BRADLEY University

Civil Engineering
1501 West Bradley Avenue | Peoria, IL 61625

Accreditation Documentation for the Civil Engineering program at Bradley University

The baccalaureate program in civil engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

Mission

Produce graduates who possess a keen awareness of the global dimensions of our profession, leadership skills required to serve our society, and the technical knowledge to pursue multiple career paths including advanced degrees.

Objectives

Leadership

Graduates understand the need for teamwork, communication skills, ethics, good citizenship, and service. They have the needed knowledge and professionalism to become leaders in their chosen profession.

Internationalization

Offer international programs to ensure that graduates have the needed awareness of relevant global issues and cultures to help them thrive in a complex and multicultural world.

Career Advancement

Graduates have the needed understanding of ethical responsibilities, licensure, the necessity for life-long learning, and contemporary issues required for placement and career advancement.

Program Relevancy

Partner with the civil engineering profession to offer an innovative program that promotes cultural diversity and responds to the needs of the profession and society in the areas of sustainability, infrastructure, and emerging technology.

Outcomes

1. the ability to apply knowledge of engineering, mathematics through differential equations, and science including calculus based physics, chemistry, and biology or astronomy;
2. the ability to design and conduct laboratory experiments as well as analyze and interpret data in more than one civil engineering area;
3. the ability to design a civil engineering system, component, or process in more than one civil engineering context to meet desired needs within realistic constraints such as economic, environmental, social, political, health and safety, manufacturability, and sustainability under the guidance of appropriately qualified faculty;
4. the ability to function on multidisciplinary teams;
5. the ability to identify, formulate, and solve civil engineering problems;
6. an understanding of their professional and ethical responsibilities including the importance of professional licensure;
7. the ability to effectively communicate orally, graphically, and in writing;

8. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
9. a recognition of the need for, and the ability to engage in life-long learning;
10. knowledge of contemporary professional practice issues in management, business, public policy, and leadership in a multicultural and societal context;
11. the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice in a minimum of four technical areas appropriate to civil engineering.

Year	Number of Civil Engineering Students Enrolled in Fall	Number of Civil Engineering Graduates in Year
2013	152	46
2012	177	33
2011	165	35
2010	168	21
2009	149	35

Assessment Tools

Evaluation of program objectives and outcomes is a major responsibility of the faculty in the civil engineering program. The faculty has primary responsibility for such fundamental areas as curriculum, research, and those aspects of student vitality that are related to the educational process. The assessment of program objectives and how these objectives help achieve the program's mission is accomplished using the following mechanisms:

The Departmental Executive Council

The department has a unique leadership structure in that each faculty is expected to lead. Furthermore, each program offered by our department is assigned a program head that serves on the departmental executive council. Currently, the council is composed of Dr. Robert Fuessle, head of the civil engineering program, Dr. Souhail Elhouar, head of the construction program, and Dr. Kris Maillacheruvu, head of the CEC undergraduate program management. The executive council serves as the assessment committee in our department and helps set the agenda for future programmatic revisions and new initiatives.

The Civil Engineering Group of the Advisory Board
We have a large advisory board composed of 38 professionals from across the United States. This board meets annually to make recommendations relative to a variety of issues facing our department including program development and alumni relations. The board plays a critical role and provides valuable input to ensure continued programmatic improvements. The civil engineering group meets annually to address issues, challenges, and new initiatives identified by the CEC faculty through the assessment processes.

Alumni and Industry Network
Our department has developed a very significant network with industry and alumni throughout the State of Illinois. Members of the various organizations involved in this network are in constant communication with the department and actively participate in joint functions. The input received from our alumni and industrial partners helps our department with the assessment process and data gathering.

Accrediting Agencies
The civil engineering program is accredited by the accreditation Board for Engineering and Technology. Over the years, input received from the visiting teams and through final statements has helped augment our assessment process and identified weaknesses in our academic programs. The input received provided valuable insights into concerns and helped us address weaknesses.

The Departmental Retreat
The officers of the five student organizations in our department are invited to discuss issues and concerns on an annual basis. Students are presented with summaries of the assessment forms for continuing students and are asked to respond to the 10 lowest scores given on the evaluations. This is a wonderful opportunity to learn directly from our students the issues and concerns they face and gives the department the opportunity to fix some problems immediately and address others in a timely manner.

