ABET
Self-Study Report

for the Degree
Bachelor of Science in **Civil Engineering**

at

Alabama A&M University
College of Engineering, Technology and Physical Sciences
Department of Mechanical and Civil Engineering
Normal, Alabama 35762

June 27, 2018

CONFIDENTIAL

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APPENDICES

BACKGROUND INFORMATION

A. Contact Information

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B. Program History

The current Bachelors of Science in Civil Engineering degree program at Alabama A&M University (AAMU) was established in 1979 as the Department Civil Engineering within the School of Engineering and Technology. The university re-organized in the Fall 2011by merging and re- aligning several departments, schools and programs. This resulted in merging of the Civil and Mechanical Engineering departments and eliminating one Chair position. The combined department is named "Mechanical and Civil Engineering Department." Dr. Mohamed Seif of the previous Mechanical Engineering Department has been named Chair of this new combined department while Dr. Pabitra K. Saha as Co-ordinator of the Civil Engineering program till his retirement in July 2016. From January 2002 to August 2011, Dr. Saha served as Chair of the previous Civil Engineering Department. Dr. Nesar Ahmed served as Co-ordinator of the Civil Engineering program in the period between August 2016 to December 2017 while Dr. Mohamed Ashour has been assigned as Co-ordinator of the Civil Engineering program in January 2018.

C. Options

The Civil Engineering program of Alabama A&M University offers courses leading to the degree of Bachelor of Science in Civil Engineering. The curriculum offered is the General Program with four major discipline sub-areas of study: Environmental and water resources, Geotechnical, Structural and Transportation Engineering.

D. Program Delivery Modes

The Program in Civil Engineering is offered as a day program only. The Civil Engineering Program is not jointly accredited nor is seeking joint accreditation by more than one commission

E. Program Locations

The Program in Civil Engineering is offered at the campus of Alabama A&M University at Normal, Alabama only.

F. Public Disclosure

The Program Education Objectives, Student Outcomes, annual student enrollment and graduation data are accessible to the public and posted at

http://www.aamu.edu/academics/engineering-technology/cme/ce/pages/curriculum.aspx

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

The last general review of the Bachelor of Science in Civil Engineering degree program was completed in Fall 2012 by the Accreditation Board for Engineering and Technology (ABET) and addressed the following unresolved program concern:

Criterion 8. Institutional Support: This criterion requires that resources available to the program be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty. Faculty members have high teaching loads, receive salaries that are lower than for comparable positions, and are not provided with adequate resources for their professional development. Travel support has been minimal, there are no opportunities for course releases, and there are no start-up packages for new faculty. Institutional support has been increasing, but if this support is not sustained, the potential exists for the program to fall out of compliance with this criterion in the future.

Due-process response: The EACE acknowledges receipt of documentation demonstrating that the university administration is working to increase institutional support including faculty salaries and additional travel support.

Currently, sufficient travel support for professional development of a qualified faculty is provided by the institution in the program annual budget.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

Engineering Criterion 1 requires that the institution evaluate, advise, and monitor students to determine its success in meeting program objectives. AAMU admission is designed to accommodate students with diverse educational backgrounds and educational goals. Individuals seeking admission to the University must earn a score equivalent to an 18 on the ACT exam. Alabama students must have passed all three parts of the state high school graduation examination. Students transferring from other post-secondary institutions must have maintained a cumulative GPA of 2.0 ("C") at the last institution attended.

B. Evaluating Student Performance

Students entering as Civil Engineering majors are required to report to the program office and interview with the chairman and/or program coordinator as soon as possible. Each student admitted to the Civil Engineering program is assigned an advisor for the duration of the program. The advisor will help the student with proper course sequencing, course planning, and other academic matters.
The program office maintains an active file, which includes student's registration record of approved courses in addition to the information on the student's current academic progress. The advisor also works with the student to keep track of his/her progress towards obtaining the degree in addition to frequently checking with Degree Works software which keeps track of the student's progress.

By using the university's Banner system, the advisor monitors the student's progress and enforces course work prerequisite requirements. Students are required to take the prerequisite courses before approval to take the next course can be given. This is the common practice of the program and is stated in the Student Handbook. In order to preclude the identified problem, faculty members are required to check student records by using the existing curriculum flow chart and the Banner system during academic advising and registration periods. Students are not allowed to take advanced courses without appropriate prerequisite courses. The university Banner system enforces the Prerequisite Verification during course registration. In addition, the prerequisites for each course are also verified manually by the instructors at the beginning of each semester (**see Appendix E.1**). This is to reinforce the prerequisite policy and cause students to withdraw from the class if they do not have appropriate prerequisites. These measures prevent students from taking courses without appropriate prerequisites. All students must earn a C or better in each CE and EGC course in order to graduate (see section F).

C. Transfer Students and Transfer Courses

AAMU has a published policy for accepting and evaluating transfer students. The policy on the transfer of credits can be found in pages 11 through 16 of the 2017-18 University Undergraduate Bulletin the excerpt of which is given following this paragraph. All students are admitted to the University through the Office of Admissions. This office is responsible for examining the transcripts of transfer students to determine which courses can be accepted by the University. Students entering from International institutions must have their transcript evaluated by an independent organization such as World Education Services. All new transfer students are interviewed by the program Coordinator who assigns an academic advisor to the students. The advisor determines which courses can be accepted by the civil engineering program. To determine which courses can be accepted by the program curriculum, the student is asked to provide a catalog of the university from which courses are being accepted or the advisor will check the web site of the institution from the student is transferring. If the institution has ABET accredited engineering programs, the advisor makes sure that these courses are listed in that engineering curriculum. If the institution does not have an engineering program, no engineering named courses will be accepted. The advisor checks the course description (and science curricula if the course being considered is a science or mathematics course) to make sure that the course is equivalent to one of the required courses in the civil engineering program. Appropriate credit is given for courses being transferred from institutions on calendars other than semester calendars. Once these courses are approved, the advisor completes a standard university substitution form to have the courses substituted for required courses in the civil engineering curriculum through channels.

Excerpt from the 2017-18 University Undergraduate Bulletin

Credit is awarded to students who have earned grades on "conditional admission." Conditional admission, transfer and special students who are admitted to the University on a "conditional" basis will have one semester to remove the "conditional" status. If the "conditional" status is not removed, the student will be notified of his ineligibility to register for the next semester.

Transfer Students from Alabama Public Two-Year Colleges

The STARS Transfer Guide is to be honored for a period of four years from the date printed off the web site by all other public institutions of higher education within the state that offer programs in the specified discipline. Students should keep a copy of this guide for verification purposes. The STARS Transfer Guide remains valid and is guaranteed only if the student continues in the major specified on his/her transfer agreement. Changes made by accrediting and/or other regulatory agencies could result in specific requirements being added to the Transfer Agreement (i.e., No Child Left Behind Mandates). Any changes made by an institution in its degree programs will affect the transfer student in the same manner as the students native to the University.

Bulletin Year Issue - The students who use transfer guides will be graduated under the Bulletin in effect on date that the guide is printed unless they choose to go under the Bulletin in effect at time of transfer. This issue is covered in item #1 on the actual transfer agreement that prints out at the end of the transfer guide.

The STARS program governs the transfer of credits from Alabama public two-year institutions to Alabama four-year institutions. Students at the public two-year institutions who have a STARS Guide, can transfer all courses listed on that Guide from public two-year institution to any public four-year institution, including Alabama A&M University. There is a STARS Guide for almost every program offered at AAMU. Courses on the Guide will transfer and count toward half (50 percent) of the courses required for a specific degree program. The courses on the Guide are accepted under the same standards as courses taken at AAMU. If a "D" grade is acceptable for an AAMU course, then with the STARS Guide, the student can transfer the course from the public two-year institution with a "D."

Students intending to transfer to AAMU are encouraged to consult with their advisors and obtain a STARS guide from the AGSC/STARS Website, http://stars.troy.edu.

Transfer Students

Request that the registrar of each institution which you have attended forward an official copy of your transcript to the Office of Admissions. Students transferring from other postsecondary institutions must have maintained a cumulative GPA of 2.0 ("C") at the institutions from which credit is being transferred. Students who have 12 transferable credit hours or equivalent quarter hours of acceptable academic credit at the college or university level may be admitted to AAMU as transfer students. Students with fewer than 12 transferable credit hours will be admitted as a high school graduate and must request high school transcript and ACT/SAT scores; however, appropriate hours will count toward the AAMU degree.

Since AAMU awards credit for course work based on semester hours, credit hours awarded for course work completed at institutions which use a quarter system must be converted to semester hours upon transfer. In some instances, such conversion may result in the student receiving an insufficient number of credit hours to fulfill the required number of semester hours for a course at AAMU. If this happens, missing credit hour(s) must be made up in the course subject.

Transfer/Readmit

Alabama A&M University students who have attended another institution(s) after leaving the university must apply to return. Students must request that the registrar of each institution attended forward an official copy of your transcript to the Office of Admissions. An official copy of your transcript(s) must be in the Office of Admissions by the deadline date stated for the application, except from those school(s) in which applicant is currently enrolled. Transfer/Readmit students are considered for admission only when they have been in good standing with the institution from which they are transferring. This means that the student must have a cumulative grade point average of 2.0, and cannot be on probation or suspension. Students must provide official transcripts from all institution(s) attended and list each school on their application for readmission to the university. Colleges or universities attended will be reviewed based on the last institution attended first. Students must comply with all university guidelines governing re-entry and transfer student status.

Students who are re-admitted to the University after a two-year absence will be governed by the Bulletin under which they are re-admitted.

Readmission to the University

A student who has not attended AAMU for two or more regular terms should consult with the Office of Admissions to determine enrollment status and to apply for readmission. Students who are readmitted to the University after a two-year absence will be governed by the Bulletin under which they re-enter.

International Students

In order to ensure that required long distance coordination may be completed in time to accommodate admission for the desired term, admission applications must be received by the following deadline dates: Fall, May 15; Spring, October 1; Summer, March 15. Entering international students must provide an affidavit of financial support. Students must have maintained a grade point average of "C" in core courses; must have earned five passes on a national or a local examination; and must have attained a minimum score of 500 (paper-based test) or 61 (internet-based test) on the TOEFL (Test of English as a Foreign Language) or a 5.5 on the International English Testing Systems (ELS) Certification Examination. A letter of recommendation from an applicant's principal or college advisor is also required. International students who receive a certificate of eligibility (the I-20) from the University are eligible to transfer to other institutions after two semesters of attendance.

International Baccalaureate Credit

AAMU will award credit for courses taken toward the International Baccalaureate (IB) diploma. Students who receive the IB diploma will be granted college credit for scores of four (4) or higher on both higher level and standard level examinations. Students who do not receive the IB diploma will be granted college credits for scores of five (5) or above on IB higher level examinations only. IB score reports should be sent to the Office of Admissions for evaluation. The academic unit responsible for the student's program of study will determine the application of credits toward specific degree requirements. If awarded, credits will be recorded without grades or quality points, and will not, therefore, be included in the calculation of the grade point average.

Special (Non-degree) Students

Persons who wish to pursue certain courses without reference to a degree may apply for admission as special students. Applications for such persons will be considered by the Director of Admissions. A student may take a maximum of twelve (12) hours as a special student except persons seeking teacher certification as directed by the Alabama State Department of Education. Before permission is given to enter a degree program, applicants must meet all requirements for being admitted as a regular degree student. At that time, credit earned as a special student can be counted toward the degree, unless the statute of limitations has expired. All applicants who apply for "special student" status must apply for admission at least two weeks prior to the beginning of the semester or session for which he/she wishes to enroll in the University. Special students must reapply for admission at the beginning of each semester or session.

Transient Students

Students enrolled at another institution who wish to pursue courses at AAMU, to be transferred back to their institution, may apply for admission as transient students. A letter of approval/good standing from the home institution is required. Transient students must apply for admission to AAMU at the beginning of each semester or session.

Transfer of Students on Suspension from Another Institution

1. Temporary, Indefinite or Permanent Academic Suspension: A student who has been suspended from another college is eligible to apply for admission to the university after 12 months have elapsed.
2. Disciplinary Suspension: Students on disciplinary suspension from another institution must be eligible to return to that institution before being considered for admission to Alabama A&M University.

Second Bachelor's Degree

Students desiring a second bachelor's degree must complete another application for admission to AAMU.

Application Procedures and Deadlines

The following steps should be followed when applying for admission to AAMU:

1. Complete an AAMU Undergraduate Application Form. Return the completed form to the Office of Admissions, Alabama A&M University, Post Office Box 908, Normal, Alabama 35762 or apply online by accessing AAMU's website at www.aamu.edu.
2. Enclose with the application the required $30.00 non-refundable application fee. Only a cashier's check, certified check, or money order made payable to Alabama A&M University will be accepted.
3. Request that an official copy of the high school transcript or General Education Development (GED) test results be forwarded to the Office of Admissions.
4. Request that official test results for American College Test (ACT) or Scholastic Aptitude Test (SAT) be sent directly to the Director of Admissions by the testing agency.
5. Request that the principal or a guidance counselor at the student's high school send a letter of recommendation to the Office of Admissions.

6. A transcript of the applicant's high school record or General Education Development (GED) Test results must be received by the Office of Admissions before an application for admission can be considered complete. All transcripts must be official and must be received directly from the issuing institutions.
7. Deadlines for receipt of applications for admissions are listed below:

Semester Session	Application Deadline
Fall	June 15th
Spring	November 1st
Summer	April 15th

8. Residence hall spaces will be assigned in the following order: citizens of the State of Alabama, citizens of the United States, and citizens of other countries.
9. For additional information, contact the Office of Admissions, Alabama A&M University, Post Office Box 908, Normal, Alabama 35762, (256) 372-5245 or (800) 553-0816.

NOTE: When a student's attendance is interrupted in excess of two regular semesters, for any reason, an application for re-admission, accompanied by the $30.00 application fee, must be filed with the Office of Admissions.

Transfer of Credits

The Office of Admissions accepts transfer credits for the University for purposes of student classification (i.e., freshman, sophomore, etc.). The deans of colleges or department chairpersons approve transfer credits for degree programs.

No credits will be accepted for developmental (remedial) courses, orientation, or religion courses in a specific religion. Exploratory/overview/survey courses that discuss more than one religion are acceptable.

Acceptance of Transfer Credit

Students who transfer from another four-year institution or two year college must submit in advance for acceptance transcripts of all previous work done on the college level. Such transcripts must be sent directly from the institution at which the work was completed. Academic work completed at other schools not listed on the Admission Application will not be accepted for transfer purposes.

Students transferring from colleges and universities must have maintained a "C" average and be in good standing with the institution from which they are transferring. Students on academic probation or suspension are not in good standing, and, therefore, will not be accepted by Alabama A&M University.

Courses may transfer from accredited colleges and universities if the grade for that course earned at the offering institution meets the requirement of the program offering the degree being pursued at Alabama A&M University. For example: Only courses with grades of C or better may transfer for ENG 101/102 because a C or better is required in ENG 101/102 for all programs at Alabama A&M University. Only a grade of C or better is accepted for transfer of MTH 112 for all business programs, but a D or better is accepted for transfer of MTH 112 for social science programs. Students should check the grade requirements for specific programs to determine if the grade earned at the offering institution is transferable to Alabama A&M University.

A student who has been suspended from an institution because of poor academic performance is not eligible to enter Alabama A&M University immediately following academic suspension.

Statewide Transfer and Articulation Reporting System (STARS)

The STARS Transfer Guide is to be honored for a period of four years from the date printed off the web site by all other public institutions of higher education within the state that offer programs in the specified discipline. Students should keep a copy of this guide for verification purposes. The STARS Transfer Guide remains valid and is guaranteed only if the student continues in the major specified on his/her transfer agreement. Changes made by accrediting and/or other regulatory agencies could result in specific requirements being added to the Transfer Agreement (i.e., No Child Left Behind Mandates). Any changes made by an institution in its degree programs will affect the transfer student in the same manner as the students native to the University.

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Students intending to transfer to AAMU are encouraged to consult with their advisors and obtain a STARS guide from the AGSC/STARS Website, http://stars.troy.edu.

International Institutions

Postsecondary credits earned from international institutions, which are patterned after the British or other Non-American systems of grading, must be evaluated by an accredited evaluator of foreign education credits (for example, the World Education Services, Inc.). Applications for the evaluation may be secured from the Office of Admissions. Courses recommended by the World Education Services, Inc., will be accepted by Alabama A&M University. It is the responsibility of the student to execute, request, and pay the cost of such evaluations.

Since AAMU awards credit for course work based on semester hours, credit hours awarded for course work completed at institutions which use a quarter system must be converted to semester hours upon transfer. In some instances, such conversion may result in the student receiving an insufficient number of credit hours to fulfill the required number of semester hours for a course at AAMU. If this happens, missing credit hour(s) must be made up in the course subject.

Advanced Standing

In order for transfer credits to be accepted for advanced standing, all prior college work must be declared on the official application and be supported by official transcripts. No credit for advanced standing will be accepted after the end of the first semester of the student's enrollment. All grades must be "C" or above.

Continuing Students

AAMU students who desire credits taken at other collegiate institutions to be applied toward their degrees at AAMU must receive approval before enrolling at the other institution. Criteria for approval include current enrollment at AAMU and a cumulative GPA of at least 2.0. The completed Transient Student Form must be signed by the student's advisor and submitted to the Office of the Registrar. Students who receive such approval must submit official transcripts documenting the work as soon as it is completed, whether they still desire credit for the work or not. The official transcript must be sent by the institution attended. The total number of hours taken at another institution or the sum of credits taken at AAMU and another institution during the same term cannot exceed the maximum allowed during the same enrollment term at AAMU: 19 credit hours for fall and spring semesters; 10 SCHs for an eight or nine-week summer session. Policies regulating grades for transient students are the same as those for other transfer credits.

Advisors with the approval of the department chair will assess whether or not the courses for which the student intends to enroll will transfer back to AAMU based on a comparison of course descriptions in the AAMU Bulletin and the bulletin of the institution the student wants to attend. Approval of transient credit is contingent upon whether the intended course is equivalent to a course at AAMU and whether or not it will be accepted by the major department for fulfillment of degree program course requirements.

Students are reminded that they should carefully review the number of credit hours that will be awarded for courses taken at another institution. AAMU can only transfer the amount of credit awarded by the institution offering the course. Since AAMU awards credit for course work based on semester hours, credit hours awarded for course work completed at institutions which use a quarter system must be converted to semester hours upon transfer. In some instances, such conversion may result in the student receiving an insufficient number of credit hours to fulfill the required number of semester hours for a course.

Credit by Examination

ADVANCED PLACEMENT (AP) PROGRAM

Several A&M University departments award credit to students who have earned designated scores on Advanced Placement (AP) Program examinations of the College Entrance Examination Board. Advanced Placement examinations are taken at the end of an AP designed course of study in high school. The applicant must apply for advanced placement credit and provide results of said examination to the Office of Admissions. Students may contact their major departments to determine specific areas where AP credits will be accepted.

Credit, if awarded, will be recorded without grades or quality points and will not be included in calculation of the grade point average.

The University awards three (3) semester credit hours to students who score three (3) on the Advanced Placement Examination in the areas of Biology, Chemistry, English, Foreign Languages, History, Mathematics, Physics, Art and Music. Students scoring 4 or 5 may be awarded additional credit upon the recommendation of the appropriate department chairperson.

