisions.

As stated above regarding 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 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 Objectives during the 2013-2014 academic year are presented in Table 1 below. Only Program Objective 6, stating that some graduates should be able to enter the surveying profession, had an assessment rating 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 regarding some graduates being able to enter the surveying profession (Objective 6), and being able to enter the construction profession (Objective 7).. The rational relative to eliminating Objective 6 was that the Department now has a Surveying Minor that establishes a clear path for students interested in pursuing surveying related careers. The rational relative to eliminating Objective 7 was that 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 instruments:

1. Fundamentals of Engineering Exam
2. Student Portfolio Review
3. Student Interviews
4. Department External Advisory Board
5. Student Performance Related to Each Outcome
6. CE Faculty/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.

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; 100 percent of the MSU CE students that took the exam in AY 2013-2014 passed it, compared to a national pass rate over this period of 74 percent.

The comparative performance over the past two years of MSU CE students relative to the national average by specific topic area on the FE exam are reported in Figures 2 to 4. Referring to Figures 2 to 4, in general CE students performed better on each area of the exam compared to the national average, as indicated by Performance Index ratios (i.e., the ratio of MSU Performance Index to the ABET Comparator Performance Index, as these values are provided by the National Council of Examiners for Engineering and Surveying) typically in the range of 1.1 to 1.2. The only area in which MSU CE student performance was nominally below the national average (ratio of 0.98) was in Computers/Computational tools.

2. Student Portfolio Review

The Civil Engineering program assessment plan calls for a portfolio of student work from

ECIV 332, Engineering Hydraulics
ECIV 401, Professional Practice and Ethics
ECIV 489, Civil Engineering Design I
ECIV 499, Capstone: Civil Engineering Design II

to be reviewed annually by three members of the CE Department Curriculum Committee and by two members of the CE Department External Advisory Board. This past year (Academic Year 2013-2014), this procedure was nominally modified, with the portfolio of student work being drawn from ECIV 414, Advanced Steel Design, rather than ECIV 332, and with the review being accomplished by two representatives of the Curriculum Committee and the full membership of the External Advisory Board. The review by both entities found satisfactory to outstanding student performance relative to the previously presented 15 targeted program outcomes.

3. Student Interviews

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 (in this case, Outcomes 1-11 in the MSU Civil Engineering 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.

A summary of student response over the past four years by program outcome is presented in Figure 5. Average student outcome assessments generally range from 2.5 (somewhat effective) to 3.0 (effective). Referring to Figure 3, and based on discussion of these responses with the faculty and the External Advisory Board, the low surveyed effectiveness this past year relative to functioning on multidisciplinary teams (2.5/4) could well result from known issues with how the college-wide course on interdisciplinary engineering design (which includes a significant interdisciplinary team project) is being taught. The format of this class is being substantially revised for fall semester 2014. Students also are somewhat concerned with their ability to understand global and contemporary issues (scores of 2.6 and 2.5, respectively). The External

Advisory Board independently echoed this concern this year, and possible courses of action in this regard are under discussion.

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.

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 two years are presented in Table 2 below. The overall average rating for this past year is 4.8/6 (approaching the 5 rating of very good), which was deemed very acceptable and represents a nominal improvement over the previous year. Areas that need improvement are communications (specifically, based on the Board's discussion, with written communications) and understanding the fundamentals of business, public policy and administration. (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.

5. Student Performance Related to Each Outcome Compared to Metric Goals

As detailed in the above narrative, student performance related to each outcome generally met or exceed metric goals.

6. CE Faculty/Curriculum Committee

Data from outcome assessment instruments 1 – 4 above are shared with Department faculty throughout the year, and are collectively brought together for their consideration at the faculty retreat in August. During the retreat in August 2014, the major action items discussed for academic year 2014 – 2015 are:

- to 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 civil engineering curriculum, and increasing student written communication exercises across their civil engineering courses.

- 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.
- to investigate avenues to increase student awareness of contemporary societal and global issues.
- to 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.