The Civil Engineering Exit Interview
The graduating seniors in our department are invited to discuss issues and concerns on an annual basis. Students are presented with summaries of the assessment forms for senior students and are asked to respond to the 10 lowest scores given on the evaluations. This is a wonderful opportunity to learn directly from our students the issues and concerns that they face and gives the department the opportunity to take corrective actions.

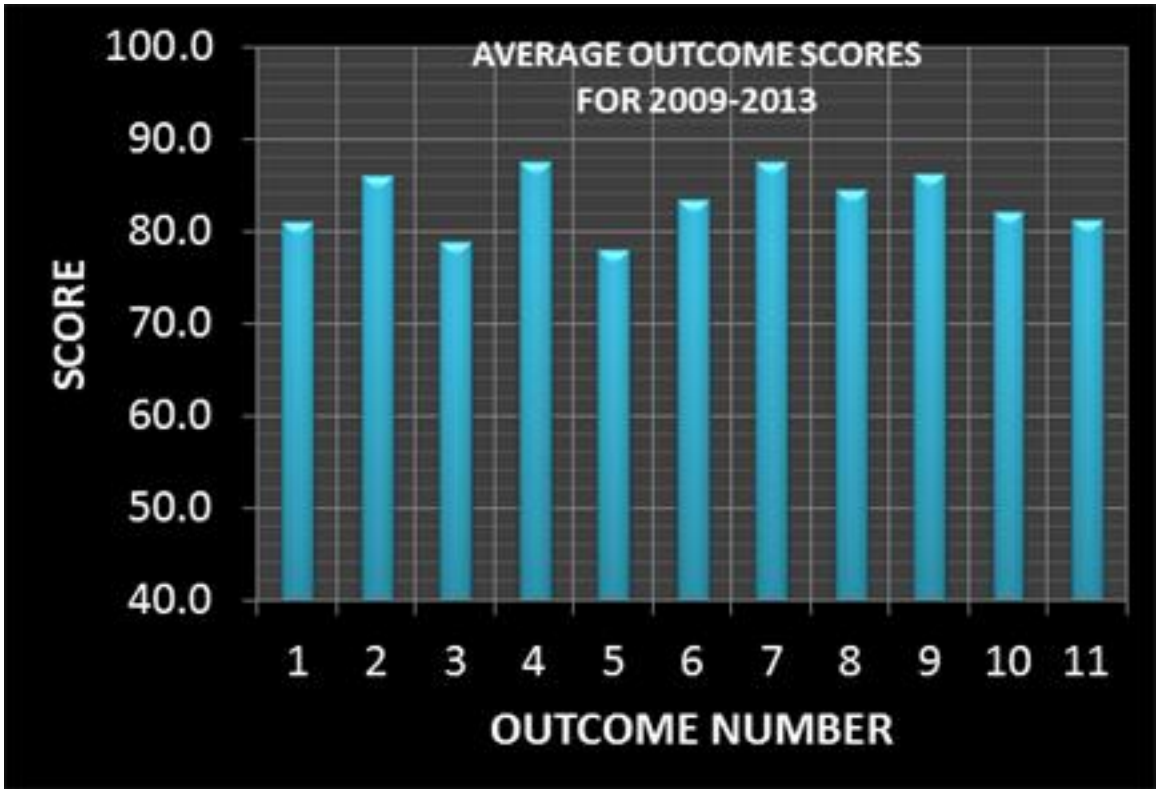
Service and Outreach Programs
The department has developed intense focus on leadership and community service. Students, faculty, alumni and board members work together on a variety of community programs. Such programs provide us with valuable opportunities to interact with employers, alumni and community leaders to assess and improve program objectives. For example, the Bridge-Pals program is celebrating its 20th year and involves middle school and high school students from within 100 miles of Peoria being invited annually to learn more about bridge building.

Civil Engineering Assessment Results

The Department of Civil Engineering and Construction utilizes a number of instruments to measure attainment of the Civil Engineering Program student outcomes. These instruments include course outcome mapping, senior exit interviews, assessment data (from our constituents and stakeholders including students, advisory board members, alumni, and employers), and interviews with capstone senior design teams. For student outcome assessment based on course outcome mapping, the department has adopted a standard of 80% as the expected level of attainment for each student outcome.