COLLEGE LEVEL EXAMINATION PROGRAM (CLEP)

CLEP, a nationwide system of credit-by-examination, is administered at many colleges and universities to award college credit to those who earn the designated minimum acceptable score. There are five general examinations and 30 specific subject examinations. The general examinations measure college-level achievement in five basic areas of the liberal arts: English composition, humanities, mathematics, natural sciences, and social sciences/history. The subject examinations measure achievement in specific college courses and are used to grant exemption from and credit for these classes. Students must check with the Testing Services Center to determine the availability of and their eligibility for subject examination.

The Testing Services Center at AAMU is an open center for CLEP administrations. Examinations are scheduled on an individual basis and are available year-round, with the exception of the English Composition with Essay Examination. This test is only offered in January, April, June, and October.

Enrolled students who want to take CLEP examinations to substitute for specific courses or who want to obtain additional information about the CLEP, should contact the Testing Services Center. Credit awarded through the CLEP must be recorded on a student's transcript no later than the end of the semester in which the examination is taken.

Military Education/Training Evaluation

The Office of Distance Education and Extended Studies evaluates military transfer credits for AAMU. For evaluation, appropriate official copies of certificates, diplomas, or transcripts should be forwarded to that office. The Guide of the Evaluation of Educational Experiences in the Armed Services as sanctioned by the American Council on Education (ACE) is the standard reference work used by AAMU for awarding credit for learning acquired through the military.

Experiential Learning: Non-Traditional/Prior Learning Credits

The University recognizes and awards non-transferrable credit for prior learning. Universally accepted evaluation and prior learning assessment techniques are used to evaluate this type of credit resulting from professional training, work-related learning, certifications, and military training. Experiential learning credits may not be used to meet requirements for general education courses. They may be used for elective credit or major credit with the approval of the department. Credits received through experiential learning do not count towards the minimum 25% credit residency requirement or satisfy the graduation requirement that one half of the major requirements must be taken at Alabama A&M University. Any student applying for experiential learning credit must be accepted to AAMU and enroll in at least one (1) credit hour. Experiential learning credit will be awarded for a maximum of 18 credit hours.

Other Non-Collegiate Sponsored Instruction

AAMU considers for college credit non-collegiate sponsored instruction approved and sanctioned by the American Council of Education and listed in the National Guide to Educational Credit for Training Programs. Appropriate official copies of certificates, diplomas or transcripts should be forwarded to the Office of Distance Education and Extended Studies for evaluation.

Visiting Student Program

A cooperative arrangement exists with the University of Alabama in Huntsville, Athens State University, Oakwood College and Alabama A&M University, whereby a student at any of the participating institutions may request permission to attend a class at one of the other schools. Conditions governing the granting of permission include the following:

1. The student must be enrolled full-time during the time he/she is participating in the Visiting Student Program.
2. His or her total load must not exceed the established maximum number of hours established at the home school.
3. The student must have an overall GPA of "C" or better.
4. The course must be unavailable at the student's home institution during that term.
5. The student's request must be approved by his/her advisor and other appropriate personnel.
6. Permission of appropriate personnel at the visiting institution is required and will be dependent upon availability of space for the visitor after the school's own students are accommodated.
7. Enrollment must be completed prior to the initial meeting of the class at the visiting institution.
9. Grades earned as a visiting student are calculated into the GPA at the home institution.
10. Courses taken under the Visiting Student Program can be counted in the GPA as a repeated course at AAMU.

In order to participate in this program, students must complete the Inter-Campus Visiting Student Form, which may be secured from the Office of the Registrar or online at Registrar's Office Forms.

Transient Students

AAMU students who desire credits taken at other institutions to be applied toward their degrees at AAMU must receive approval before enrolling at the other institution. Criteria for approval includes current enrollment at AAMU and a cumulative GPA of at least 2.0. The completed Transient Student Form must be completely filled out, signed and submitted to the Office of the Registrar. Students who receive such approval must have submitted official transcripts documenting the work as soon as it is completed, whether they still desire credit for the work or not. The official transcript must be sent by the institution attended. Send official transcripts to: Office of the Registrar, AAMU, PO Box 848, Normal, AL, 35762.

The total number of hours taken at another institution or the sum of credits taken at AAMU and another institution during the same term cannot exceed the maximum allowed during the same enrollment term at AAMU: 19 credit hours for fall and spring semesters; 10 credit hours for an eight or nine week summer session.

If the transient course is accepted back to AAMU, only the credit hours for the transient course is applied to the student's program here at AAMU. The grade for the transient course is not calculated into the GPA.

Advisors will evaluate whether or not the courses for which the student intends to enroll will transfer back to AAMU based on a comparison of course descriptions in the AAMU Bulletin and the bulletin of the institution the student wants to attend. Approval of transient credit is contingent upon whether the intended course is equivalent to a course at AAMU and whether or not it will be accepted by the major department for fulfilling of degree program course requirements.

Since AAMU awards credit for course work based on semester hours, credit hours awarded for course work completed at institutions which use a quarter system must be converted to semester hours upon transfer. In some instances, such conversion may result in the student receiving an insufficient number of credit hours to fulfill the required number of semester hours for a course at AAMU. If this happens, missing credit hour(s) must be made up in the course subject.

The State of Alabama has an AGSC/STARS system, which is a Statewide Transfer and Articulation Reporting System (STARS) developed by the Alabama Articulation and General Studies Committee (AGSC). The AGSC was created in March of 1994 by the Alabama State Legislature through ACT 94-202.

The purposes of this AGCS/STARS agreement are to:

1. Permit flexibility among institutions in the specific courses they may offer to enable students to fulfill general studies requirements.
2. Avoid increasing credit hour requirements for completion of baccalaureate degrees.
3. Develop the credit hour distribution requirements rather than specific course requirements.
4. Achieve a balance between general studies requirements and pre-professional or pre- major studies.
5. Establish faculty committees that will be responsible for course specifications, review, and approval.

Under AGSC guidelines, AAMU is required to accept and give credit for 1/2 of the total bachelor degree program hours (not to exceed 65 semester hours) upon transfer from a community/junior college. Four-year to four-year transfer work beyond 1/2 of the total bachelor degree hours would be evaluated on a course-by-course basis by the receiving institution.

D. Advising and Career Guidance

AAMU has a two-tiered approach for advising students. The first tier is the responsibility of the University College. The University College (UC) serves as the portal of entry for all freshmen and new students; provides academic and support services to help students succeed in their educational pursuits; and certifies lower division students' completion of requirements for entrance into their major departments. The general objectives are (a) to assist pre-college and currently enrolled students in acquiring the skills and competencies necessary for success in college; (b) to assist freshmen, and other students who have not officially declared majors, in a systematic progression through the freshman core curriculum by providing a comprehensive and effective advising system; (c) to ensure students complete the university-designated program of study and established exit criteria prior to release from University College; (d) to provide instructional programs to meet the varied intellectual needs of students; and (e) to provide a caring, nurturing and communing environment, where relevant skills and competencies, collegiate adjustments, career goals, and education plans-commensurate with students' abilities and interest are actualized.

Academic support services provided by the University College include the Academic Advising Center, the Academic Support Services, New Student Orientation Program (SOAR, BULLDOG WEEK, and OPERATION TRANSITION), TRIO/Special Programs, Testing Services, the Computer Instruction Assistance Laboratory, and the North Alabama Center for Educational Excellence (NACEE) Satellite Program. These support services are described in the University's Undergraduate Bulletin.

Prospective students entering the civil engineering program must meet all admission requirements established by the University and the College of Engineering, Technology, and Physical Sciences and must satisfy the following requirements:

- Adequate mathematics and sciences background, such as algebra, geometry, trigonometry, physics, and chemistry, preferably in high school
- Meet requirements to exit University College
- Complete EGC 101, Engineering Drawing and Graphics; MTH 125, Calculus I; PHY 213, General Physics I; and CHE 101/101L, General Chemistry I/Lab.

The second tier of the advising system is based on the individual interaction between a student and his/her major academic advisor (see section "B" above for details). During the pre-registration period in each semester the students meet their advisors. The advisor then goes through the student's records, Banner system and Degree Works system with the curriculum flow chart and determines the courses the student is qualified to take in the next semester based on the required prerequisite courses. The students then fill out a registration form with the list of approved courses which is then signed by the student and the advisor. The advisor then assigns the student a PIN number which is used by the student to register the courses in Banner. This rigorous advising process ensures that the student remains on the path of his/her graduation date target.

Additional Career Guidance

The internship and Co-Op programs offer work experience, full or part-time, directly related to a student's field of study for which the student can receive college credit, but not towards a degree in civil engineering. The purpose of an internship is to help a student learn industrial standards, standards of participation, responsibility, and communication. Internships are posted on the bulletin boards of the Civil Engineering office and also of College of Engineering, Technology and Physical Sciences located in AJ Bond Hall. Additional services are provided through the University's Career Development Services through Co-op program.

Career Development Services (CDS) is a member of the National Association of Colleges and Employers (NACE). NACE's JobWeb links the student to a number of helpful job search resources. As a member of NACE, CDS receives Job Choices magazines aimed at students in various disciplines, which are available to students at no cost. The CDS gives workshops and seminars and reviews resumes. Additionally, the CDS coordinates recruitment visits by local companies. During the advising appointment and usually following course advisement, the students are encouraged to ask questions pertaining to undergrad research opportunities, internships, and jobs or general curriculum and career questions.

E. Work in Lieu of Courses

With the exception of Advanced Placement (AP) Program of the College Entrance

Examination Board taken in high school and CLEP (College-Level Examination Program), the Civil Engineering program does not generally award credit in lieu of courses. The process is specified in the 2017-18 University Undergraduate Bulletin and can be found in the excerpt given section C above.

AAMU Civil Engineering students are encouraged to join in a cooperative education or internship position. The work experience is listed on the student transcript, but no credit is awarded toward the BSCE degree.

F. Graduation Requirements

To meet the requirements for graduation, a student must successfully complete the required 130 semester hours of course work as prescribed in the curriculum with an overall cumulative grade point average of 2.00. In addition, Civil Engineering undergraduate degree candidates must satisfy each of the following requirements:

- Complete the University General Education Curriculum requirements.
- Complete each course in major attempted at AAMU with a grade of "C" or better.
- Complete each EGC course attempted at AAMU with a grade of "C" or better.
- Take the Fundamentals of Engineering (FE) Examination prior to graduation.

University policy requires that students get their records checked with a program advisor within a designated time-period prior to graduation followed by a final check by the Academic Advisor of the College. Both advisors verify all program requirements have been met through review of the student's records. The Civil Engineering baccalaureate degree checklist is provided in Figure 1-1.

The title of the awarded degree as shown on the formal transcript and diploma is Bachelor of Science in Civil Engineering.

G. Transcripts of Recent Graduates

Transcripts and other student records may be requested during the site visit. The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted.

Figure 1-1a Civil Engineering BS Degree Checklist

B.S., CIVIL ENGINEERING		ALABAMA A & M UNIVERSITY GRADUATION CHECK-SHEET						CATALOG: 2017 - 2018				
								Semester Enrolled:				
NAME:	ID No:					Semester Graduating:		ADVISOR:				
GENERAL EDUCATION Requirements	HRS REQ	HOURS AAMU	ERND TRANS	GR	QPS	MAJOR Requirements	HRS REQ	HOURS AAMU	ERND TRANS	GR	QPS
[1]ENG 101 Composition I	3	3			0.00	CE 101 Intro to Civil Engineering	3				0.00
[1]ENG 102 Composition II	3				0.00	CE 201 Surveying	3				0.00
ENG 205 General Speech	3				0.00	CE 304 Environmental Engineering	3				0.00
ENG 201 or 202 or 203 or 204	3				0.00	CE 305 Hydrogeology	3				0.00
ART 101 or 220 or 221 or MUS 101	3				0.00	CE 306 Structural Analysis	3				0.00
[3]History Sequence I	3				0.00	CE 308 Soil Mechanics	3				0.00
[3]History Sequence II	3				0.00	CE 310 Transportation Sys & Materials	3				0.00
ECO 231 or 232	3				0.00	CE 401 Structural Steel Design	3				0.00
MTH 125 Calculus I	4				0.00	CE 402 Reinforced Concrete Design	3				0.00
PHY 213 General Physics I	4				0.00	CE 404 Hydraulic Engg & Design	3				0.00
PHY 213 General Physics II	4				0.00	CE 408 Foundation Design	3				0.00
CHE 101 General Chemistry I	3				0.00	CE 410 Transport Engg & Design	3				0.00
CHE 101L General Chemistry Lab	1				0.00	CE 424 Civil Engineering Practice	3				0.00
CHE 102 General Chemistry II	3				0.00	CE 470 Civil Engg Design Project	3				0.00
CHE 102L General Chemistry II Lab	1				0.00	CE 4xx or NRE 494 or 495	3				0.00
ORI 101 Survival Skills	1				0.00						
ORI 102 Survival Skills	1				0.00	Major Totals:	45	0	0.00		0.00
PED/MSC/HED Elective	2				0.00						
General Ed Totals:	48	3	0.00		0.00	DEPARTMENT Requirements				Major GPA	#DIV/0!
GENERAL Engineering Requirement		General Ed GPA			0.0000	MTH 126 Calculus II	4				0.00
EGC 101 Engg Drawing/Graphics	3				0.00	MTH 227 Calculus III	4				0.00
EGC 104 Comp. Programming [CL]	3				0.00	MTH 238 Applied Diff Equations	3				0.00
EGC 204 Engineering Analysis	3				0.00	EE 201 Linear Circuit Analysis I	3				0.00
EGC 205 Statics	3				0.00						
EGC 206 Dynamics	3				0.00	Dept Totals:	14	0	0.00		0.00
EGC 207 Strength of Materials	3				0.00	OTHER COURSES Taken					
EGC 207L Strength of Materials	1				0.00						0.00
EGC 305 Fluid Mechanics	3				0.00						0.00
EGC 305L Fluid Mechanics Lab	1				0.00						0.00
General Eng. Totals:	23	0	0.00		0.00						0.00
General Engineering GPA:					#DIV/0!						0.00
Total AAMU Hours: 3		Transfer Hours Total:			0.00						0.00
Total Quality Points: 0		Transfer Hours Used:			0.00						0.00
Total Hours Required for Degree: 130		Overall EGC/CE GPA:			#DIV/0!	Other Courses Totals:	0	0	0.00		0.00
		Overall GPA:			0.0000						
[1] Must earn grade of C or better.						Student _____					
[3] History Seq. HIS(101/102) or (201/202)									Advisor		
						Bulldog Email _____					
						Phone _____			Coordinator		

Figure 1-1b Example of Civil Engineering BS Degree Checklist on "Banner - Degree Works"

Legend

☑ Complete	≈ Complete except for classes in-progress	(T) Transfer Class	REG Registered Course
☐ Not Complete	≈ Nearly complete - see advisor	@ Any course number	* Prerequisites

Degree in Bachelor of Science in Civil Engineering					**Bulletin Year:** 2013-2014 **Credits Required:** 130 **GPA:** 3.700 **Credits Applied:** 137
Your GPA in EGC classes is 3.47					
☑ You meet the minimum GPA requirement					
☐ GenEd required	Still Needed: See **GenEd Requirements - CE** section				
☑ Major required					
☑ Core required					
GenEd Requirements - CE					**GPA:** 3.930 **Credits Required:** 65 **Credits Applied:** 61
Unmet conditions for this set of requirements: 65 credits are required. You currently have 61, you still need 4 more credits.					
☑ AREA I: WRITTEN COMPOSITION					
☑ English Composition I	ENG 101	Composition I	A	3	Spring 2016
☑ English Composition II	ENG 102	Composition II	A	3	Spring 2014
☑ AREA II: HUMANITIES & FINE ARTS					
☑ Fine Arts	ART 101	Art Appreciation	A	3	Spring 2014
☑ Literature	ENG 203	World Literature I	A	3	Fall 2014
☑ General Speech	ENG 205	General Speech	A	3	Spring 2015
☐ AREA III: NATURAL/PHYSICAL SCI & MATH					
☑ Calculus I	MTH 125	Calculus I	A	4	Spring 2014
☑ Physics I	PHY 105	Physics Lect/Lab I	A	4	Fall 2014
☐ Physics II	Still Needed: **1** Class in **PHY** 106*				
☑ AREA IV: HISTORY, SOCIAL, & BEHAV SCI					
☑ HISTORY SEQUENCE					
☑ World History I & II	HIS 101 HIS 102	World History I World History II	A A	3 3	Spring 2014 Spring 2015
☑ Principles of Macro or Micro Economics	ECO 232	Principles of Microeconomics	A	3	Fall 2014
☑ AREA V: OTHER REQUIREMENTS					
☑ PhysEd, Military Sci, or Health	HED 101	Personal & Community Health	A	2	Fall 2013
☑ Computer Programming	EGC 104	Computer Programming	A	3	Spring 2014
☑ General Chemistry I & Lab	CHE 101 CHE 101L	General Chemistry I General Chemistry Lab I	A A	3 1	Fall 2013 Spring 2014
☑ General Chemistry II & Lab	CHE 102 CHE 102L	General Chemistry II General Chemistry Lab II	A B	3 1	Spring 2015 Spring 2015
☑ Calculus II	MTH 126	Calculus II	A	4	Fall 2014
☑ Calculus III	MTH 227	Calculus III	A	4	Spring 2015
☑ Applied Differential Equations	MTH 238	Applied Differential Equations	B	3	Fall 2015
☑ Engineering Analysis	EGC 204	Engineering Analysis	A	3	Fall 2015
☑ Survival Skills	ORI 101 ORI 102	Survival Skills First Year Experience	A A	1 1	Fall 2013 Spring 2014
Major in Civil Engineering					**GPA:** 3.500 **Credits Required:** 61 **Credits Applied:** 61
☑ Intro to Civil Engineering	CE 101	Introduction to CE	A	1	Fall 2014
☑ Surveying	CE 201	Surveying	A	3	Fall 2014
☑ Environmental Engineering	CE 304	Environmental Engineering	B	3	Spring 2016
☑ Hydrogeology	CE 305	Hydrogeology	A	3	Spring 2017
☑ Structural Analysis	CE 306	Structural Analysis I	A	3	Fall 2016
☑ Soil Mechanics & Lab	CE 308 CE 308L	Soil Mechanics Soil Mechanic Lab	B A	3 1	Spring 2017 Spring 2017
☑ Transportation Systems	CE 310	Transport System	A	3	Spring 2016
☑ Structural Steel Design	CE 401	Structural Steel Design	B	3	Spring 2017
☑ Reinforced Concrete Design	CE 402	Reinforced Concrete Design	B	3	Fall 2017
☑ Hydraulic Engineering & Design	CE 404	Hydraulic Engineering & Design	A	3	Spring 2017
☑ Foundation Design	CE 408	Foundation Design	B	3	Fall 2017
☑ Transportation Engineering & Design	CE 410	Transportation Engineering	A	3	Fall 2016
☑ Civil Engineering Practice	CE 424	CE Practice	B	3	Fall 2017
☑ Civil Engineering Design Project [CS]	CE 470	CE Project	A	3	Spring 2017
☑ CE or NRE Elective	CE 480	Special Topics	A	3	Fall 2016
☑ Engineering Drawing;/Graphics	EGC 101	Engineering Drawing & Graphics	A	3	Fall 2013
☑ Fluid Mechanics & Lab	EGC 305 EGC 305L	Fluids Mechanics Fluid Mechanics Lab	C A	3 1	Fall 2016 Fall 2016
Core Requirements - CE					**GPA:** 4.000 **Credits Required:** 4 **Credits Applied:** 4
☑ Linear Circuit Analysis I & Lab	EE 201 EE 201L	Linear Circuit Analysis I Linear Circuit Analysis I Lab	A A	3 1	Fall 2015 Fall 2015

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

The Civil Engineering program at Alabama Agricultural and Mechanical University has accepted and implemented the use of the term "objectives" as described in the ABET Engineering Criteria for 2017-18. Hence, the program educational objectives are broad statements that describe what the faculty of the Civil Engineering program at Alabama Agricultural and Mechanical University are preparing graduates to attain within a few years after graduation.