During the year, the department Curriculum Committee discussed and acted on the following items related to the CE 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 ECIV 202, 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: 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: Introduce new professional elective class, ECIV 491, 3 cr, on cold regions engineering
Rational: Many students will work in northern tier states in which awareness of cold weather effects on civil engineering infrastructure is important

Action: Introduce new professional elective class, ECIV 492, 3 cr, to study abroad active transportation modes (bike and pedestrian) in European countries
Rational: Respond to increased interest in sustainable/alternate modes of transportation, as well as provide students with international experience

Action: Eliminate the department established requirement that students must take a specific "analytical elective" as a mandatory part their program from the list of courses: EGEN 415, Advanced Mechanics of Solids, EGEN 435, Fluid Dynamics, M 441 Numerical Linear Algebra and Optimization, M 442 Numerical Solution of Differential Equations, M 450 Applied Mathematics I, and PHSX 320, Classical Mechanics, and instead be allowed to take any course from the professional elective list
Rational: In light of changing needs of contemporary engineering practice, students should be able to increase the breadth or depth of their knowledge on a topic that supports their career direction, rather than being constrained in taking one of the specific courses designated by the department as an analytical elective

The Department continues to offer selected courses on-line, notably in the area of engineering mechanics during the summer session. Department experience in this regard is summarized in Table 3. The Department has been on the forefront of on-line course offerings within the University. The University has few polices relative to on-line course offerings, so the Department has developed and implemented its own protocols in this regard (e.g., relative to admissions, class-size, exam procedures, etc.).

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

- 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 civil engineering 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.
- review and further develop policies and direction for on-line education.
- investigate and ideally pilot a new approach to obtaining employer feedback on graduate performance in practice.

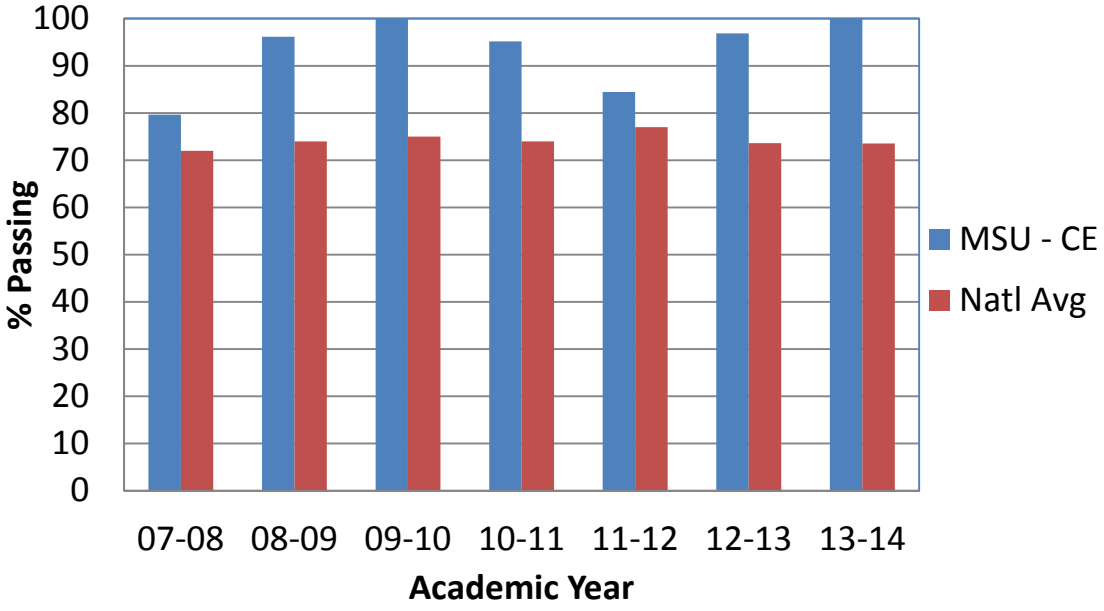

Figure 1. FE Exam Results, CE Program, Acad Yrs 07-08 to 13-14.