Outcome Scores

The weighted average scores for each of the eleven Civil Engineering Program outcomes for the period between 2009 and 2013 are shown below:



The Indirect Outcome assessment process implemented by the Department of Civil Engineering and Construction was designed to assess the degree to which our Civil Engineering Program is meeting its objectives and outcomes by each of the six constituencies it represents. Provided in the table below is a summary of the results of the assessment for each outcome by each of its constituencies and also an overall average for all outcomes. The rating system is 1 to 5 with 5 being the highest rating possible.

CONSTITUENT	1	2	3	4	5	6	7	8	9	10	11	AVG
Freshman	3.44	3.54	4.04	4.35	3.75	4.05	4.35	3.68	4.32	4.35	3.34	3.93
Senior Exit	3.72	3.57	3.72	3.73	3.77	3.79	3.69	3.56	4.03	3.67	3.73	3.73
Soph & Jr	3.8	3.7	3.95	4.04	4.09	3.91	4.02	3.64	4.25	3.85	3.94	3.93
Alumni	4.08	4.03	4.02	4.13	4.16	4.14	4.13	4.03	4.18	4.05	4.05	4.09
Advisory	4.49	4.5	4.4	4.41	4.52	4.45	4.35	4.4	4.49	4.39	4.34	4.43
Employer	4.14	4.06	4.19	4.24	4.2	4.15	4.11	4.04	4.22	4.08	4.12	4.14
AVERAGE	**3.82**	**3.77**	**3.97**	**4.09**	**4.00**	**4.00**	**4.07**	**3.77**	**4.21**	**4.00**	**3.83**	**3.96**

Self Improvement

Our department utilizes a comprehensive assessment process that consists of collecting information from constituents using assessment forms, direct interviews with student leaders, course assessment, faculty assessment, recommendations from ABET, and exit interviews with graduating seniors. Using these assessment tools, the Civil Engineering Program was able to identify deficiencies and address them. Based on the assessment cycles in 2007-08 and 2010-11, the Civil Engineering Program took drastic actions to correct many of the problems cited by our students and other constituents. The changes included:

Assessment Process

The assessment process in 2011 revealed two weaknesses that have been addressed. First the CE laboratory and computing facilities received a low score in 2011 and 2012. Subsequently, the department spent over $40,000 during summer 2012 to completely replace machines in its computing laboratories with quad-processing computers. A new hire for departmental computing services has made improvements in the network.

Another identified weakness has been the CE senior project design course. Starting in the spring 2012, Dr. Al-Khafaji hired three practicing civil engineers to teach three different sections of CE senior design. These sections permitted seniors to select projects emphasizing their preferred subdiscipline: structural, environmental, or transportation engineering.

1. New Civil Engineering Assessment Forms Developed.
2. New Computer Program for Civil Engineering Assessment Data Analysis
3. New Civil Engineering Program Objectives

In addition to the annual retreat and student exit interviews, the CEC department implements a comprehensive assessment cycle once every three years. The last cycle was completed in 2010-2011 and data collection efforts for the 2013-2014 cycle have already started; The assessment cycle normally takes about one year because it involves seven constituents, including employers whose input is solicited during the Annual CEC Job Fair held in the fall, the Advisory Board meeting held in the spring, and the alumni who are solicited throughout the year.

Remodeling of Laboratories

The department utilized its own gift funds and invested over $80,000 to improve its laboratories and address weaknesses identified by its constituents. These include

1. The Surveying laboratory was overhauled with new chalkboard, storage, removal of sinks, new tiles, and new ceiling. The new facility was used in fall 2010.
2. The Geotechnical laboratory was remodeled with new cabinets, new equipment, and removal of obsolete equipment.
3. The Concrete laboratory was totally overhauled and the humid room fixed, new titles, new equipment purchased and some fixed, new drain, new sinks, and a storage room. The sprinkler system in the curing room in the concrete laboratory now works.

A total of 31 new computers were purchased and installed in Jobst 126. The new computer facility addresses many of the issues cited by our students. The total cost exceeded $60,000 and the CEC gift funds were used to partially pay for this purchase.