Mission Statement

The mission statement for Alabama Agricultural and Mechanical University is available online at the AAMU website (http://www.aamu.edu/aboutaamu/pages/default.aspx):

Institutional Mission
Alabama Agricultural and Mechanical University reflects the uniqueness of the traditional land-grant institution combining teaching, research, service, liberal arts, and vocational fields. The University offers baccalaureate, masters, and doctoral level degrees (that are compatible with the times) to all qualified and capable individuals who are interested in further developing their technical, scientific, professional, and scholastic skills and competencies. The University operates in the three-fold function of teaching, research, extension and other public service. Alabama A&M University, a center for excellence, provides an educational environment for the emergence of scholars, scientists, leaders, critical thinkers, and other contributors to a global society. In cooperation with business, industry, governmental agencies, and other private and community-based institutions, Alabama A&M University provides a laboratory where theory is put into practice globally. Further, the University is committed to:

Excellence in education and the creation of a scholarly environment in which inquiring and discriminating minds may be nourished;
Education of students for effective participation in local, state, regional, national, and international societies;
Search for new knowledge through research and its applications;
Provision of a comprehensive outreach program designed to meet the changing needs of the larger community;
Programs necessary to address adequately the major needs and problems of capable students who have experienced limited access to education, and
Integration of state-of-the-art technology into all aspects of University functions.

In cooperation with businesses, industry, governmental agencies, and other private and community-based institutions, Alabama A&M University provides a laboratory where theory is put into practice, in a productive environment.

The Civil Engineering program is committed to preparing its students for immediate entry into the engineering profession as well as into graduate programs of study. It is also committed to research in order to place its faculty and students at the forefront of development in the profession of civil engineering. This brings the latest advances into the classroom positioning students to lead the profession into the twenty-first century. The program offers opportunities to students who previously had limited access to education and trains these students to contribute to the civil engineering profession. It thereby reflects the University's scope and mission.

Program Educational Objectives

The program of Civil Engineering has established a set of educational objectives that are consistent with the mission of Alabama A&M University (http://www.aamu.edu/aboutaamu/pages/default.aspx) and the ABET general criteria for basic level programs. These educational objectives have been developed over a period of time and are consistent with the ABET Engineering Criteria for 2018-2019.

The Program Educational Objectives of the Civil Engineering program are to produce graduates who, after the first few years of their graduation, have:
Successfully practiced civil engineering in industry and/or government
Continued to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)
Recognized the need for scholarship, leadership, and services to society.

These Program Educational Objectives (PEOs) are published in the Department's brochure, web site, Student Handbook, and are shown in the University's new Undergraduate Bulletin (2017-2018).

http://www.aamu.edu/academics/engineering-technology/cme/ce/pages/curriculum.aspx

Original program educational objectives (PEOs) were developed in 1999 by the CE program faculty in consultation with the program constituencies. They have been revised periodically in response to assessment findings, and to incorporate feedback from alumni, employers, and the CE Advisory Board. These PEOs are available to the general public in the 2017-2018 AAMU Undergraduate Bulletin that is available online

http://www.aamu.edu/administrativeoffices/academicaffairs/Documents/Bulletins/Bulletin_2017-2018.pdf

For reference, the applicable page from the 2017-2018 Undergraduate Bulletin is reproduced below in Figure 2-1.

In addition to publishing the objectives in the AAMU Civil Engineering website, they are also included in the CE Undergraduate Student Brochure (Figure 2-2 and Appendix E.3), which is a

document that is provided to prospective students and also to students at orientation. The brochure is also available online at the Civil Engineering Web site (http://www.aamu.edu/Academics/engineering-technology/CME/ce/Documents/CE-Brochure.pdf)

Consistency of the Program Educational Objectives with the Mission of the Institution

As shown in Table 2-1, our program objectives are consistent with and directly supportive of the mission of the institution. Stated succinctly, PEO #1: ability to successfully practice civil engineering in industry and/or government support the AAMU Mission elements 1, 2,3,5,6 (Excellence in education, Effective participation in societies, Search for new knowledge integrating of state–of-the-art Technology in addition to training to students who previously had limited access to education); PEO #2: the ability to continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.) support the AAMU Mission elements 1,3 (Excellence in education, Search for New Knowledge); and PEO #3: Recognize the need for scholarship, leadership, and services to society support all six elements AAMU Mission (Excellence in education, Effective participation in societies, Search for New Knowledge integrating of state–of-the-art Technology, Comprehensive Outreach in addition to training to students who previously had limited access to education)

Table 2-1 Map of civil engineering program objectives and the mission of the institution.

AAMU Mission	CE PEOs		
	PEO #1: Successfully practice civil engineering in industry and/or government	PEO #2: Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	PEO #3: Recognize the need for scholarship, leadership, and services to society
Excellence in education and the creation of a scholarly environment in which inquiring and discriminating minds may be nourished;	X	X	X
Education of students for effective participation in local, state, regional, national, and international societies;	X		x
Search for new knowledge through research and its applications;	X	X	X
Provision of a comprehensive outreach program designed to meet the changing needs of the larger community;			X
Programs necessary to address adequately the major needs and problems of capable students who have experienced limited access to education; and	X		X
Integration of state–of-the-art technology into all aspects of University functions.	X		X

Program Constituencies

The faculty identified that the most important constituencies to our program are the **Students, Faculty, Alumni, Employers, and Advisory Board**. In consideration of the size and resources of our program, the Department decided to focus on these five constituencies. Details about these constituents and the means by which they provide input to the program are shown below.

Students are the immediate beneficiaries of the program and subsequently have expectations to receive an education that will prepare them for a professional career in civil engineering or enable them to undertake graduate studies, or contribute to society in other ways. As such, undergraduate civil engineering students are constituents of the program. Their parents and families also have an obvious interest in the program, although they are not considered direct constituents. Students participate in the assessment process through individual course assessment surveys, and the senior exit survey.

Alumni have a vested interest in the educational program through their alumni status, financial support, as employers of future graduates, and as family members that become students. They are the "products" and strong supporters of the academic program. Their careers demonstrate the accomplishment of the PEOs. Alumni participate in the assessment process through the annual alumni survey and participation on the professional advisory board.

The ***faculty*** has the academic responsibility for the curriculum and for education of the students. Faculty members develop and deliver the educational program that provides for a professional career in civil engineering and interact with each of the other constituents. The program and curricula they administer is a major means of accomplishing all of the program's objectives. They have a strong vested interest in the program and the upholding of standards of quality. Faculty members participate in the assessment process through individual course assessment, department faculty meetings and interaction with the industry advisory board.

Considering the high percentage of our graduates who enter the workforce, employers of our graduates are also an important constituency. The employers of our graduates need young engineers who are technically capable good problem solvers committed to self-improvement through life-long learning. Our educational objectives are consistent with all of these key competencies. Potential employees include small and large consulting and construction companies operating within the region as well as nationally and internationally; Departments of Transportation throughout the US; and other local, state and federal government agencies. Employers participate in the assessment process through the industry advisory board.

The **Civil Engineering Advisory Board** for the civil engineering program is primarily established to represent our employer constituents. However, it is common for an employer to be an alumnus. In fact we find that alumni who are employers of our students are often our best advisors based on their strong desire to serve the civil engineering program. Placement records show that our students are employed extensively by the construction industry, private sector consulting, state agencies (departments of transportation and environmental services), and with city and county government agencies. The Board is made up of active and retired professionals representing a balanced cross section of various civil engineering disciplines. The current Board

members are listed in Table 2.2 along with their professional affiliation. Our board members are volunteers and provide their own resources to attend meetings usually conducted at least once in every semester.. The board members also evaluate the capstone design project presentations and conduct the exit interviews of the graduating seniors.

Table 2.2 - Civil Engineering Advisory Board Membership

Last	First	MI	E-mail Address(es):	Company	
Brown	Maqueshia		brownm@dot.state.al.us	Alabama Department of Transportation (ALDOT)	Alumni
Colar	Justin	D	Justin.d.colar@usace.army.mil	U.S. Army Corps of Engineers	Alumni
Foreman	James	W	j4man@comcast.net	Retired AAMU Professor	
Hall	Alicia		halla@dot.state.al.us	ALDOT	Alumni
Leonard	Dejarvis		leonardd@dot.state.al.us	ALDOT	Alumni
Liaw	Goang	S	Goang.liaw@aamu.edu	Retired AAMU Professor	
Moran	Michael	J	2mjmoran@gmail.com	Retired from U.S. Army Corps of Engineers	
Purifoy	Claudinette		Claudinette.Purifoy@us.army.mil	U.S. Army Corps of Engineers	Alumni
Qualls	Gregg		gqualls@hiwaay.net	Qualls engineering	
Rice	Alou		alou.c.rice@sam.usace.army.mil	U.S. Army Corps of Engineers	Alumni
Pabitra	Saha		pabitra.saha@gmail.com	Retired AAMU Professor	
Stanley	Algernon		alstanley@msn.com	Stanley Construction Company, Inc.	
Taylor	Matt		mtaylor@servicesteelinc.com	Service steel inc., Huntsville, AL	
Thomas	Ron		rthomas@volkert.com	Volkert and Associates, Inc	Alumni
Torres	Antonio		Tony.Torres@hnd01.usace.army.mil	U.S. Army Corps of Engineers	
Wilkins	Charles		cwilkins@gwjones.com	G. W. Jones & Sons	

Process for Revision of the Program Educational Objectives

The Civil Engineering program has established a long-term relationship with alumni and their respective employers. The program has received feedback from the alumni through graduate surveys that have been conducted regularly by the department. The program's educational objectives have been developed to be consistent with the mission of AAMU and in conjunction with the survey results from the graduates.

The process to establish and review the programs educational objectives involves various constituencies which consist of students, faculty, alumni, employers and members of the Advisory Board. To ensure the program is meeting its educational objectives, the Department has designed several assessment tools to evaluate the process. The Department uses a student feedback form, a graduating senior exit interview form to collect data and comments from current students and our graduates. These data are analyzed and used for the improvement of the program. In addition, suggestions from the Advisory Board and faculty members are great resources for future enhancements to the program.

The processes used by the Civil Engineering Program to assure achievement of program educational objectives are guided by an **overall** process diagram entitled "The Continuous Improvement of the Civil Engineering Program" (Figure 2.3) and by an enhanced more specific program quality control diagram (Figure 2.4: Continuous Quality Improvement Feedback Diagram). These diagrams show how each constituent is involved in developing and improving the educational objectives and program outcomes at the scheduled times. Constituent involvement in the assessment process is also included in the diagram. This diagram serves the dual purpose of providing the processes used to monitor the overall program quality as well as processes used to assure achievement of program objectives. The diagram shows how the Department uses Assessment Tools such as Student Feedback form, graduating senior Exit Interview form, CE Graduate Survey form and Course Evaluation form to collect data and comments from Constituencies such as Students and CE Alumni. Additional data are also obtained through evaluation of Student Course Performance r. Furthermore, suggestions from the Advisory Board and Faculty members are resources for future enhancements to the program. These data are analyzed by the faculty and used for the assessment of the program achievement. Final action for any program improvement is taken at the CE Faculty Meeting as shown in the diagram, as guided by the Governing Elements such as University Mission & Goal, ABET Criteria and Professional Development.

A special form entitled "Continuous Improvement of Civil Engineering Program," (Appendix E.4) is used extensively by the Department to document the findings of such analysis, the action taken and recommendations to improve the program. A number of improvements to the program have been made as a result of these assessment tools. Additional documents that outline the various Continuous Improvement Processes will be provided to the Evaluation Team during their visit.

The *program objectives* are subject to change and modification as part of the continuous improvement process. Although the program objectives are evaluated by the constituencies every two to three years, any modification or change can only be considered for implementation at a two year interval when the new University Undergraduate Bulletin is published. The primary method of assessment is the survey of the constituents through advisory board members, exit interview and students' feedback. Sample survey results are included in Appendices E.6 & E.8 Complete documentation will be made available during the ABET visit in Fall 2018.

Figure 2-1 2017-2018 AAMU Catalog Reference to Program Educational Objectives

Department of Mechanical & Civil Engineering and Construction Management

Dr. Mohamed Seif, Chair
314 Arthur J. Bond Hall
Voice: (256) 372-5889, Fax: (256) 372-5888, mohamed.seif@aamu.edu

Introduction

The Department of Mechanical & Civil Engineering and Construction Management offers programs of study at both undergraduate and graduate levels. For undergraduate students, we offer ABET accredited programs leading to degrees of bachelor of science in civil engineering (BSCE) and bachelor of science in mechanical engineering (BSME). The department also offers graduate instruction and research leading to Master of Engineering in Materiel Engineering with emphasis on Mechanical Engineering (ME) or Civil Engineering (CE). Students in the Department have access to the most modern instructional and laboratory infrastructure. Among the faculty are internationally recognized authorities in their respective fields of expertise. Mechanical Engineering and Civil Engineering are extremely versatile technical fields with the most promising career prospects.

The degree program in Civil Engineering (BSCE) provides a course of study deigned to give students a through grounding in both theoretical and practical areas of Civil Engineering. The civil engineer plans, designs, construct and maintains physical works and facilities that are deemed essential to modern life. Civil Engineering includes the broad categories of construction, structural engineering, soil mechanics and foundations, transportation systems, water resources, hydraulic engineering, environmental engineering, surveying and mapping, city planning and municipal engineering.

Mission Statement/Objectives

The program educational objectives of the Civil Engineering Program are to produce graduates who, after the first few years of their graduation, have:

1. Successfully practiced civil engineering in industry and/or government
2. Continued to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)
3. Recognized the need for scholarship, leadership, and services to society.

Financial Assistance/Scholarships

Financial assistance is available through the Office of Student Financial Aid in three major types of aid: Federal Aid, State Aid and Institutional Aid. The College of Engineering, Technology and Physical Sciences has offered the following scholarships to eligible engineering students in the recent past and anticipates continuation of the same in the future:

- The Boeing Scholarship
- The American Society of Civil Engineers, Alabama Section. Awarded to a senior in Civil Engineering/AAMU
- The Birmingham Construction Industry Authority Scholarship. Awarded to an eligible Engineering major interested in construction
- Alabama Space Grant Consortium Scholarship
- Undergraduate/graduate research assistantships through various grants and research contracts

Programs Offered

Bachelor of Science in Civil Engineering Degree		
MAJOR	CONCENTRATION	MINOR
Civil Engineering		

Additional scholarships are available to Civil Engineering majors only, through an annual grant funded by the Alabama Licensing Board for General Contractors. In addition, a variety of scholarships are offered through national competitions by organizations such as the American Institute of Steel Construction, American Concrete Institute, National Society of Professional Engineers, and American Society of Civil Engineers, etc. Announcements are posted on the department bulletin board as they are available.

Figure 2-2 CE Undergraduate Student Brochure (Page 2 of 2 - see Appendix E.3 for the Complete Brochure)

WHY ABET ACCREDITATION MATTERS

- ✓ ABET is a trusted standard for employers worldwide.
- ✓ Demonstrates commitment to quality education.
- ✓ Employers prefer graduates from ABET accredited programs.
- ✓ Prepares graduates to enter workforce through professional licensure, registration and certification.
- ✓ Salary $65 K - $130 K (median $82 K, source: US Bureau of Labor Statistics, https://www.bls.gov)
- ✓ Learn more about ABET: www.abet.org

MISSION

The Civil Engineering Program is committed to preparing its students for immediate entry into the engineering profession, as well as the graduate programs of study. The Program is also committed to research and development in order to place its faculty and students at the forefront of development in the profession of civil engineering at the state and national levels. The latest advances are brought into the classroom through continued research, thereby positioning the students on the cutting edge of the profession.

The program offers opportunities to students with previous limited access to education the training needed to make professional contributions to the civil engineering enterprise.

EDUCATIONAL OBJECTIVES

The objective of the Civil Engineering program is to produce graduates who,

1. Successfully practice civil engineering in industry and/or government,
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.), and
3. Recognize the need for scholarship, leadership, and services to society.

FACULTY & FACILITIES

The Program's faculty members have a broad range of experience in the academic and industrial environment. Each faculty has significant involvement in research or consultancy activities. The Department receives research grants from NASA, Army, Air Force, AMCOM, FHWA, ORNL, ALDOT, and other agencies.

The Program is housed in a modern Engineering Building and is continuously housing state-of-the-art laboratories and computing facilities, equipment, and other modern engineering tools to meet the requirements of the of the industry.

The program provides the following laboratories for teaching/research purposes:

- CAD/Microcomputer laboratory with cutting edge civil engineering design software packages
- Surveying
- Soil Mechanics (Geotechnical) and Environmental
- Concrete
- Structures
- Transportation/Material Testing
- Hydraulics

All of these laboratories provide undergraduate students an excellent opportunity to obtain a comprehensive learning experience in civil engineering. In addition, our small class sizes provide exceptional individualized learning opportunities for our students.

CAREER OPPORTUNITIES

What jobs are available for the civil engineering graduates? Many professional career opportunities in Transportation, Structural, Construction, Environmental, Geotechnical, Municipal, Industrial and Consulting Engineering, Architecture, Engineering Management, and Military Services are available for civil engineering graduates.

FINANCIAL AID AVAILABLE

Financial aid is available through scholarships, assistantships, and campus jobs, funded through federal, state, industrial endowment and research projects.

STUDENT ACTIVITIES

There are professional organizations available for CE students.

ASCE American Society of Civil Engineers

Society of Women Engineers

These organizations benefit the students through networking and by attending workshops and conferences, and national competitions.