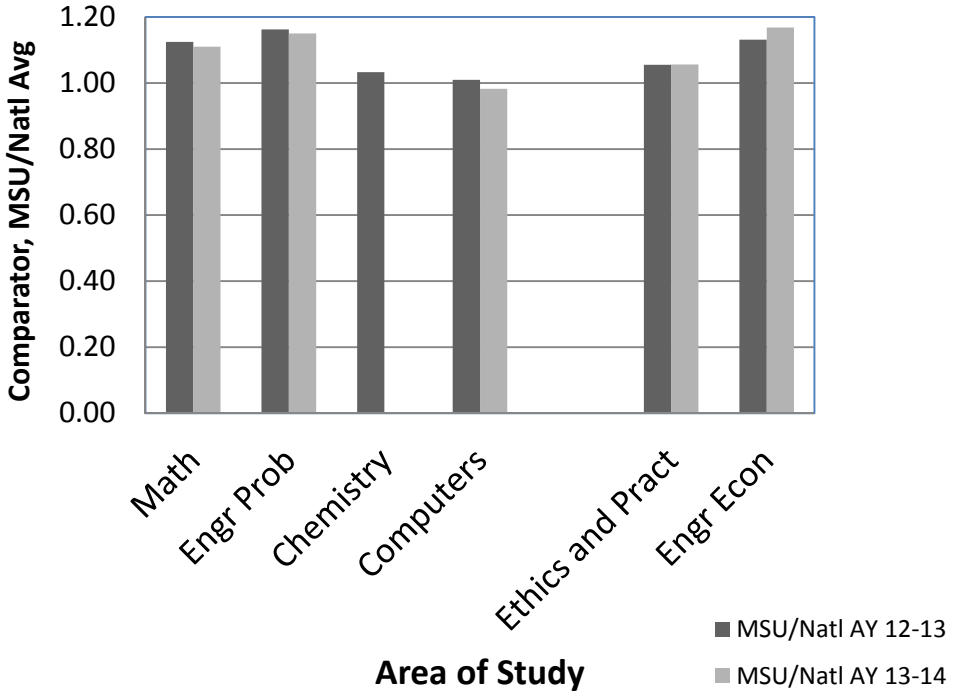

Figure 2. FE Exam Results, MSU CE Program, General Questions, Acad Yrs 12-13 and 13-14.

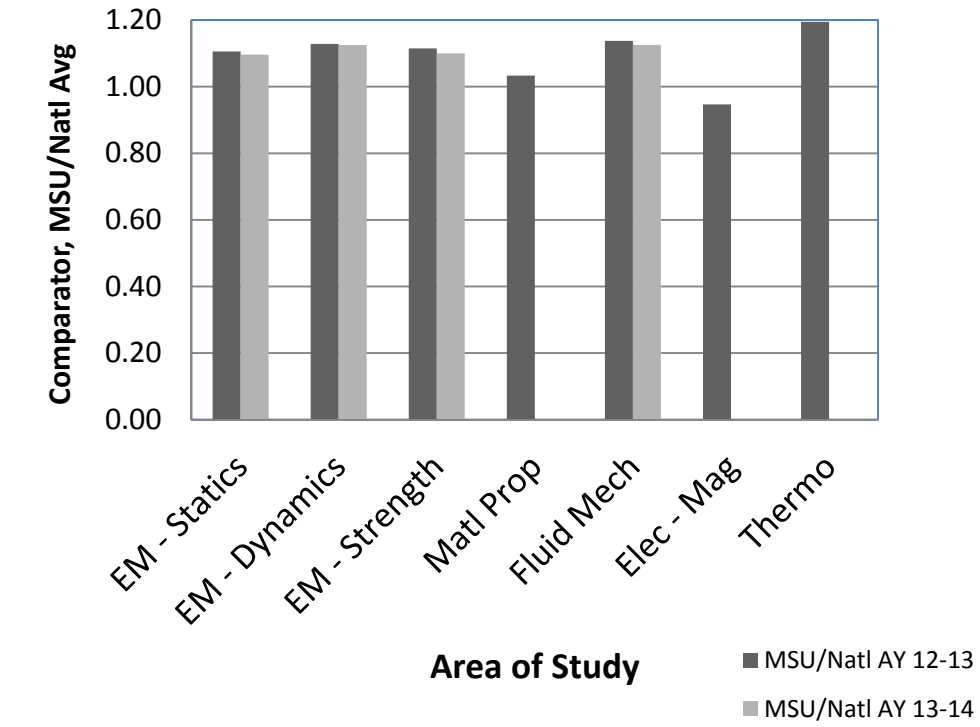

Figure 3. FE Exam Results, CE Program, Basic Eng. Questions, Acad Yrs 12-13 and 13-14.