Civil Engineering Program Modified

The Department of Civil Engineering and Construction has recently completed a thorough review of its program. The review included all civil engineering faculty who considered all prerequisites for their courses. Several committee meetings during the fall 2009 culminated in a proposed program modification that was considered at an all-day departmental meeting. The proposed program includes a reduction in number of hours to graduate, a set of course modifications including changes in prerequisites and course number, and a few course additions or deletions. A brief rationale for each of these is described below.

The proposed Civil Engineering program is a slight program modification in that the total required hours for graduation is being reduced from 130 to 127. The 3-hour reduction is accomplished by a more efficient use of our laboratory instruction for three courses. CE 124 is being reduced from two hours to one. CE 304, Fluid Mechanics, with lecture and laboratory is being reduced from four hours to three; and CE 304 is renumbered to be CE 260. The laboratory hours devoted to concrete and steel is being reduced from two hours to one.

Course modifications are proposed for three reasons: a) additions, modifications, and deletions of prerequisites are being made to ensure that only essential prerequisites are retained and unnecessary prerequisites are removed; b) the description of catalog content and course titles ensures a more accurate description of our program, c) course numbers were revised to properly reflect the order that courses must be taken according to prerequisites. The modification of prerequisites eliminates unnecessary burden on our students and on faculty advisors. More importantly, it also ensures a proper enforcement of the program's academic standards.

Several course modifications are noteworthy. One important course addition is CE 393, a required course that emphasizes important and required aspects for civil engineering accreditation. These aspects are sustainability, related aspects of economics, and the social and professional responsibilities of a Civil Engineer including ethics, life-long learning, and licensure. CE 280, Structural Materials Lab" is being deleted because laboratories in all Civil Engineering materials: soils, asphalt, fluids, concrete and steel, are being bundled with an appropriate lecture course for that material. Therefore, the hours for certain lecture courses are being increased from three to four to permit an associated laboratory. Finally, the senior design project course will be offered for one and thee hours respectively for the fall and spring semesters. During the fall semester, students will be introduced to various business aspect of civil engineering also including leadership, ethics, public policy issues, and LEED.

Math Courses

To improve the math contents of the program MTH 116 "Brief Calculus With Applications II" was deleted in favor of QM 262 "Quantitative Analysis I" to provide material that is more useful to our students when they take upper level required courses and elective graduate construction courses such as scheduling, advanced scheduling, and construction simulation. Finally, special Topic and Project courses were introduced in place of the CON 409 Special Topics course in order to aid in alleviating difficulties by providing the opportunity to offer topic courses as needed during the transition period that has started in the current 2010-2011 academic year.

The University Library

The quality of the BU library and services received the lowest score from surveyed students. During the assessment interviews, most of the students indicated that do not go to the library as they found it to have inadequate resources and to be uncomfortable, hot, and generally not an environment that is conducive to studying. The quality of library has been a concern for quite some time and the department has raised the issue to the Bradley University administration. Recently, the university started taking steps towards updating the library and bringing it up to par with what one would expect to see at a 21st century institution of higher education.

All Vacant Positions Filled

This was a major issue in the Civil Engineering program but did adversely impact our Construction program. The hiring of a new faculty in Construction to replace a retiring professor will allow our Construction to offer more elective courses. In fact, during our study abroad program in 2009 and in 2011 elective courses were also taught by a Construction faculty form the American University in Cairo.

A New Senior Project in Civil Engineering

A new sequence of CE 493 and CE 498 was developed and is being implemented for the first time during the 2012-2013 academic year. The sequence includes a one credit hour senior project planning class in the fall and a three credit hour project

design course during the spring semester. Practicing engineers are hired during the spring to mentor the students through the completion of a real design project.

New GPS system

This was purchased and training for faculty was initiated in 2009-2010. It is now incorporated into our surveying laboratory. This course is required of all Construction majors.

LEED Accreditation

Dr. Al-Khafaji was appointed by Mayor Ardis of Peoria to be the Chairman of the Sustainability Commission. Our Construction and CEC majors attended many seminars and conferences on the subject. We also invited speakers into classes to speak on LEED. Finally, part of the requirement for the Construction Senior Project course is a section on LEED. This is an area where we believe that short courses on LEED will soon be offered to help our students.