Figure 2.3 Continuous Improvement of Civil Engineering Program

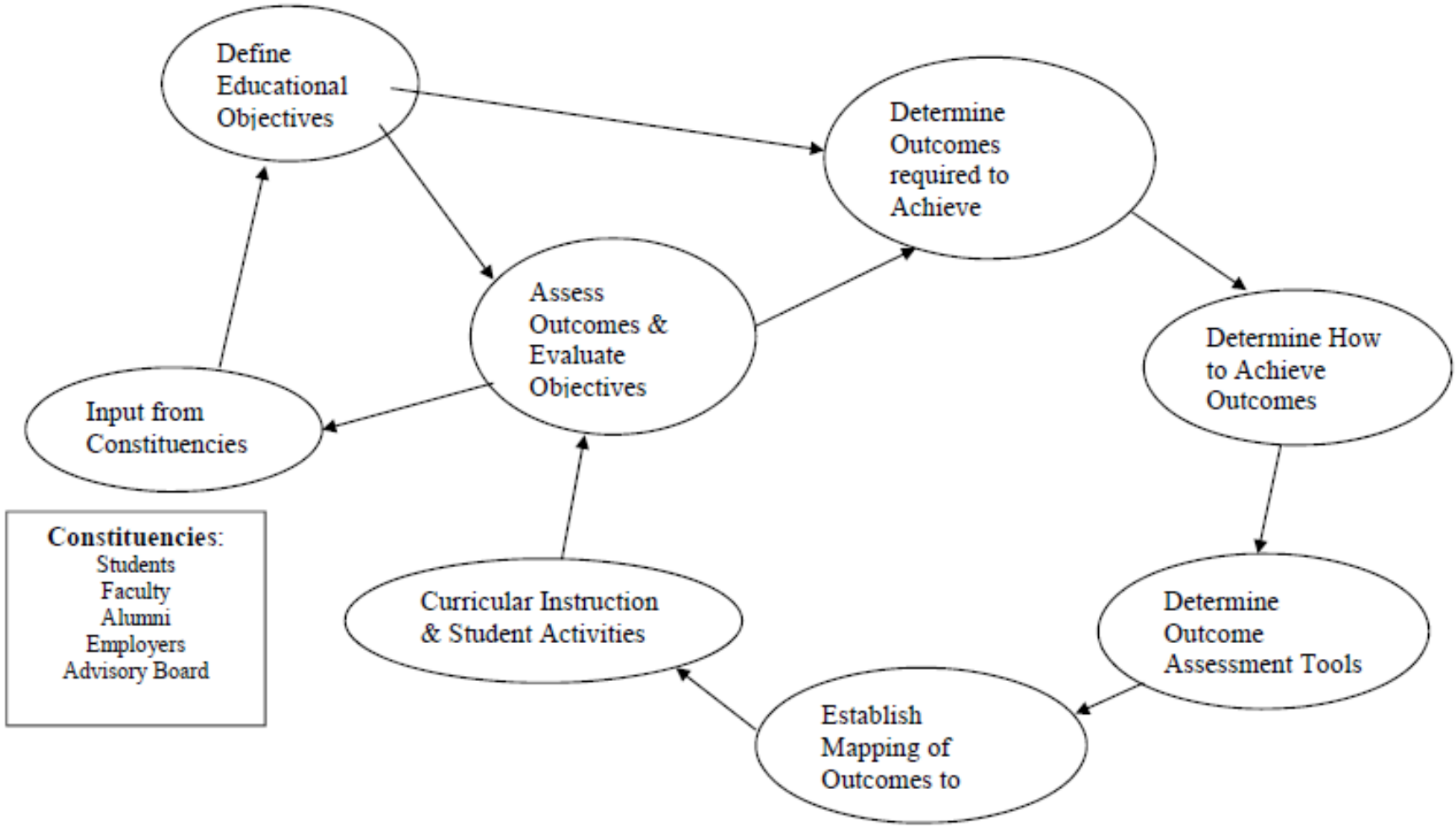
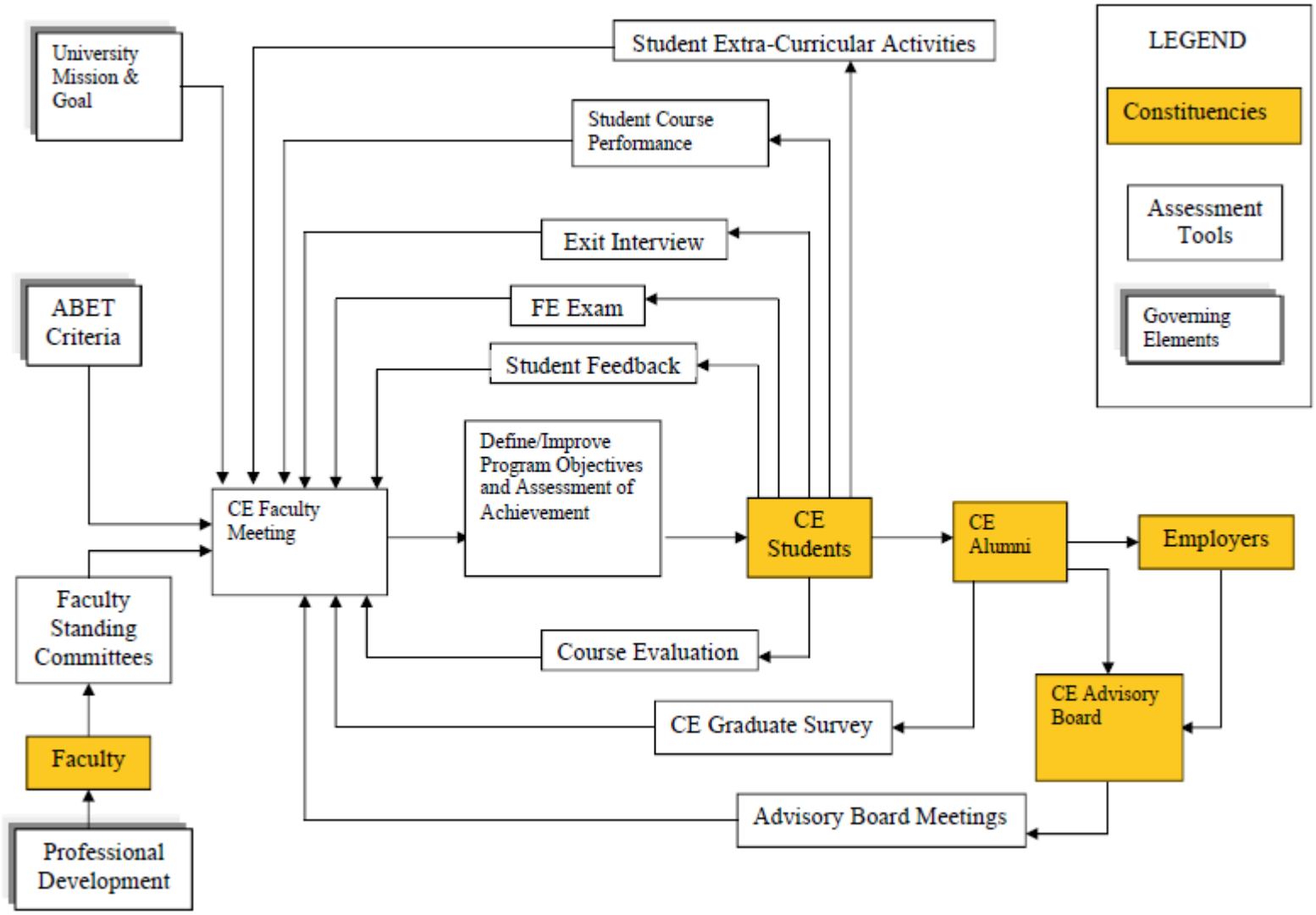


Figure 2.4 Continuous Quality Improvement Feedback Diagram



CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

Engineering Criterion 3 states that …"each program must have an assessment process that is evidenced by documented results." The seven student outcomes that follow our Program Educational Objectives have been identified to meet the outcomes requirements of ABET EAC Criterion 3 and the Civil Engineering Program criteria. As recommended by our faculty and resulting from an extensive outreach effort to our constituencies, they have been reorganized slightly into a logical grouping of knowledge and skills. The program faculty have not added any additional outcomes. We have also adopted the Engineering Criteria definition of outcomes as narrower statements that describe what students are expected to know or be able to do by the time of graduation from our program. The seven student outcomes for the Civil Engineering program at Alabama A&M University are listed below.

Students who graduate from Alabama A&M University in the Civil Engineering program will have the capability to:

1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering; (a, c, e, k), (objectives 1, 2)
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data; (a, b, d, e, g, k), (objectives 1, 2)
3. Communicate with multidisciplinary teams; (d, f, g), (objectives 1, 3)
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions; (f, h, j), (objectives 1, 3)
5. Continue their education and professional development; (i, j, k), (objectives 2, 3)
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities; (a, c through k), (objectives 1, 2, 3) and,
7. Use any modern engineering tools necessary for engineering practice (b, c, e, k), (objectives 1, 2).

The notes indicated in the first set of parentheses at the end of each student outcome statement above describe how it relates to the outcome requirements of Criterion 3 (a through k) of the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET) and the second set to the Program Educational Objectives of AAMU Civil Engineering. Table 3-1 presents the direct mapping between the student outcomes developed for the BS-CE program and the ABET (a) through (k) criteria. This mapping is used for evaluation of attainment of the student outcomes and to ensure that the individual ABET (a) through (k) criteria are addressed.

The student outcomes for the Civil Engineering degree program can be easily reached by the public through the department's web page. The direct link is:

http://www.aamu.edu/Academics/engineering-technology/CME/ce/Documents/Student_Outcomes.pdf

Table 3.1 Mapping of CE Program Outcomes to the Outcome Requirements of Criterion 3

	CE Program Outcomes						
ABET Outcome Requirements of Criterion 3	1	2	3	4	5	6	7
(a) an ability to apply knowledge of mathematics, science, and engineering.	X	X				X	
(b) an ability to design and conduct experiments as well as analyze and interpret data.		X					X
(c) an ability to design a system, component, or process to meet desired needs.	X					X	X
(d) an ability to function on multi-disciplinary teams.		X	X			X	
(e) an ability to identify, formulate, and solve engineering problems.	X	X				X	X
(f) an understanding of professional and ethical responsibility.			X	X		X	
(g) an ability to communicate effectively.		X	X			X	
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context.				X		X	
(i) a recognition of the need for, and an ability to engage in life-long learning.					X	X	
(j) a knowledge of contemporary issues.				X	X	X	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	X	X			X	X	X

B. Relationship of Student Outcomes to Program Educational Objectives

The notes indicated in the second set of parentheses at the end of each student outcome statement in the previous section describe how it relates to the Program Educational Objectives (PEO) of the Civil Engineering Program. The mapping of the student outcomes to the PEOs is shown in Table 3.2. Both the PEOs and student outcomes are accomplished through the sound and rigorous curriculum of the BSCE degree program. This curriculum encompasses the specific knowledge and skills requirements identified in the ABET criteria.

In addition, these program outcomes also satisfy the program criteria set by ASCE in terms of CE curriculum topics and our faculty qualifications. More details of these discussions can be found in Section "PROGRAM CRITERION".

Table 3.2 Mapping of CE Student Outcomes to CE Educational Objectives

CE Educational Objectives	CE Student Outcomes						
	1	2	3	4	5	6	7
1. Successfully practice civil engineering in industry and/or government	X	X	X	X		X	X
2 Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X	X			X	X	X
3. Recognize the need for scholarship, leadership, and service to society			X	X	X	X	

Each of the student outcomes mentioned above have been defined by a few high level performance criterion so that they can be communicated to students, integrated into the curriculum and measured in a consistent and reliable manner. Table 3.3 shows performance criterion for each outcome for the Civil Engineering program. Since engineering faculty members only have a direct influence on the courses taught within our program, the integration of student outcomes is guaranteed in the engineering courses alone. Student study in math and basic sciences enhances achievement of outcomes, but engineering faculty members have no consistent ability to influence change in courses taught outside of our program.

Table 3.3 Student outcomes and performance criteria

Student Outcome	Performance Criteria	
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering	1a	Identify necessary basic physical principles and/or theorems and use them to formulate problems as mathematical (or Experimental) problems.
	1b	Solve engineering problems applying the theorems of Mathematics (Calculus and Statistics) and using the principles of Science.
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data	2a	Able to formulate and design an Experiment to obtain data in support of an engineering problem
	2b	Knowledge of equipment, sensors and data acquisition methods
	2c	Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data
3. Communicate with multidisciplinary teams	3a	Individual – Contributes to team project, work
	3b	Individual – Takes responsibility and values other team Members
	3c	Acknowledgement of sources
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions	4a	Awareness of sustainability, and environmental and global impact
	4b	Understand engineering economics
	4c	Understands contemporary technical issues in the field related case studies
5. Continue their education and professional development	5a	Able to conduct literature search using library and Internet for assignments
	5b	Demonstrated professional membership and attendance at professional seminars, meetings, and field trips
	5c	Understand the importance of professional licensing (FE & PE)
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	6a	Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis
	6b	Alternative Designs
	6c	Demonstrates knowledge of professional code of ethics and acknowledges sources
7. Use any modern engineering tools necessary for engineering practice	7a	Able to write a computer program to solve engineering problem
	7b	Able to use modern equipment to solve engineering problem through laboratory Experiment or field work
	7c	Able to use computer software for engineering analysis, design, or Experimental work

CRITERION 4. CONTINUOUS IMPROVEMENT

The philosophy of continuous improvement of academic programs using outcomes-based assessment began at Alabama A&M University in 1999. Since then, the Civil Engineering Program (then a Department) has adopted the following assessment tools to evaluate student outcomes:

- Alumni surveys
- Senior exit surveys
- Outcomes-based student course evaluations and Action Plan documents for continuous quality improvement
- Regular consultation with the CE Industry Advisory Board

A comprehensive outcomes assessment process has been established to verify that graduating seniors in the Civil Engineering Program have achieved the seven outcomes. Evidence supporting this achievement is gathered in a variety of ways. The three primarily sets of evidence come from the course reports (which contain examples of student work in addition to the instructor materials and report), graduating senior surveys, and direct measurement activities. The following paragraphs describe each of these sources and their importance in the outcome assessment process.

The course combines results across sections and among related courses. Since the CE faculty is small (4 members), the faculty serves as a committee of the whole to evaluate outcome achievement for all courses in the program. The evidence measures are validated through independent analysis of the material. All evidence that suggest problems are combined and reviewed by the faculty members to determine whether the problem can be corrected within the scope of a particular course or the problem is of broader curricular impact. In all cases the results are documented and reviewed annually by the faculty.

Each semester graduating seniors receive a short survey regarding their experience at Alabama A&M. They are asked specifically about the learning outcomes and how well their education at Alabama A&M has prepared them for their engineering careers. They are also asked to rate the level of service they received in regard to teaching and advising. These surveys are summarized and reviewed by the entire faculty. In the senior exit surveys, it was desired to achieve at least 70% of respondents to strongly agree or agree on each survey question. The faculty believes that a minimum average score of 70% on the focused question/assignment is also necessary to show that the outcome was achieved for that particular course.

The direct measurement activities (focused question/focused assignment) may include (among others) a unique written assignment, a unique question on a course test or final exam, or a laboratory assignment common to all CE students. At least three direct measurements are

conducted for each outcome each year. The results of the direct measurement activities are recorded on the Focused Question/Focused Assignment form for assessment purposes.

A. Student Outcomes

Student Outcome Assessment Methods

The principal tools that have been used to assess the attainment of student outcomes are:

- Senior exit surveys
- outcome rubrics

A list of groups of data sources and frequency is given in Table 4-1. As can be seen in the Table, qualitative assessment tools are also used to address specific issues raised by all of the constituencies (e.g. advisory board, students). Consequently, these procedures are intended to methodically evaluate the performance of current students and recent graduates. Complete details of the assessment tools and their use in the evaluation of student outcomes are presented below.

Table 4.1 PROGRAM ASSESSMENT METHODS

Assessment Methods
1. Conduct exit interviews with graduating students
2. Conduct CE Advisory boards meetings (two times/year).
3. Conduct CE faculty meetings (four time/year)
4. Maintain records of ABET accreditation reviews and reports reviews and reports.
5. Maintain records of academic advising.
6. Conduct and analyze student course evaluations.

1. Conduct exit interviews with graduating students

   The CE Advisory Board conducts a collective interview with the graduating seniors. In addition a Student Exit Interview form is also filled by each graduating senior, which is used to assess graduating seniors' perception of the program and to solicit comments about possible improvements and modifications. The CE Advisory Board summarizes the interview

and sends the report to the Program Coordinator. Sample highlights of Exit Interview are given in Appendix E.11. Graduating Senior Exit Survey Form for Fall 2017 and Spring 2018 and the survey analysis can be found in Appendix E12. The current Student Exit Interview Questionnaires and the Report from CE Advisory Board can be found in Appendix E.9. Although we do not use these data in our attainment criteria, they are a valuable supplement to develop the action plans for continuous improvement.

2. Conduct CE Advisory board meetings

   The Civil Engineering Advisory Board is comprised of fifteen civil engineering professionals, including five from U. S. Army Corps of Engineers, four from Alabama Department of Transportation, and four from local private sectors. In addition, two retired faculty members also serve on the Board. Among them, seven are AAMU alumni. The Board helps the Program in identifying the current and changing needs of the profession, and gives suggestions on how to improve the program to effectively achieve the program objectives and outcomes.

   The Civil Engineering faculty meet with the Civil Engineering Advisory Board two times per year. During these meetings, the Advisory Board members and the faculty exchange ideas to improve the program by taking improvement steps, such as modifying curriculum and/or evaluating students' performance to achieve educational objectives. . The board members evaluate the CE 470 Project presentation by graduating seniors and administer the Exit Interview. They have suggested practical project topics that were adopted by seniors. Additionally board members actively engage in fund raising efforts for the department and for the ASCE Student Chapter. They have also provided guest lectures to help student retention. They have participated in the recent faculty recruitment process. The Board evaluates our program based on their individual and collective assessments. The minutes of Advisory Board meeting will be available at the time of ABET visit.

3. Conduct CE faculty meetings

   Civil Engineering faculty meetings are held several times during the academic year. These meetings are in addition to the CE Advisory Board meetings mentioned above. The Program Coordinator in collaboration with faculty members prepares annual objectives and plans to achieve the program goals. The Program Coordinator develops agendas and presides at all faculty meetings. In these meetings, the reports from the Coordinator and program standing committees are addressed and discussed. In addition, faculty members bring up their suggestions for program and curriculum improvement, based on their classroom experience and other information gained from students' feedback, graduate survey, and developments in peer institutions. The minutes of faculty meetings will be available at the time of ABET visit.

4. Maintain records of ABET accreditation reviews and reports.

   The program maintains records of current and previous ABET accreditation reviews and reports for the future reference and the program improvements. The removal of the shortcomings and/or concerns that were identified by the EAC during the previous reviews has been used as our goal in the University Institutional effectiveness process

5. Maintain records of academic advising

The program office maintains an active file for each student, which includes student enrollment information, transfer credits, substitution records, registration record, copy of curriculum and flow chart for the year of the student's enrollment and a copy of current transcript. On-line Degree-Works and updated Transcript on Banner allows the advisor to keep track of the students' progress toward obtaining the degree. The records will be available at the time of ABET visit.

This annual cycled evaluation process consists of two phases: planning phase and the assessment phase. The planning phase is to create department goals and includes specific student learning outcomes. It also includes the description of the methods that will be used to assess the accomplishments of the objectives. Furthermore, projected use of the assessment results to refine the program is also included.

6. Conduct and analyze student course evaluations.

   The University has a student course evaluation process. At the end of each semester and summer session, students have the opportunity to evaluate their instructors in each class using a standard Student Course Evaluation Form. The evaluation is conducted by the Office of Academic Affairs via online. The students fill out an online form. The results are analyzed in standard format and forwarded to the respective Department Chair/Program Coordinator and the faculty for consultation, and for their reference and future improvement. The average CE faculty ratings are superior or excellent. The results are used in the faculty evaluation for tenure and promotion.