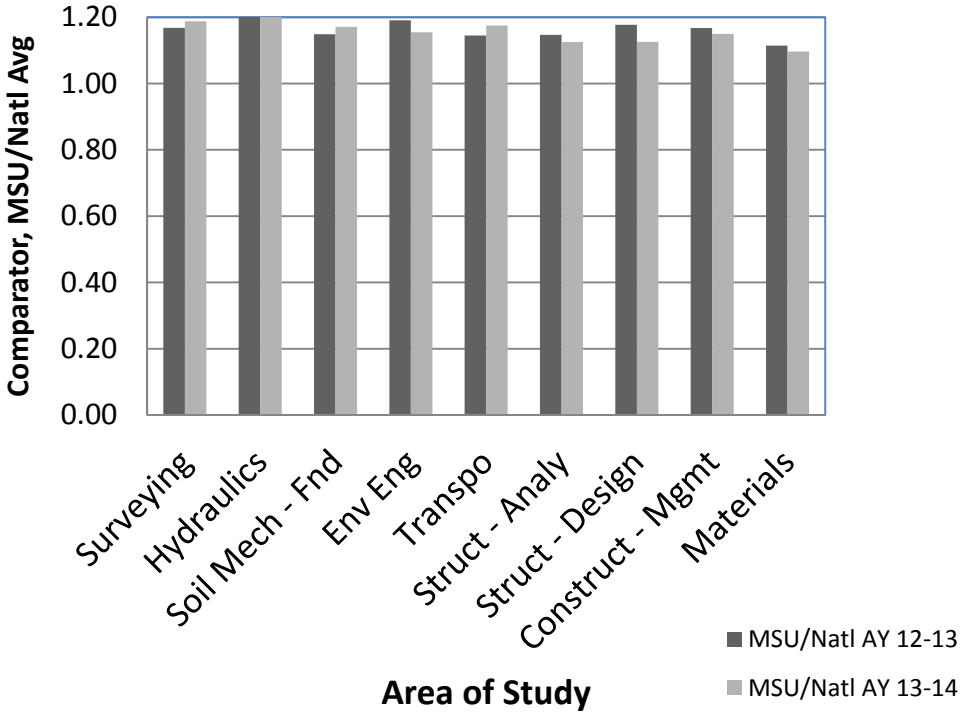

Figure 4. FE Exam Results, CE Program, Civil Eng. Questions, Acad Yrs 12-13 and 13-14.