Course Outcome Rubrics

Each course syllabus included Course Outcomes and Assessment Rubrics. A planning matrix is used for assessment of each student outcome using the related performance criteria by selecting certain courses each semester. The student outcome rubrics are given in Appendix E.15 and the planning matrix for each outcome is given later in the section "***Achievement of Student Outcomes".*** The rubrics were designed to quantify the student outcomes using measurable performance criteria. The process of scoring the rubric consists of two steps. Each faculty who is teaching a class evaluates students' performance with respect to performance indicators and determines the number of the students who received 60% (meets expectations) or greater. Faculty may choose one or a combination of homework assignments, exams, quizzes, and projects for an acceptable representation of the class performance. These rubric scores along with class enrollment and actions suggested are reported using the "Course Assessment Data Sheet (Excel Spreadsheet)" and "Action Plan" form. Subsequently, all the classes contributing to each performance criterion of each outcome are grouped and an average score (percentage of student attainment = total number of the students who received 60% (meets expectations) or greater divided by total enrollment in all contributing classes) is assigned to each performance criterion of each of the student outcomes. Example: the total number of the students who received 60% in performance criterion 1a in all its contributing classes are added up and the sum is divided by the total enrollment in all these classes to give the percentage of student attainment in criterion 1a. This process is documented for each outcome. Sample "Course Assessment Data Sheet (Excel Speadsheet)" and "Action Plan Form" are provided in Appendix E.12

Assessment Planning

The assessment of student outcomes was completed on two-year cycles from 2012-2017; however its frequency has been changed to one -year cycle effective current academic year 2017-18. The cycle that was used for the current ABET cycle is illustrated in Table 4.2.

Table 4.2 Data collection cycle for 2013-18

Program Outcomes	2013-14	2014-15	2015-16	2016-17	2017-18
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering;		x		x	x
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data;	x		x		x
3. Communicate with multidisciplinary teams		x		x	x
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions;	x		x		x
5. Continue their education and professional development;		x		x	x
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	x		x		x
7. Use any modern engineering tools necessary for engineering practice	x		x		x

Data was only collected every two years for the first two cycles (2013-2017) and then collected for all outcomes for the third cycle 2017-2018. However various other assessment and evaluation activities have been taking place in each outcome each year.

A Faculty Assessment Team as well as each CE faculty is responsible for the various Assessment and Evaluation Activities. Table 4.3 shows the multiple parties involved in the assessment and evaluation cycle.

Table 4.3 Responsibility for Assessment and Evaluation Activity

Assessment and Evaluation Activity	Responsibility for activity
Review of performance criteria that define the outcome	*Faculty Assessment Team w/Assessment Resource
Map educational strategies related to performance criteria	All Program Faculty
Review mapping and identify where data will be collected	All Program Faculty
Develop and/or review assessment methods used to assess performance criteria	*Faculty Assessment Team w/Assessment Resource
Collect and analyze data	*Faculty Assessment Team w/Assessment Resource
Evaluate assessment data including processes	*Faculty Assessment Team w/Assessment Resource
Report findings	All Program Faculty
Take action where necessary	All Program Faculty

*Faculty Assessment Team includes the Program Coordinator and all Program Faculty

The cycle of activity for student outcomes over a 6 year period is given in Table 4.4.1 and Table 4.4.2.

Table 4.4.1 Cycle of activity for student outcomes-1, 3 and 5 over 6 year period

Program Outcome 1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering
Program Outcome 3. Communicate with multidisciplinary teams.
Program Outcome 5. Continue their education and professional development

	Assessment and Evaluation Activity	14-15	15-16	16-17	17-18	18-19
1	Collect data	X		X	X	X
2	Evaluate assessment data including processes	X		X	X	X
3	Report findings		X		X	X
4	Take action where necessary		X		X	X

Table 4.4.2 Cycle of activity for student outcomes-2, 4, 6, and 7 over 6 year period

Program Outcome 2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data
Program Outcome 4. Consider contemporary issues and mutual global and societal influence on the engineering solutions
Program Outcome 6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities
Program Outcome 7. Use any modern engineering tools necessary for engineering practice

	Assessment and Evaluation Activity	13-14	14-15	15-16	16-17	17-18	18-19
1	Collect data	X		X		X	X
2	Evaluate assessment data including processes	X		X		X	X
3	Report findings		X		X	X	X
4	Take action where necessary		X		X		X

Each outcome has been mapped to the engineering courses for making an assessment plan and is depicted in Table 4.5-1 and recently revised Table 4.5-2. These maps were used to collect summative data.

Table 4.5-1 Program Outcomes Mapping for Engineering Courses for Assessment Plan (2013-2017)

	Spring															Fall												
Performance Criteria	CE1011	CE3043	CE3053	CE3083	CE3083L	CE3103	CE4013	CE4043	CE4703	EGC1011	EGC1043	EGC2053	EGC2063	EGC2073	EGC2073L	CE1011	CE2013	CE3063	CE4023	CE4083	CE4103	CE4243	CE4703	EGC1011	EGC1043	EGC2043	EGC2053	EGC3053	EGC3053L
1a													X														X	X	
1b		X		X										X														X	
2a					X										X														X
2b					X										X		X												X
2c			X		X																X				X				
3a								X	X											X			X						
3b								X	X										X				X						
3c							X		X											X			X						
4a		X							X											X			X						
4b			X						X													X	X						
4c									X											X	X		X						
5a		X							X							X					X		X						
5b							X		X							X			X				X						
5c									X							X						X	X						
6a									X										X		X		X						
6b							X		X												X		X						
6c									X										X			X	X						
7a						X								X											X				
7b					X										X		X												X
7c							X		X									X					X						

Table 4.5-2 Program Outcomes Mapping for Engineering Courses for Assessment Plan (2017-2018)

Performance Criteria	CE 101	CE 201	CE 304	CE 305	CE 306	CE 308	CE 310	CE 401	CE 402	CE 404	CE 408	CE 410	CE 424	CE 470	EGC 1011	EGC 1044	EGC 2044	EGC 2055	EGC 2066	EGC 2077	EGC 2077L	EGC 3055	EGC 3055L
1a																		X	X			X	
1b			X	A	A															X		X	
2a						X															X		X
2b		X				X															X		X
2c				X		X						X					X						
3a				A						X	X			X									
3b									X	X				X									
3c								X			X			X									
4a			X				A				D	A		D									
4b				D								A	X	X									
4c	A										X	X		D									
5a	X		X									X		X									
5b	D							X	X					X									
5c	X												X	X									
6a									X			X		X									
6b								X				X		X									
6c									X				X	X									
7a							X									X				X			
7b		X				X															X		X
7c					X			X						D	A								

X: No change A: Added D: Deleted

Achievement of Student Outcomes

Results for each student outcome are reported separately in the following tables and all supporting documentation will be available in the ABET resource room at the time of the visit. Each table represents the planning matrix for the activity for the current ABET accreditation cycle. Each outcome planning matrix includes performance indicators, courses and/or co-curricular activities (educational strategies) that provide students an opportunity to demonstrate the indicator, where summative data are collected, timetable, method of assessment. Each table is followed by a graph showing the results with a three cycle trend line and the performance target.

Learning Outcome: 1. <u>Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering</u>

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Current Assessment Coordinator	Evaluation of Results
1a	**Identify necessary basic physical principles and/or theorems and use them to formulate problems as Mathemat-ical (or Experimental) problems.**	EGC 205, 206, 305	Exams, Home Works, Quizzes, Lab reports, if any, and Design project, if any.	Fall: EGC 205, EGC 305 Spring: EGC 206	Fall and Spring Semester	Ahmed Acharya	Department Curriculum Committee
1b	**Solve engineering problems applying the theorems of Mathematics (Calculus and Statistics) and using the principles of Science.**	CE 304, 308, 305,306 EGC 207, 305	Exams, Home Works, Quizzes, Lab reports, if any, and Design project, if any.	Fall: EGC 305, CE 306 Spring: EGC 205, 207, CE 304, CE 308	Fall and Spring Semester	Acharya Ahmed Ashour Acharya Ahmed Elsayed Ashour	Department Curriculum Committee

1st cycle (2014-15) Results: A sample of 71 students (100% of 2014-15 cohort) were assessed. This represents **3 SO** (Fall'14: EGC 205; Spring'15: EGC 206 & 207) **& 3 JR** (Fall'14: EGC 305; Spring'15: CE304, CE 308) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 1a : 94%; Criterion 1b :70%.**

Actions for 2015-16: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2015-16.

Achievements of both criterion were at or substantially more than the acceptance level of 70%. The *Curriculum Committee suggested the following for continuous improvement:

- Continue to provide more concept examples, quizzes, and group problem solving in class, relate the lab experiments to the course content, provide more examples on free body diagrams
- Spend more time in demonstrating how to apply principles of science and use basic mathematical skills to solve engineering problems.
- Solve more problems related to relationships between soil parameters.

2nd cycle (2016-17) Results: A sample of 84 students (100% of 2016-17 cohort) were assessed. This represents **4 SO** (Fall'16: EGC 205; Spring17: EGC 205, 206 & 207) **& 4 JR** (Fall'16: EGC 305, CE 306; Spring'17: CE 304, CE 308) classes**. Based on changes made, the following changes were seen: Criterion 1a -5% (89%); Criterion 1b +28% (98%).**

Actions for 2017-18: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2017-18:

All three criterion achieved substantially more than the acceptance level of 70%. Although substantial progress was made the *Curriculum Committee suggested the following for continuous improvement:

- Continue to spend more time in demonstrating how to apply principles of science and use basic mathematical skills to solve engineering problems and assign problems that require application of engineering equations and principles
- Continue to provide more concept examples, quizzes, and group problem solving in class. Relate the lab experiments to the course content
- Show more examples of free body diagram

3rd cycle (2017-18) Results: A sample of 104 students (100% of 2017-18 cohort) were assessed. This represents **4 SO** (Fall'17: EGC 205; Spring18: EGC 205, 206 & 207) **& 2 JR** (Fall'17: EGC 305; Spring'18: CE 304) classes**. Based on changes made, the following changes were seen: Criterion 1a +9% (98%); Criterion 1b -18% (80%).**

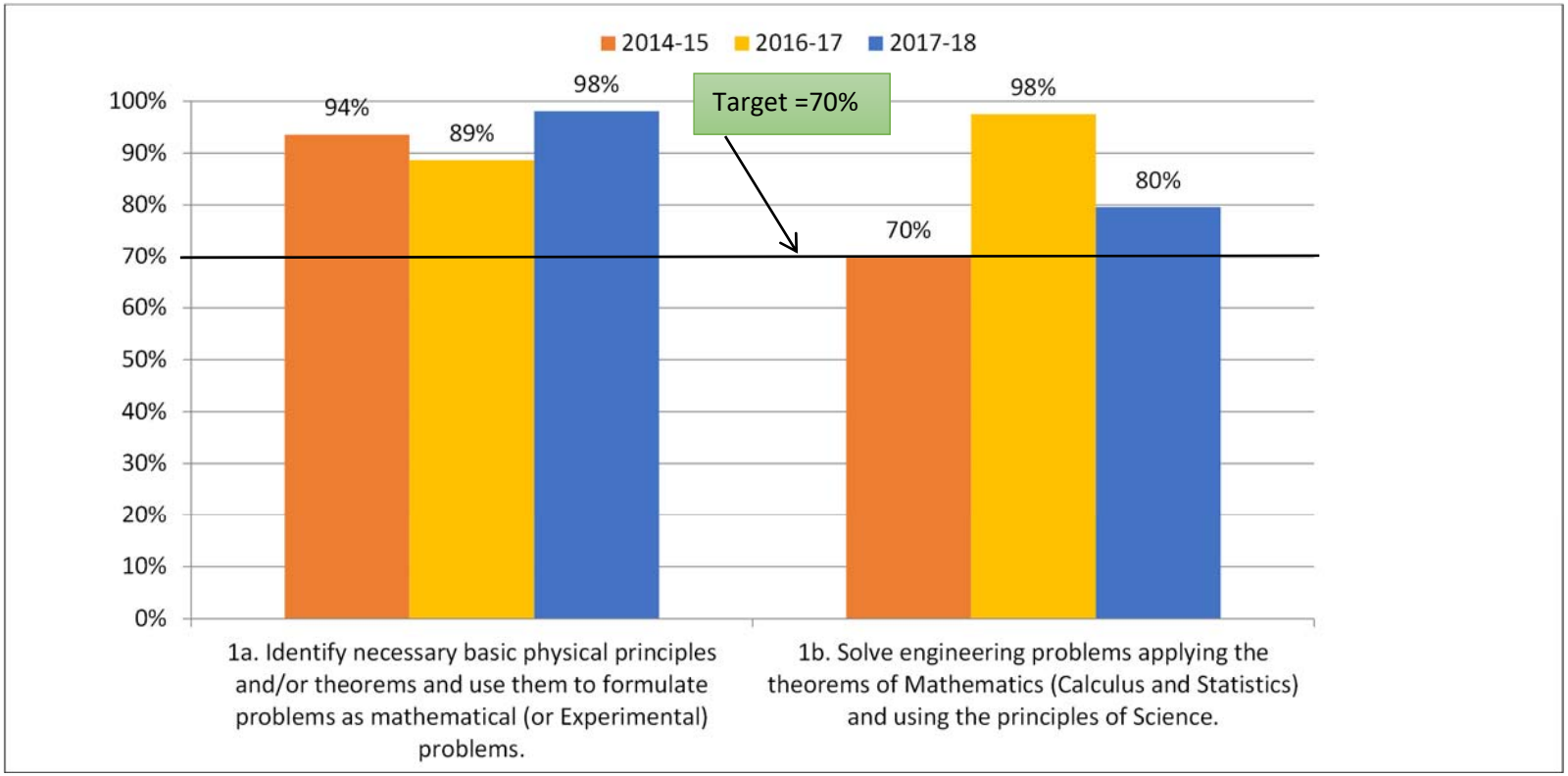
Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially above the acceptance level of 70% although criterion 1b dropped substantially from the last assessment cycle. The *Curriculum Committee suggested the following for continuous improvement:

- Continue providing more problem solving examples in class and assignments that require application of engineering equations and principles. Relate the lab experiments to the course content.
- Show more examples involving integrations and differentiations involving velocity, acceleration and position
- Continue to provide FE type assignments specific to this outcome.

***Curriculum Committee** includes the Program Coordinator and all Program Faculty

Figure 4.1. Achievement Chart for Learning Outcome # 1: Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with sample of project reports and Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 2. Design and Conduct Experiment Within Civil Engineering Domain and to Analyze and Interpret Data

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
2a	**Able to formulate and design an Experiment to obtain data in support of an engineering problem**	CE 308L, EGC 305L, 207L	Lab Report	Fall: EGC 305L; Spring: CE 308L, EGC 207L	Fall and Spring Semester	Ahmed Ashour Acharya	Department Curriculum Committee
2b	**Knowledge of equipment, sensors and data acquisition methods**	CE 201, 308L, EGC 305L, 207L	Quiz, Lab Report	Fall: CE 201, EGC 305L; Spring: CE 308L, EGC 207L	Fall and Spring Semester	Bhattacharjee Acharya Ahmed Ashour	Department Curriculum Committee
2c	**Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data**	CE 305, 308L, 410, EGC 204	Lab Report	Fall: CE 410, EGC 204; Spring: CE 305, 308L	Fall and Spring Semester	Acharya Bhattacharjee Ashour	Department Curriculum Committee

1st cycle (2013-14) Results: A sample of 99 students (100% of 2013-14 cohort) were assessed. This represents **2 SO** (Fall'13: CE 201 EGC 204), **3 JR** (Fall'13: EGC 305L; Spring'14: CE 305, 308L) & **1 SR**(Fall'13: CE 410) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 2a: (92%); Criterion 2b: (90%); Criterion 2c: (89%)**

Actions for 2014-15: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2014-15:

All three criterion achieved substantially more than the acceptance level of 70%. In order to further improve students' knowledge in usage of equipment the *Curriculum Committee recommended procurement of multiple sets of lab equipment so that individual student can have opportunity to get trained in equipment uses and data acquisition.

2nd cycle (2015-16) Results: A sample of 134 students (100% of 2015-16 cohort) were assessed. This represents **3 SO** (Fall'15: CE 201 EGC 204;Spring'16: EGC 207L), **3 JR** (Fall'15: EGC 305L; Spring'16: CE 308L, CE 305) and **1 SR**(Fall'15: CE 410) classes. All three criterion showed a downward trend **Criterion 2a: - 31% (61%); Criterion 2b: +3% (93%); Criterion 2c: –6%(83%)**

Actions for 2016-17: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2016-17:

Although criterion 2b & 2c achieved substantially higher acceptance level, criterion 2a fell well below that of 70% and substantial decrease from the previous cycle is noted. The *Curriculum Committee suggested the following for continuous improvement particularly to improve students' knowledge in criterion 2a :

- Continue providing more engineering examples, discuss practical problems of design of experiments.
- Present some of the educational videos and do more example problems in class.
- Continue to design an experiment and work in a team to accomplish the task.
- Purchase multiple sets of lab equipment for lab activities.

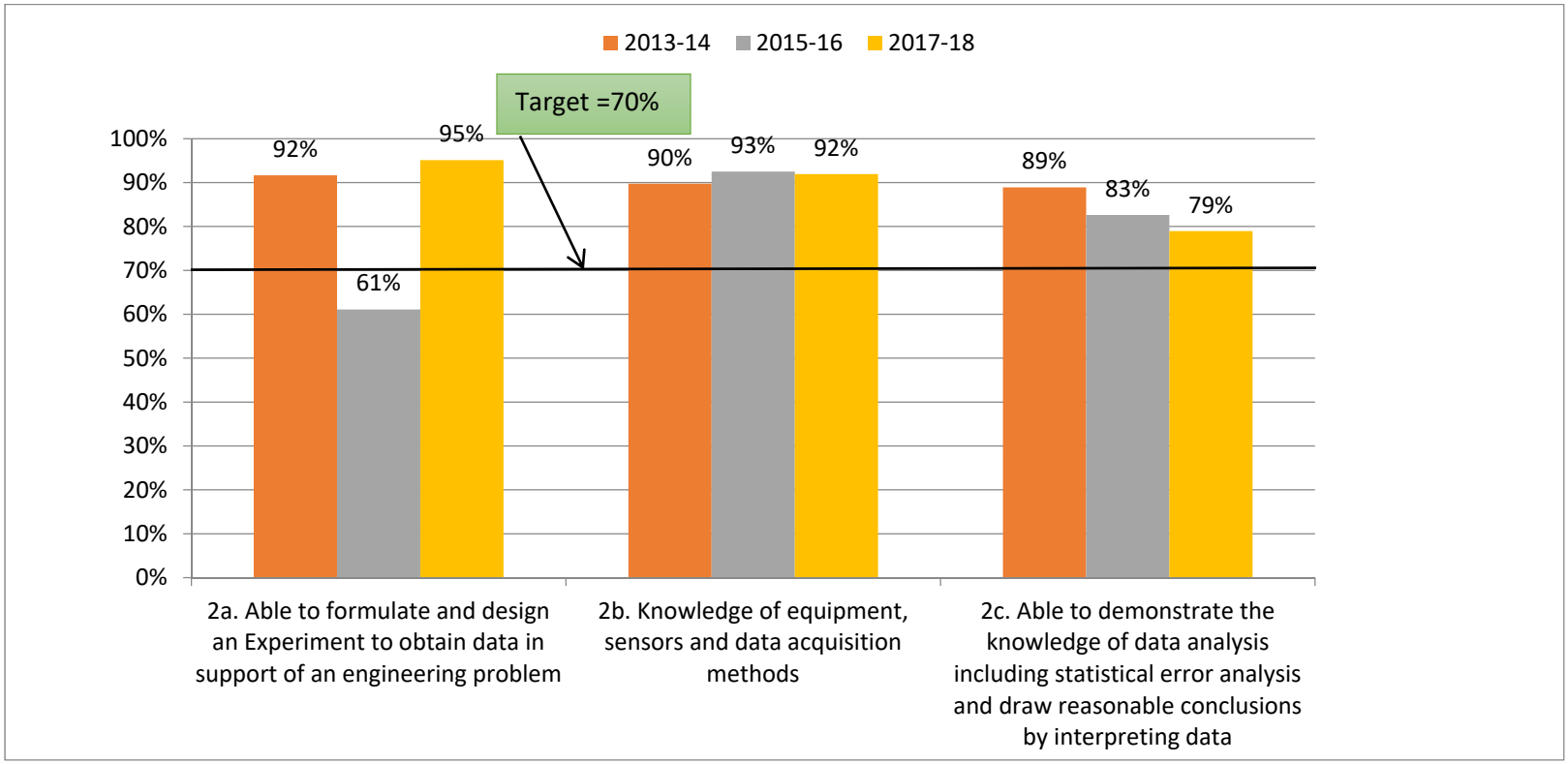
3rd cycle (2017-18) Results: Results: A sample of 160 students (100% of 2017-18 cohort) were assessed. This represents **3 SO** (Fall'17: CE 201, EGC 204; Spring'18: EGC 207L), **3 JR** (Fall'17: EGC 305L; Spring'18: CE 308, CE 305) and **1 SR**(Fall'17: CE 410) classes. Based on the actions taken, the following changes were seen: **Criterion 2a: +34%(95%); Criterion 2b: -1%(92%); Criterion 2c: -4%(79%)**

Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially above the acceptance level of 70% although criterion 2b & 2c dropped slightly from the last assessment cycle. Although substantial progress was made in criterion 2a, the *Curriculum Committee suggested the following for continuous improvement:

- Continue assigning a student designed experiment in addition to lab design examples in order to obtain data in support of engineering problem. Provide additional references related to the experiments.
- Continue to use multiple sets of lab equipment for lab activities. Continue adding more equipment's in the lab and design additional experiments.
- Provide more examples on traffic data analysis, hydro/hydrogeological data and statistical analysis and examples of regression analysis and confidence intervals. Students need to work on data processing during lab time

Figure 4.2. Achievement Chart for Learning Outcome #2. Design and Conduct Experiment Within Civil Engineering Domain and to Analyze and Interpret Data



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with sample of lab reports and Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 3. Communicate with Multidisciplinary teams Evaluated for 2014-15 and 2016-17 cycles

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
3a	**Individual – Contributes to team project, work**	CE 305, 404, 470, 408	Design Project Report	Fall: CE 408, 470; Spring: CE 305, 404, 470	Fall & Spring Semester	Acharya Bhattacharjee Ahmed	Department Curriculum Committee
3b	**Individual – Takes Responsibility**	CE 402, 404, 470	Report, Home Work	Fall: CE 402, 470, Spring: CE 404, 470	Fall & Spring Semester	Ahmed Bhattacharjee Acharya	Department Curriculum Committee
3c	**Acknowledgement of sources**	CE 401, 408, 470	Design Project Report	Fall: CE 408, 470 Spring: CE 401, 470	Fall & Spring Semester	Ashour Ahmed Acharya Bhattacharjee	Department Curriculum Committee

1st cycle (2014-15) Results: A sample of 91 students (100% of of 2014-15 cohort) were assessed. This represents **6 SR** classes (Fall'14: CE 408, CE 402, CE 470; Spring'15: CE 401, CE 404, CE 470). The percent of the sample that demonstrated each criterion were as follows: **Criterion 3a: 87%; Criterion 3b: 93%; Criterion 3c: 100%.**

Actions for 2015-16: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2015-16:

All three criterion achieved substantially more than the acceptance level of 70%. The *Curriculum Committee suggested the following for continuous improvement:

- Continue to provide more concept examples, engineering design project, and group problem solving in class.
- Continue selecting team leader who will distribute individual assignments, and encourage students to be a team leader.

- Continue selecting team leader, and he or she will distribute individual assignment. Assign individual task at the beginning of semester and require submission of individual progress report from each student.
- Continue to require proper Acknowledgement of sources in the class project and assignments and present the sources in a standard format

2nd cycle (2016-17) Results: A sample of 57 students (100% of 2016-17 cohort) were assessed. This represents **1 JR** class (Spring'17: CE 305) and **6 SR** classes (Fall'16: CE 408, CE 402, CE 470; Spring'17: CE 401, CE 404, CE 470). Based on the actions taken, the following changes were seen: **Criterion 3a: +10% (97%); Criterion 3b: +7% (100%); Criterion 3c: -4% (96%).**

Actions for 2017-18Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2017-18:

All three criterion achieved substantially above the acceptance level of 70% although criteria 3c dropped slightly from the last assessment cycle. Although substantial progress was made the *Curriculum Committee suggested the following for continuous improvement:

- Continue to assign homework that requires teamwork
- Continue to provide more concept examples, engineering design project, and group problem solving in class.
- Continue selecting team leader and encourage to be a team leader.
- Include acknowledgement of all resources they used during field trips, data collection, and development of full report. Present the sources in a standard format.

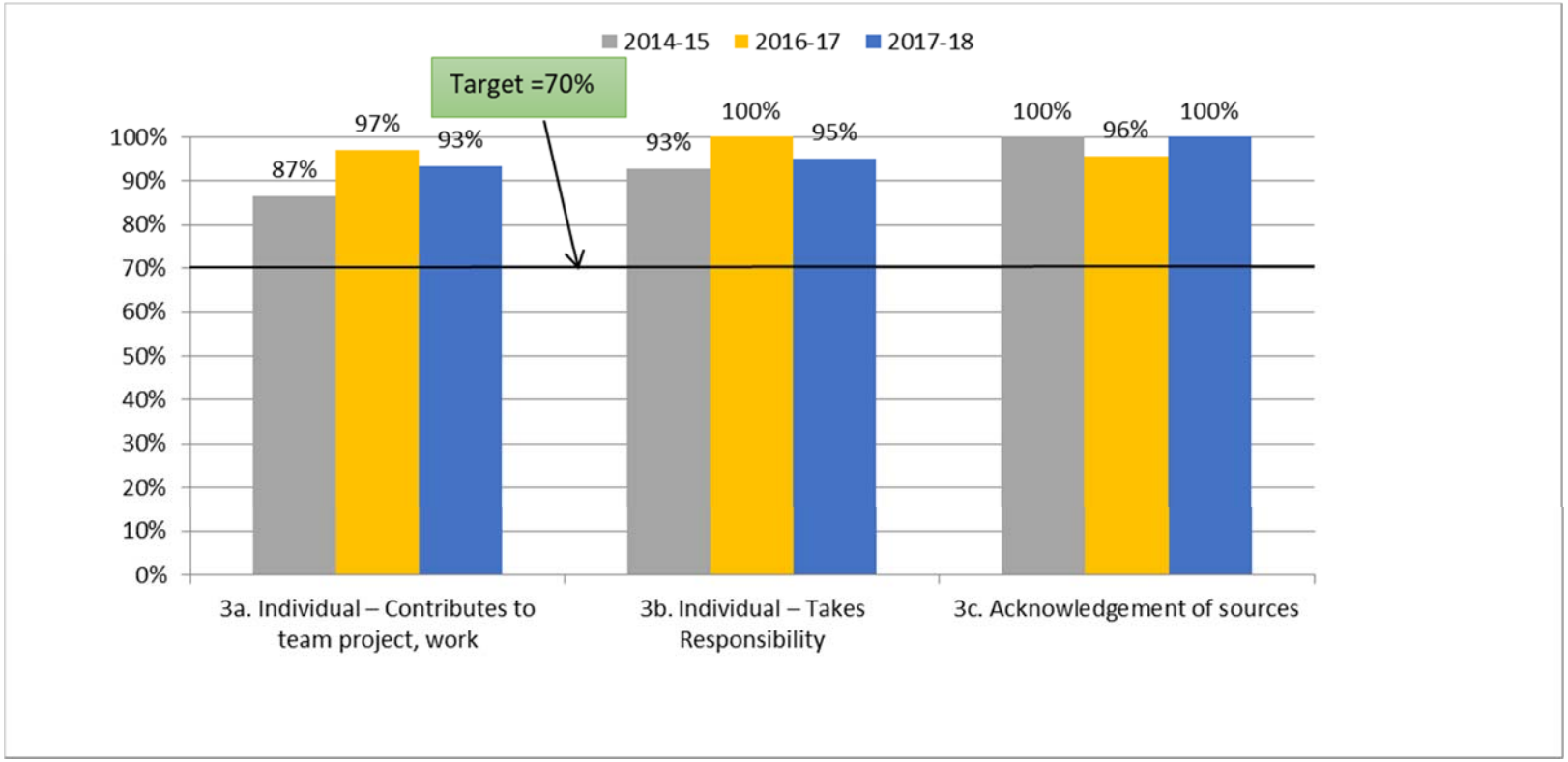
3rd cycle (2017-18) Results: A sample of 69 students (100% of 2017-18 cohort) were assessed. This represents **1 JR** class (Spring'18: CE 305) and **6 SR** classes (Fall'17: CE 408, CE 402, CE 470; Spring'18: CE 401, CE 404, CE 470). Based on the actions taken, the following changes were seen: **Criterion 3a: -4% (93%); Criterion 3b: -5% (95%); Criterion 3c: +4% (100%).**

Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially above the acceptance level of 70% although criterion 3a and 3b dropped slightly from the last assessment cycle. Although substantial progress was made the *Curriculum Committee suggested the following for continuous improvement:

- Continue to provide more concept examples, engineering design project, and group problem solving in class.
- Continue to provide homework, class project and presentation that need teamwork and individual participation in developing engineering design concept. Encourage students to be a team leader.
- Show examples of ASCE reference guideline.

Figure 4.3. Achievement Chart for Learning Outcome #: 3. Communicate with Multidisciplinary teams



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with sample of project reports and Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 4. <u>Consider contemporary issues and mutual and societal influence on the engineering solutions</u>

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
4a	**Awareness of energy conservation, safety and environmental impact**	CE 304, 408, 470, 310, 410	Quizzes, and Reports	Fall: CE 408, 470 Spring: CE 304, 470	Fall & Spring Semester	Ahmed Ashour Acharya Bhattacharjee	Department Curriculum Committee
4b	**Awareness of business and engineering economics and global impact**	CE 305, 424, 470, 410	Quizzes, and Reports	Fall: CE 424 470 Spring: CE 305, 470	Fall & Spring Semester	Acharya Bhattacharjee Ahmed	Department Curriculum Committee
4c	**Understands contemporary technical issues in the field related case studies**	CE408. 410 470, 101	Quizzes, and Reports	Fall: CE101, 408, 410, 470 Spring: CE 101, 470	Fall & Spring Semester	Acharya Bhattacharjee Ahmed Ashour	Department Curriculum Committee

1st cycle (2013-14) Results: A sample of 69 students (100% of 2013-14 cohort) were assessed. This represents **2 JR** (Spring'14: CE 304, 305) & **3 SR** (Fall'13: CE, 410, 424, 470;) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 4a: (100%); Criterion 4b: (73%); Criterion 4c: (95%).**

Actions for 2014-15: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2014-15:

All three criterion achieved the acceptance level of 70%. The Curriculum Committee suggested the following:

- In order to further improve students' awareness related to outcome 4b faculty need to require economic analysis for term projects and include other global impacts such as social, environmental impacts
- Arrange more seminars and conferences, and visits to active construction sites for exposure to contemporary engineering issues (see Student Exit Interview Response of Fall 2012).

2nd cycle (2015-16) Results: A sample of 68 students (100% of 2015-16 cohort) were assessed. This represents **2 JR** (Spring'16: CE 304, 305) & **3 SR** (Fall'15: CE, 410, 424, 470) classes The percent of the sample that demonstrated each criterion were as follows: **Criterion 4a: -4% (96%) ; Criterion 4b : +13%(86%); Criterion 4c : +5%(100%).**

Actions for 2016-17: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2016-17:

All three criterion achieved substantially more than the acceptance level of 70%. In order to improve students' awareness in criterion 4a the Curriculum Committee suggested the following for continuous improvement:

- Continue to provide more concept examples, assignments, and problem solving in class relating to environmental impacts.
- Continue providing more practical example problems on engineering economic analysis.
- Revising this learning outcome in CE 305-Hydrogeology class is suggested. If continued the same learning outcome, continue providing references/examples/articles related to hydrological and hydrogeological impact while delivering class lectures.

3rd cycle (2017-18) Results: A sample of 103 students (100% of 2017-18 cohort) were assessed. This represents **2 FR** (Fall'17 & Spring'18: CE **101), 2 JR** (Spring'18: CE 304, 310) & **5 SR** (Fall'17: CE 408, 410, 424, 470; Spring'18: CE470) classes The percent

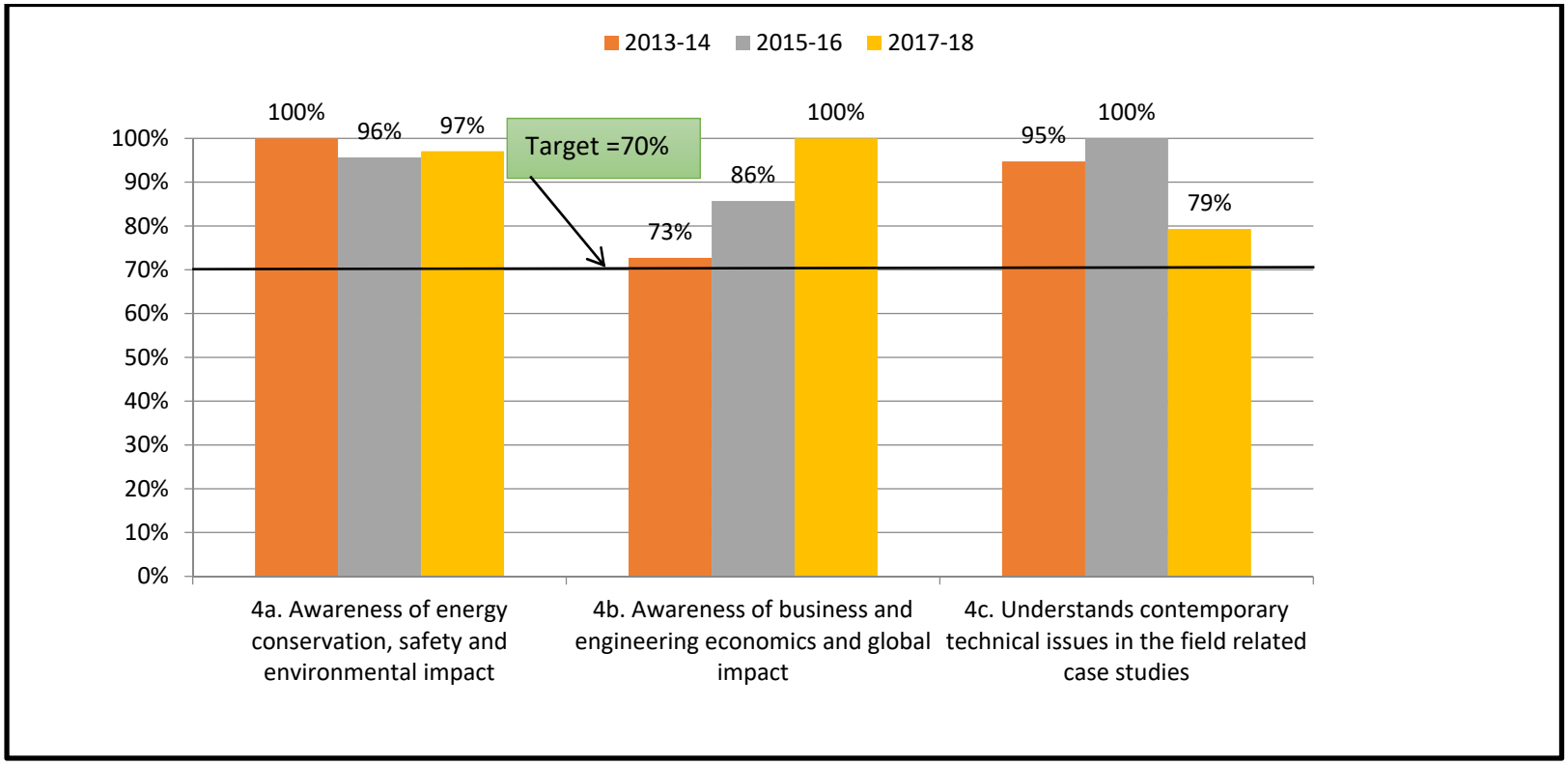
of the sample that demonstrated each criterion were as follows: **Criterion 4a: +1% (97%) ; Criterion 4b : +14%(100%); Criterion 4c : -21%(79%).**

Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially above the acceptance level of 70% although criterion 4c dropped substantially from the last assessment cycle. The *Curriculum Committee suggested the following for continuous improvement:

- Continue to provide more concept examples, assignments, and problems on sustainability and environmental impacts.
- Continue providing more practical example problems on engineering economic analysis.
- Assign class exercises/field work or projects that help students to understand various contemporary technical issues in the field. Invite guest lectures. Discuss case studies and show an example how to write.
- Discuss relevant topics on energy conservation.
- Discuss more examples of actual case studies of global impact of engineering projects.
- Require incorporation of alternate cost analysis and also recovery life.

Figure 4.4. Achievement Chart for Learning Outcome #: 4. Consider contemporary issues and mutual and societal influence on the engineering solutions



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with sample of project reports
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 5. <u>Continue their education and professional development.</u>

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
5a	**Able to conduct literature search using library and Internet for assignments**	CE 101, 304, 410, , 470	Home Works and Project Reports	Fall: CE 101, 410, 470 Spring: CE 101, 304, 470	Fall & Spring Semester	Bhattacharjee Ahmed Acharya	Department Curriculum Committee
5b	**Demonstrated professional membership and attendance at professional membership, seminars, meetings, and field trips**	CE 101, 401, 402, 470	Home Works and Project Reports	Fall: CE 101, 402, 470 Spring: CE 101, 401, 470	Fall & Spring Semester	Bhattacharjee Ahmed Acharya	Department Curriculum Committee
5c	**Understand the importance of professional licensing (FE & PE)**	CE101, 424 470	Home Works and Project Reports	Fall: CE101, 424, 470 Spring: CE 101, 470	Fall & Spring Semester	Bhattacharjee Ahmed Acharya	Department Curriculum Committee

1st cycle (2014-15) Results: A sample of 160 students (100% of 2014-15 cohort) were assessed. This represents **1 FR** (Fall'14: CE101), **1 JR** (Spring'15: CE 304) and **6 SR** (Fall'14: CE 402, 410, 424, 470; Spring'15: CE 401, 470) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 5a: (77%); Criterion 5b: (35%); Criterion 5c: (80%).**

Actions for 2015-16: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2015-16:

Criterion 5a & 5c achieved the acceptance level of 70% while criterion 5b achieved substantially below the target of 70%. the *Curriculum Committee suggested the following for continuous improvement:

- More Internet search/Library search research- assign more home works that need literature research.
- Provide more information on professional membership, seminars, meetings, and arrange field trips to learn by observation.
- Require students to obtain Free AISC and ACI membership and attend webinars/site visits etc.
- More Student participation in the ASCE student Chapter, and regional competitions, attending ASCE local chapters monthly meetings are encouraged.
- Continue to explain the importance and benefits of having professional licensing like (FE & PE).
- Encourage students to attend FE review sessions and to meet professionals from outside companies and professional agencies.