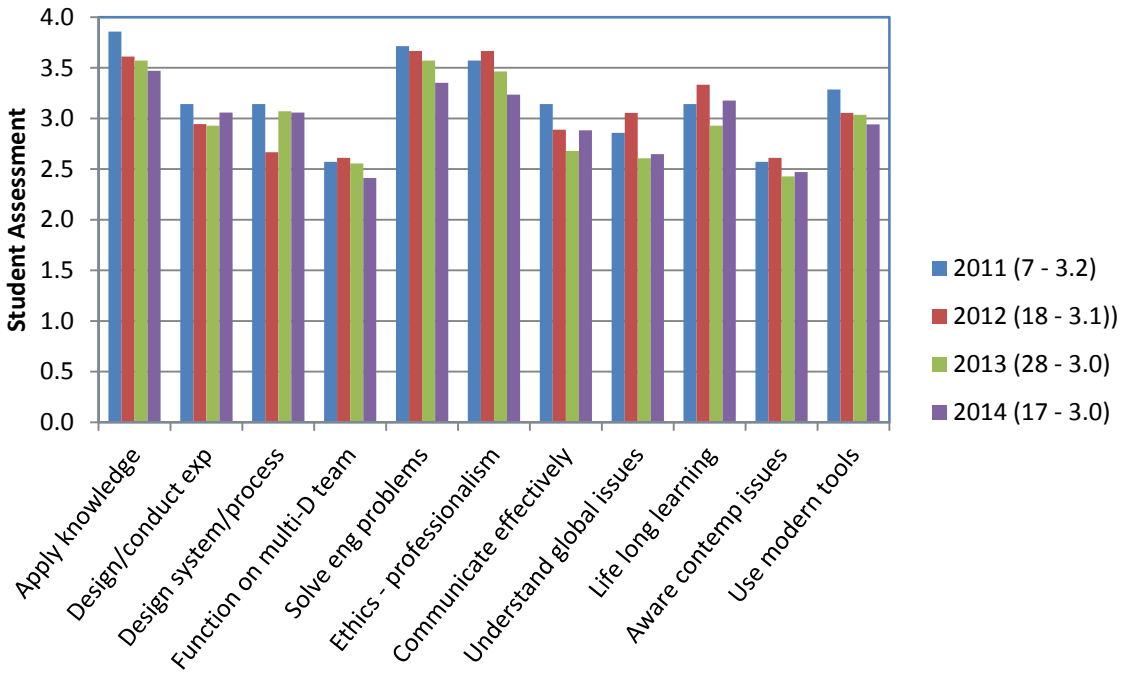

Figure 5. Student Survey Results, CE Program, Acad Yrs Ending 11, 12, 13 and 14.

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

Objective	Met (0 -10)	Suitable (0-10)	Ratio Met/Suitable
All graduates of the Civil Engineering Program can expect to be able to:	12-13/13-14	12-13/13-14	12-13/13-14
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	8.5/9.4	9.6/9.4	0.88/1.00
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	7.9/8.1	9.5/9.0	0.83/0.90
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	8.5/9.1	8.9/9.6	0.96/0.95
4. contribute to society and the Civil Engineering profession through involvement in professional related and/or other service activity, and	8.4/8.8	8.8/9.5	0.86/0.92
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.	8.1/8.6	9.5/9.8	0.86/0.88
Some graduates of the Civil Engineering Program can expect to be able to:			
6. enter the surveying profession and become licensed to practice surveying;	6.9/6.3	7.5/4.8	0.92/1.32
7. begin careers in the construction industry; or	8.5/8.4	8.0/8.5	1.06/0.99
8. earn advanced degrees in Civil Engineering or other fields.	8.8/8.5	8.1/8.4	1.08/1.01
Average	8.2/8.4	8.7/8.6	0.97

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

OUTCOME	2013	2014	Change
1. apply knowledge of mathematics, science, and engineering	5.4	5.8	1.08
2. design and conduct experiments and analyze and interpret experimental data	4.4	4.8	1.09
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	4.4	5.0	1.14
4. function as a member of a multidisciplinary team	4.9	5.2	1.05
5. identify, formulate and solve engineering problems	5.4	5.7	1.05
6. explain professional and ethical responsibility	5.1	4.7	0.92
7. compose and present effective written, verbal and graphical communications	3.7	3.8	1.04
8. draw upon a broad education to explain the impact of engineering solutions in a global, economic, environmental and societal context	4.7	4.5	0.96
9. explain the need for, and demonstrate the capacity for, life-long learning	4.8	4.7	0.97
10. explain contemporary issues as they relate to the solution of engineering practice	4.5	4.8	1.07
11. apply the techniques, skills and modern tools necessary for engineering practice	5.1	5.0	0.98
12. synthesize and evaluate knowledge in a specialized area related to civil engineering	4.8	5.2	1.08
13. explain the elements of project management, construction and asset management	4.7	4.7	0.99
14. explain the fundamentals of business, public policy and administration	3.7	4.2	1.13
15. explain the role of the leader, leadership principle, and attitudes conducive to effective professional practice of civil engineering.	4.2	4.7	1.11
Average	4.7	4.8	1.04

Table 3. CE Department Experience with On-Line Courses.

Course No.	Title	Enrollment		
		2012	2013	2014
		On-site/On-line	On-site/On-line	On-site/On-line
EGEN 201	Statics	13/13	10/19	13/20
EGEN 202	Dynamics	8/11	12/14	18/15
EGEN 205	Strength of Materials	19/21	22/39	12/28
EGEN 335	Fluid Mechanics	6/8	7/20	15/20
ECIV 220	CE and Const – Ancient to Modern	-/12	-/5	-/7
ECIV 331	Hydrology	-	-/5	-/9

Table 4. 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