2nd cycle (2016-17) Results: A sample of **171** students (100% of 2016-17 cohort) were assessed. This represents **2 FR** (Fall'16: CE101; Spring'17: CE 101), **1 JR** (Spring'17: CE 304) & **6 SR** (Fall'16: CE 402, 410, 424, 470; Spring'17: CE 401, 470) classes. Based on the actions taken, the following changes were seen: **Criterion 5a: +2% (79%); Criterion 5b: +65% (100%); Criterion 5c: -3% (77%).**

Actions for 2017-18: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2017-18:

All three criterion achieved the acceptance level of 70% while achievement in criterion 5b improved substantially. In order to improve student performance in FE Exam the *Curriculum Committee suggested the following:

- the students be encouraged to attend the FE Review sessions;

- faculty to continue to encourage students to attend ASCE local chapters monthly meetings and ASCE Southeast regional conference and meet professionals from outside companies and professional agencies;
- require students to do more research using Internet search/Library search.

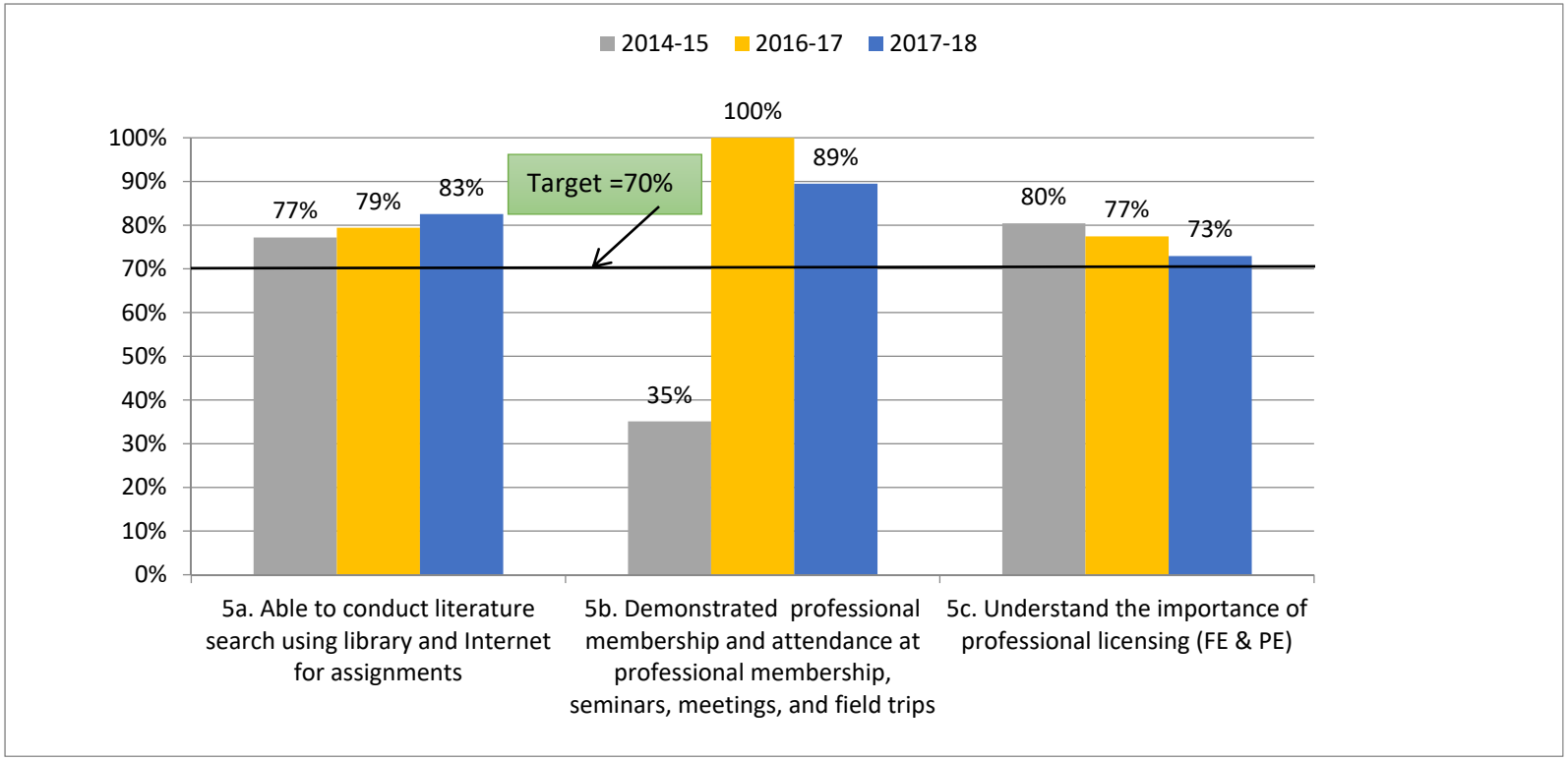
3rd cycle (2017-18) Results: A sample of **130** students (100% of 2017-18 cohort) were assessed. This represents **2 FR** (Fall'17: CE101; Spring'18: CE 101), **1 JR** (Spring'18: CE 304) & **6 SR** (Fall'17: CE 402, 410, 424, 470; Spring'18: CE 401, 470) classes. Based on the actions taken, the following changes were seen: **Criterion 5a: +3% (83%); Criterion 5b: -11% (89%); Criterion 5c: -5% (73%).**

Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

Criterion 5a and 5b achieved substantially above the acceptance level of 70% while achievement in criterion 5c declined to marginal. In order to improve student performance in FE Exam the *Curriculum Committee suggested the following:

- More Internet search/Library search research is suggested. Continue showing examples of how to search relevant data from archive.
- Ask the students to get ACI and ASCE "student membership". Discuss with them the corresponding advantages.
- faculty to continue to encourage students to attend FE review sessions, show NCEES website and discuss current FE and PE guidelines.
- continue to encourage students to attend ASCE local chapters monthly meetings and ASCE Southeast regional conference and meet professionals from outside companies and professional agencies.
- Show effective way of searching archived data.

Figure 4.5. Achievement Chart for Learning Outcome #5. Continue their education and professional development



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 6. <u>Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities</u>

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	ContExt for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
6a	**Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis**	CE 402, 410, 470	Exams, Quizzes, Home Works and Project Reports	Fall: CE 402, 410, 470 Spring: CE 470	Fall & Spring Semester	Ahmed Bhattacharje Acharya	Department Curriculum Committee
6b	**Alternative Designs**	CE 401, 410, 470	Exams, Quizzes, Home Works and Project Reports	Fall: CE 410, 470; Spring: CE 401, 470	Fall & Spring Semester	Ahmed Bhattacharje Acharya	Department Curriculum Committee
6c	**Demonstrates knowledge of professional code of ethics and acknowledges sources**	CE 402,424, 470	Quizzes, Project Reports & Project Presentation	Fall: CE 402,424, 470 Spring: CE 470	Fall & Spring Semester	Ahmed Bhattacharje Acharya	Department Curriculum Committee

1st cycle (2013-14) Results: A sample of 67 students (100% of 2014 cohort) were assessed. This represents **5 SR** (Fall'13: CE 410, 424, 470; Spring'14: CE 401, 404,) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 6a:(79%); Criterion 6b: (90%); Criterion 6c: (74%).**

Actions for 2014-15: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2014-15.

All three criterion achieved the acceptance level of 70%. Students showed design methodology, design codes followed and reported in their reports and presentations. However, the *Curriculum Committee felt that improvements needed in the following areas:

- appropriate analysis, selection of appropriate criteria, and design constraints based on the project assignment; additionally more professional code of ethics needs to be discussed and incorporating alternate design in the project should be more emphasized.

2nd cycle (2015-16) Results: A sample of 71 students (100% of 2015-16 cohort) were assessed. This represents **6 SR** (Fall'15: CE 402, 410, 424, 470; Spring'16: CE 401, 470) classes.. Based on the actions taken, the following changes were seen: **Criterion 6a:+17% (96%); Criterion 6b:+10%(100%); Criterion 6c: +22%(96%).**

Actions for 2016-17: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2016-17:

All three criterion achieved substantially more than the acceptance level of 70% showing appreciable improvements in all three criterion. However, the *Curriculum Committee suggested the following for continuous improvement:

- Continue to require alternative design in the class project.
- Continue discussing and designing homework to incorporate more professional code of ethics.
- Continue to require student design teams to demonstrate professional code of ethics and acknowledges sources in their project
- Continue to encourage students to attend FE review sessions and guest lectures invited from professional agencies.

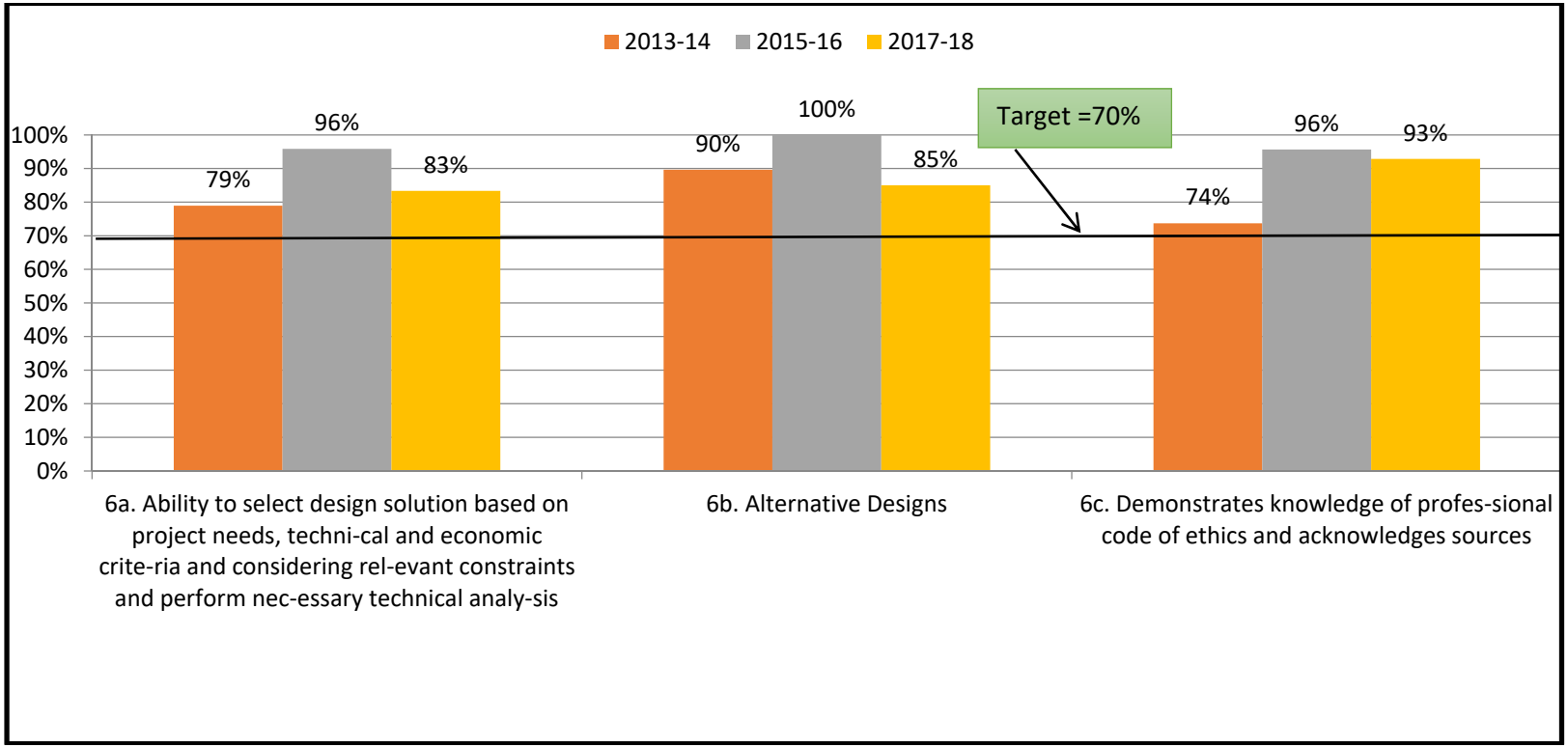
3rd cycle (2017-18) Results: A sample of 71 students (100% of 2015-16 cohort) were assessed. This represents **6 SR** (Fall'17: CE 402, 410, 424, 470; Spring'18: CE 401, 470) classes.. Based on the actions taken, the following changes were seen: **Criterion 6a: -10% (86%); Criterion 6b:-13% (87%); Criterion 6c: -2%(94%).**

Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially more than the acceptance level of 70% although achievement of criterion 6a & 6b declined by more than 10%. The *Curriculum Committee suggested the following for continuous improvement:

- Discuss practical design problems and provide more examples on LOS based design and geometric design.
- Continue to require appropriate analysis, selection of appropriate criteria, and design constraint based on the project assignment.
- Show examples of alternative design case studies and continue to require incorporation of alternate design in projects.
- More professional code of ethics needs to be discussed; require incorporation of principle of ethics and professional codes. Discuss specific case studies of ASCE ethics rules. Encourage students to attend professional meetings.

Figure 4.6 Achievement Chart for Learning Outcome #6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

Learning Outcome: 7. Use any modern engineering tools necessary for engineering practice

Sr. No.	Performance Criteria	Strategies [Courses used in the 3 cycles]	Assessment Method(s)	Context for Assessment	Time of data collection	Assessment Coordinator	Evaluation of Results
7a	**Able to write a computer program to solve engineering problem**	CE 310, EGC 104, 207	Home Works, Programming Assignments, Exams	Fall:, EGC 104, Spring: EGC207, CE 310	Fall & Spring Semester	Ashour, Bhattacharjee	Department Curriculum Committee
7b	**Able to use modern equipment to solve engineering problem through laboratory Experiment or field work**	CE 201, EGC 305L, 308L, 207L	Lab Reports and Project Reports	Fall: CE 201, EGC 305L Spring: CE 308L, EGC 207L	Fall & Spring Semester	Bhattacharjee Acharya Ashour Ahmed	Department Curriculum Committee
7c	**Able to use computer software for engineering analysis, design, or Experimental work**	CE 306, 401, 470 EGC101	Home Works, Lab Reports and Project Reports	Fall: CE 306, 470 Spring: CE 401, 470,	Fall & Spring Semester	Ashour Ahmed, Bhattacharjee	Department Curriculum Committee

1st cycle (2013-14)) Results: A sample of 95 students (100% of 2014cohort) were assessed. This represents **1 FR** (Spring'14: EGC 104), **1 SO** (Fall'13: CE 201;), **5 JR** (Fall'13: CE 305L, 306; Spring'14: CE 306, 310, CE 308L) & **2 SR** (Fall'13: CE 470; Spring'14: CE 401,) classes. The percent of the sample that demonstrated each criterion were as follows: **Criterion 7a: (91%); Criterion 7b: (77%); Criterion 7c: (79%).**

Actions for 2014-15: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2014-15:

All three criterion achieved the acceptance level of 70%. However, the *Curriculum Committee felt that improvements needed in the following areas:

- Introduction of StaadPro structural design software early in the semester and assignment of more problems involving spreadsheet computing or Matlab programming;
- Need to provide each student enough access through procurement of modern equipment and increase the field oriented practical classes; it is also recommended by graduating seniors at exit interview (see Student Exit Interview Response of Fall 2012)
- Utilize Blackboard and PowerPoint more effectively.

2nd cycle (2015-16) Results: A sample of 86 students (100% of 2015-16 cohort) were assessed. This represents **1 FR** (Fall'15: EGC104), **3 SO** (Fall'15: CE 201; Spring'16: EGC207, 207L), **4 JR** (Fall'15: EGC305L, CE306; Spring'16: CE 308L, 310), & **3 SR** (Fall'15: CE470; Spring'16: CE 401, 470), classes. Based on the actions taken, the following changes were seen: **Criterion 7a: -21% (70%); Criterion 7b: +18 (95%); Criterion 7c: +14% (92%).**

Actions for 2016-17: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2016-17:

All three criterion achieved the acceptance level of 70%. Criterion 7a showed substantial decrease from previous cycle while 7b and 7c showed major improvements. The *Curriculum Committee felt that improvement is needed in the following areas, particularly for improving students' **ability to write a computer program to solve engineering problems**:

- Continue to draw flowcharts in class and assign more problems involving spreadsheet computing or Matlab programming.
- Continue introducing StaadPro early in the semester and assign small homework problems using StaadPro for more training.
- Continue providing specific assignments on use of equipment to solve a real engineering problems
- Need additional modern equipment to formulate additional labs..

3rd cycle (2017-18) Results: A sample of 154 students (100% of 2017-18 cohort) were assessed. This represents **4 FR** (Fall'17 & Spring'18: EGC101,104), **2 SO** (Spring'18: EGC207, 207L), **4 JR** (Fall'17: EGC305L, CE306; Spring'18: CE 308, 310), & **3 SR** (Fall'17: CE470; Spring'18: CE 401, 470), classes. Based on the actions taken, the following changes were seen: **Criterion 7a: +24% (94%); Criterion 7b: 0% (95%); Criterion 7c: +6% (98%).**

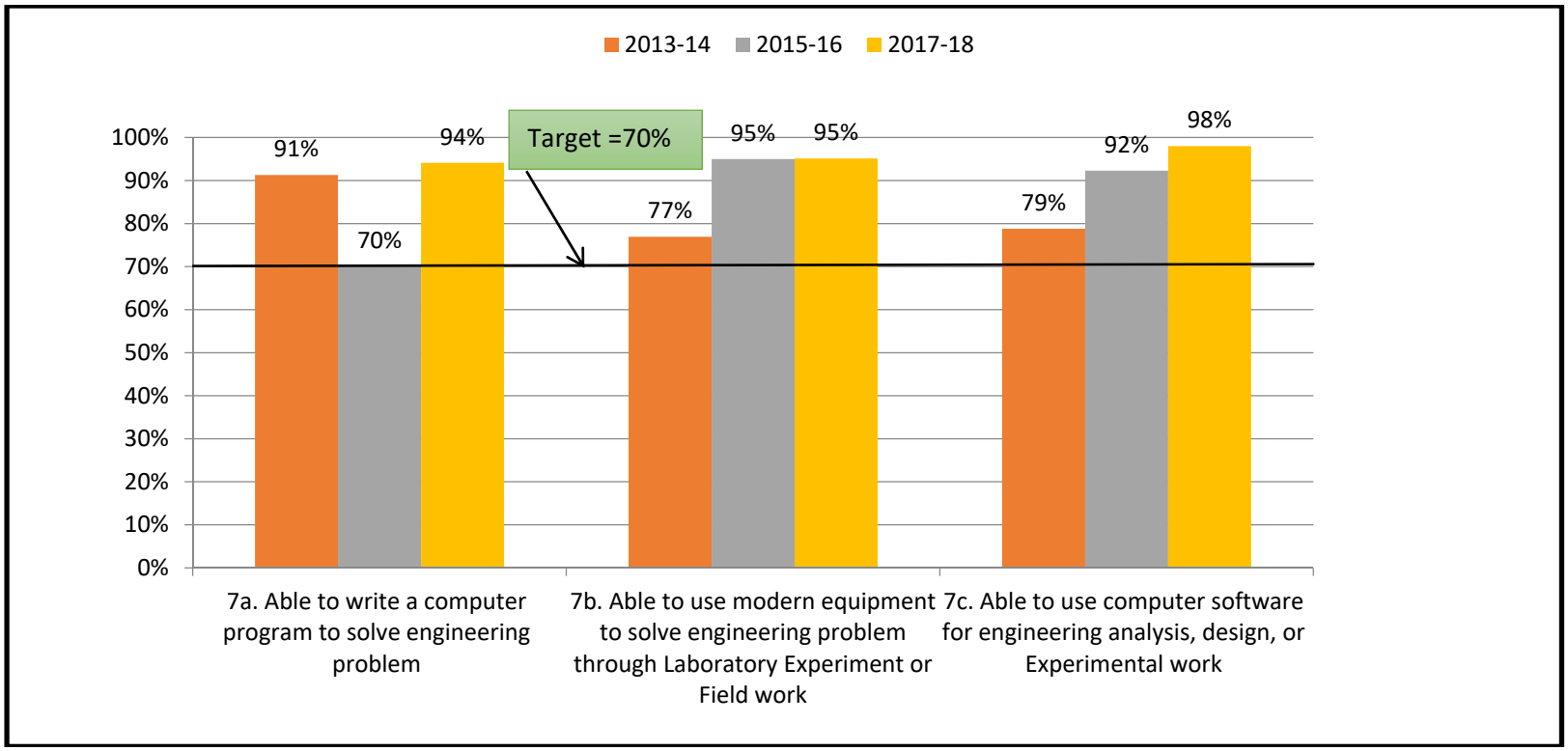
Actions for 2018-19: Actions suggested by the faculty members of respective courses at the end of the semester were discussed in departmental faculty meetings that led to the following actions for adoption by the faculty teaching the courses in the academic year 2018-19:

All three criterion achieved substantially above the acceptance level of 70% and criterion 7a showed major improvement Although substantial progress was made in criterion 7a, the *Curriculum Committee suggested the following for continuous improvement:

- Provide some coding examples and give some review of Matlab basics.
- Continue adding more new equipment and design relevant laboratory experiment.

***Curriculum Committee** includes the Program Coordinator and all Program Faculty

Figure 4.7 Achievement Chart for Learning Outcome #7. Use any modern engineering tools necessary for engineering practice



Display materials available at the time of the visit in the ABET resource room:

- Rubric for scoring Indicators with sample of lab reports and Course Action Plans
- Senior Exit Survey and results
- Minutes of Civil Engineering Curriculum Committee where recommendations were made

B. Continuous Improvement

Following is a list of the major changes in the CE program:

1. CE308L (Soil Mechanics Lab, one cr. hr.) removed as separate course and became part of the 3 cr. hr. course CE308 (Soil Mechanics)
2. CE 101 (Intro. to Civil Engineering) modified to a three-credit hour course
3. EE 201L (Linear Circuit Analysis I Lab, 1 cr. hr.) removed
4. CE473 (Earth Structures Engineering), new elective 3 cr. hr. geotechnical class added to course inventory
5. CE440 (Fundamentals of Engineering, zero cr. hr. class) added to course inventory as graduation requirement
6. MTH 238 (Applied Deferential Equations) removed as a Pre-Requisite for CE 306 (Structural Analysis)
7. MTH 227 (Calculus III) removed as a Pre-Requisite for EGC 305 (Fluid Mechanics)
8. Number of course learning outcomes modified

C. Additional Information

Documentary evidence that will be available for review during the visit to demonstrate achievement of the program outcomes and assessment will include:

1. Course descriptions and outlines
2. Samples of student work in analysis, laboratory reports, and design projects
3. Course materials that illustrate evaluation of student performance
4. Course Assessment Data Sheets and Action Plan Forms
5. Continuous Improvement of Civil Engineering program
6. Interviews with graduating seniors (Exit Interview)
7. Alumni survey
8. Minutes of Advisory Board meetings
9. Minutes of faculty meetings

Table 4.6 List of Actions Taken to Improve CE Curriculum Since Last ABET Visit.

Year Action Taken	Action Taken	Justification
Spring 2015	Modify CE 308 course description.	Experiment part was included in the course and some materials are covered in Foundation Design.
Spring 2015	Remove CE 308L. One credit hour removed.	The experiment part was included in CE 308.
Spring 2015	Remove EE 201L. One credit hour removed.	EE 201L skills are not considered essential for successful practice of civil engineering. The advisory board recommended removal.
Spring 2015	Modify EGC 101 description.	Hand sketching is removed from EGC 101 and included in CE 101; EGC 101 is to cover computer aided design only.
Spring 2015	Modify CE 101 course description, increase credit hours from 1 to 3.	Include important skills necessary to get in to the CE program curriculum easily; new skills included hand sketching, ethics and principle of design.
Spring 2018	Create new elective geotechnical course CE 473 Earth Structures Engineering.	The CE course inventory lacks elective course in geotechnical engineering.
Spring 2018	Modify prerequisites requirement of CE 306.	Prerequisites MTH 238 and EGC 101 are removed; these are not directly related to CE 306. A review of curriculums in other institutions also supported this action.

Spring 2018	Modify prerequisites requirement of EGC 305.	Prerequisite MTH 227 is removed as the content is not directly related to EGC 305. A review of curriculums in other institutions also supported this action.
Spring 2018	Create new zero credit mandatory course CE 440 Fundamentals of Engineering.	This course is created for mandatory FE review. All students in CE curriculum must take this course before graduation.
Fall 2017	Replace current system of ABET assessment of every alternative years to full assessment in every year.	This will provide comprehensive data in every year to assess and evaluate program performance. . It will also synchronize with yearly SACS evaluation.

See Appendix E4 for continuous improvement forms
See Appendix E5 for approval of 2018 curriculum improvement

CRITERION 5. CURRICULUM

Program Curriculum

The Civil Engineering Program at AAMU is set to be a broad-based program that allows students to have an emphasis within their program during their senior year. The program has been designed by the faculty to produce a graduate broadly acquainted with tools and principles that would be used in the civil engineering field. While designed to develop the essential knowledge, skills, and abilities needed for professional practice or graduate study, the curricular structure of the program, coupled with the integrated influence of liberal arts studies equips our students with a holistic educational experience that is designed to prepare students to succeed in a world characterized by rapidly developing technology, growing complexity, and globalization. The curriculum aligns with the program educational objectives through its direct support of the student outcomes. Student outcomes map directly into program educational objectives.

The program offers courses in the areas of structural analysis and design, geotechnical engineering, environmental engineering and Water Resources, and transportation engineering. The curriculum consists of at least two courses (6 semester hours) in each of these areas, with additional electives to satisfy students' need to pursue their interests in any particular area. The students are introduced to basic and generic design concepts and problems as early as their freshmen year in Engineering Drawing and Graphics (EGC 101), and Introduction to Civil Engineering (CE 101). The CE 101 class is frequently taken on field trips to construction/project sites to listen to professionals share their practical experience, professionalism, and ethics. The students are guided through required basic engineering science courses, such as Statics, Dynamics, Strength of Materials, Structural Analysis, Transportation Systems, Environmental Engineering, and Soil Mechanics, with appropriate mathematics, physics and chemistry prerequisites. This approach also satisfies the requirement of ASCE program criteria; recent ASCE program criteria requirement of additional basic science area is satisfied by the Hydrogeology course (CE 305).

The CE Design Project (CE 470) and required courses on engineering design provide a comprehensive exposure to the design of complex systems, components, and/or processes. Such design exposure is provided in all of the Department's major disciplines - structural engineering, geotechnical engineering, environmental engineering and water resources engineering, and transportation engineering. This ability to design includes not only analysis of specific problem situations, but also the synthesis of appropriate data into a systematic approach for designing a solution.

A.1. Alignment with Program Educational Objectives and Student Outcomes

The curriculum aligns with the program educational objectives through its direct support of the student outcomes. Student outcomes map directly into program educational objectives as described on the section on Criterion 3.

As shown in Tables 3.2, and 4.5, each program educational objective is related to at least one

student outcome and each student outcome is addressed in more than one course in the curriculum. This provides students with the opportunity to develop and enhance the knowledge and skills represented by the student outcomes in multiple situations and engineering applications. Individual course syllabi also includes course related mapping.

A.2. Satisfaction of Curriculum Requirements

The section below describes how the Civil Engineering Program exceeds ASCE program criteria and the ABET Engineering Criterion 5 requirements in two categories: the credit hours of mathematics and science courses (37 semester hours) exceed the requirement of 32 semester hours or 25% and the engineering topics requirement of 59 hours of instruction, which exceeds the requirement of 48 hours or 37.5%. The general education component and the other class requirements are consistent with the program and institution objectives and account for no more than 24 and 10 credit hours, respectively.

The information is also available in Table 5-1 Curriculum. The curriculum for the Bachelor of Science in Civil Engineering degree is given in Figure 5-1. One hundred and thirty (130) semester hours with an overall GPA > 2.0 are required for the degree. Students must earn at least a C in each of the CE and EGC courses in order to graduate. In addition, the students are required to take the Fundamentals of Engineering (FE) exam, and it is recommended (through faculty advisor) that they take this exam in their senior year. The flow chart of civil engineering curriculum (revised Spring 2017) showing the prerequisite structure can be found in Figure 5.2. In general, the Departmental faculty is grouped into five major emphasis areas for undergraduate teaching: 1) Structural Engineering; 2) Geotechnical Engineering; 3) Transportation Engineering; 4) Environmental Engineering and 5) Hydraulics and Water Resources Engineering.

Required courses are offered at least annually as shown in the curriculum, several basic engineering science courses are offered each semester, such as Engineering Drawing and Graphics (EGC101), Computer Programming (EGC104), and Statics (EGC205). The CE Design Project (CE470) is offered each semester to accommodate the need of senior graduates. Each course syllabus includes two specific sections namely Course Outcomes and Assessment Tools with performance criterion describing its contribution to program outcomes. The course and enrollment summary is given in Table 5.1, which shows the maximum section enrollment for the last two terms the course was offered.

Table 5-1 Curriculum

Civil Engineering

Course (Department, Number, Title)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE[1]	Subject Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
Freshman I							
ORI 101 Survival Skills	R				1	Fall 2017/Spring 2018	49
ORI 102 Survival Skills	R				1	Fall 2017/Spring 2018	35
ENG 101 Composition I [1]	R			3		Fall 2017/Spring 2018	45
CHE 101 General Chemistry I	R	3				Fall 2017/Spring 2018	35
CHE 101L General Chemistry I Lab	R	1				Fall 2017/Spring 2018	33
PED/MSC/HED Elective	E				2	Fall 2017/Spring 2018	24
EGC 101 Eng. Drawing & Graphics	R				3	Fall 2017/Spring 2018	35
MTH 125 Calculus I	R	4				Fall 2017/Spring 2018	37
CE 101 Intro. to Civil Engineering	R		3			Fall 2017/Spring 2018	52
Freshman II							
ENG 102 Composition II [1]	R			3		Fall 2017/Spring 2018	33
MTH 126 Calculus II	R	4				Fall 2017/Spring 2018	20
CHE 102 General Chemistry II	R	3				Fall 2017/Spring 2018	22
CHE 102L General Chemistry II Lab	R	1				Fall 2017/Spring 2018	20
PHY 213 Physics I	R	4				Fall 2017/Spring 2018	27
EGC 104 Computer Programming	R				3	Fall 2017/Spring 2018	28
Continued on the next page							

Course (Department, Number, Title)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.	Subject Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
Sophomore I							
MTH 227 Calculus III	R	4				Fall 2017/Spring 2018	17
PHY 214 Physics II	R	4				Fall 2017/Spring 2018	16
History Sequence I [3]	R			3		Fall 2017/Spring 2018	60
EGC 205 Statics	R		3			Fall 2017/Spring 2018	25
CE 201 Surveying	R		3			Fall 2017/Fall 2018	21
Sophomore II							
History Sequence II [3]	R			3		Fall 2017/Spring 2018	60
MTH 238 Applied Diff. Equations	R	3				Spring 2017/Sp'18	18
EE 201 Linear Circuit Analysis I	R		3			Spring 2017/Sp'18	22
EGC 206 Dynamics	R		3			Spring 2017/Sp'18	26
EGC 207 Strength of Materials	R		3			Spring 2017/Sp'18	19
EGC 207 Strength of Materials Lab	R		1			Spring 2017/Sp'18	19
Junior I							
ECO 231 or 232				3		Fall 2017/Spring 2018	15/22
EGC 204 Engineering Analysis	R	3				Fall 2016/Fall 2017	21
EGC 305 Fluid Mechanics	R		3			Fall 2016/Fall 2017	10
EGC 305 Fluid Mechanics Lab	R		1			Fall 2016/Fall 2017	9
CE 306 Structural Analysis	R		3			Fall 2016/Fall 2017	12
ENG 205 General Speech	R			3		Fall 2017/Spring 2018	21
Continued on the next page							

Course (Department, Number, Title)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.	Subject Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
Junior II							
CE 304 Environmental Engineering	R		3			Spring 2017/Sp'18	11
CE 305 Hydrogeology	R	3				Spring 2017/Sp'18	13
CE 308 Soil Mechanics	R		3			Spring 2017/Sp'18	13
CE 310 Transportation Systems	R		3			Spring 2017/Sp'18	18
CE 401 Structural Steel Design	R		3 (√)			Spring 2017/Sp'18	8
Senior I							
ENG 201 or 202 or 203 or 204	R			3		Fall 2017/Spring 2018	17
CE 402 Reinforced Concrete Design	R		3 (√)			Fall 2016/Fall 2017	6
CE 408 Foundation Design	R		3 (√)			Fall 2016/Fall 2017	6
CE 410 Transportation Eng. & Des.	R		3 (√)			Fall 2016/Fall 2017	10
CE 424 Civil Engineering Practice	R		3			Fall 2016/Fall 2017	6
Senior II							
ART 101 or 220 or 221 or MUS 101	R			3		Fall 2017/Spring 2018	58
CE 404 Hydraulic Eng. & Design	R		3 (√)			Spring 2017/Sp'18	9
CE 4XX OR NRE 494 Or NRE 495	R		3			Fall 2017/Sp'18	Varies
CE 470 Civil Engg Design Project	R		3 (√)			Fall 2017/Sp' 2018	5
Continued on the next page							

Course (Department, Number, Title)	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.	Subject Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Maximum Section Enrollment for the Last Two Terms the Course was Offered
		Math & Basic Sciences	Engineering Topics Check if Contains Significant Design (√)	General Education	Other		
CE Elective							
CE 409 Public Health Engineering	E		3			Not offered in recent years	
CE 411 Urban Transportation Planning	E		3			Not offered in recent years	
CE 412 Pavement Systems	E		3			Not offered in recent years	
CE 413 Construction Management	E		3			Not offered in recent years	
CE 414 Design of Timber Structures	E		3 (√)			Not offered in recent years	
CE 415 Transportation Materials….	E		3 (√)			Fall 2013	12
CE 450 Hydraulics of Open Channel	E		3			Not offered in recent years	
CE 455 Wastewater Treatment	E		3			Not offered in recent years	
CE 460 CAD in Civil Engineering	E		3 (√)			Not offered in recent years	
CE 480 Special Topics in CE	E		3			Spring 2017/Fall 2017	6
Add rows as needed to show all courses in the curriculum.							
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		37	59	24	10		
OVERALL TOTAL CREDIT HOURS FOR COMPLETION OF THE PROGRAM	130						
PERCENT OF TOTAL		28.46%	45.38%	18.46%	7.69%		
Total must satisfy either credit hours or percentage — Minimum Semester Credit Hours		32 Hours	48 Hours				
Total must satisfy either credit hours or percentage — Minimum Percentage		25%	37.5 %				

Figure 5.1 Civil Engineering Curriculum

Civil Engineering
130 Credit Hours

FRESHMAN YEAR

First Semester			Second Semester		
Course No.	Course Title	Hrs	Course No.	Course Title	Hrs
ORI 101	First Year Experience	1	ORI 102	First Year Experience	1
ENG 101	Composition I[2]	3	ENG 102	Composition II[2]	3
MTH 125	Calculus I	4	EGC 104	Computer Programming[2]	3
CHE 101	General Chemistry I	3	CHE 102	General Chemistry II	3
CHE 101L	General Chemistry I Lab	1	CHE 102L	General Chemistry II Lab	1
PHY 213	General Physics with Calculus I	4	EGC 101	Engg Drawing/Graphics[2]	3
CE 101	Intro to Civil Engg[2]	3	MTH 126	Calculus II	4
		19			18

SOPHOMORE YEAR

First Semester			Second Semester		
Course No.	Course Title	Hrs	Course No.	Course Title	Hrs
	HIS Sequence – See GenEd Listing[1]	3		HIS Sequence – See GenEd Listing[1]	3
MTH 227	Calculus III	4	MTH 238	Applied Differential Equations	3
PHY 214	General Physics with Calculus II	4	EE 201	Linear Circuit Analysis I[2]	3
EGC 205	Statics[2]	3	EGC 206	Dynamics[2]	3
CE 201	Surveying[2]	3	EGC 207	Strength of Materials[2]	3
	PED/MSC/HED – See GenEd Listing[1]	2	EGC 207L	Strength of Materials Lab[2]	1
		19			16

JUNIOR YEAR

First Semester			Second Semester		
Course No.	Course Title	Hrs	Course No.	Course Title	Hrs
	Hum/Fine Art – See GenEd Listing[1]	3	CE 304	Environmental Engineering[2]	3
	Economics – See GenEd Listing[1]	3	CE 305	Hydrogeology[2]	3
EGC 204	Engineering Analysis[2]	3	CE 308	Soil Mechanics[2]	3
EGC 305	Fluid Mechanics[2]	3	CE 310	Transportation Systems[2]	3
EGC 305L	Fluid Mechanics Lab[2]	1	CE 401	Structural Steel Design[2]	3
CE 306	Structural Analysis I[2]	3			15
		16			

SENIOR YEAR

First Semester			Second Semester		
Course No.	Course Title	Hrs	Course No.	Course Title	Hrs
	Literature – See GenEd Listing[1]	3		Fine Arts – See GenEd Listing[1]	3
CE 402	Reinforced Concrete Design[2]	3	CE 404	Hydraulic Engg & Design[2]	3
CE 408	Foundation Design[2]	3	CE 470	Civil Engg Design Project[2] CS	3
CE 410	Transportation Engg & Design[2]	3		[2]CE 4xx, [2]NRE 494, 495	3
CE 424	Civil Engineering Practice[2]	3			12
		15			

[1]See General Education Requirements section of this Bulletin for eligible courses. [2]MinGrade of C required.

Figure 5.2a Structure of Civil Engineering Curriculum

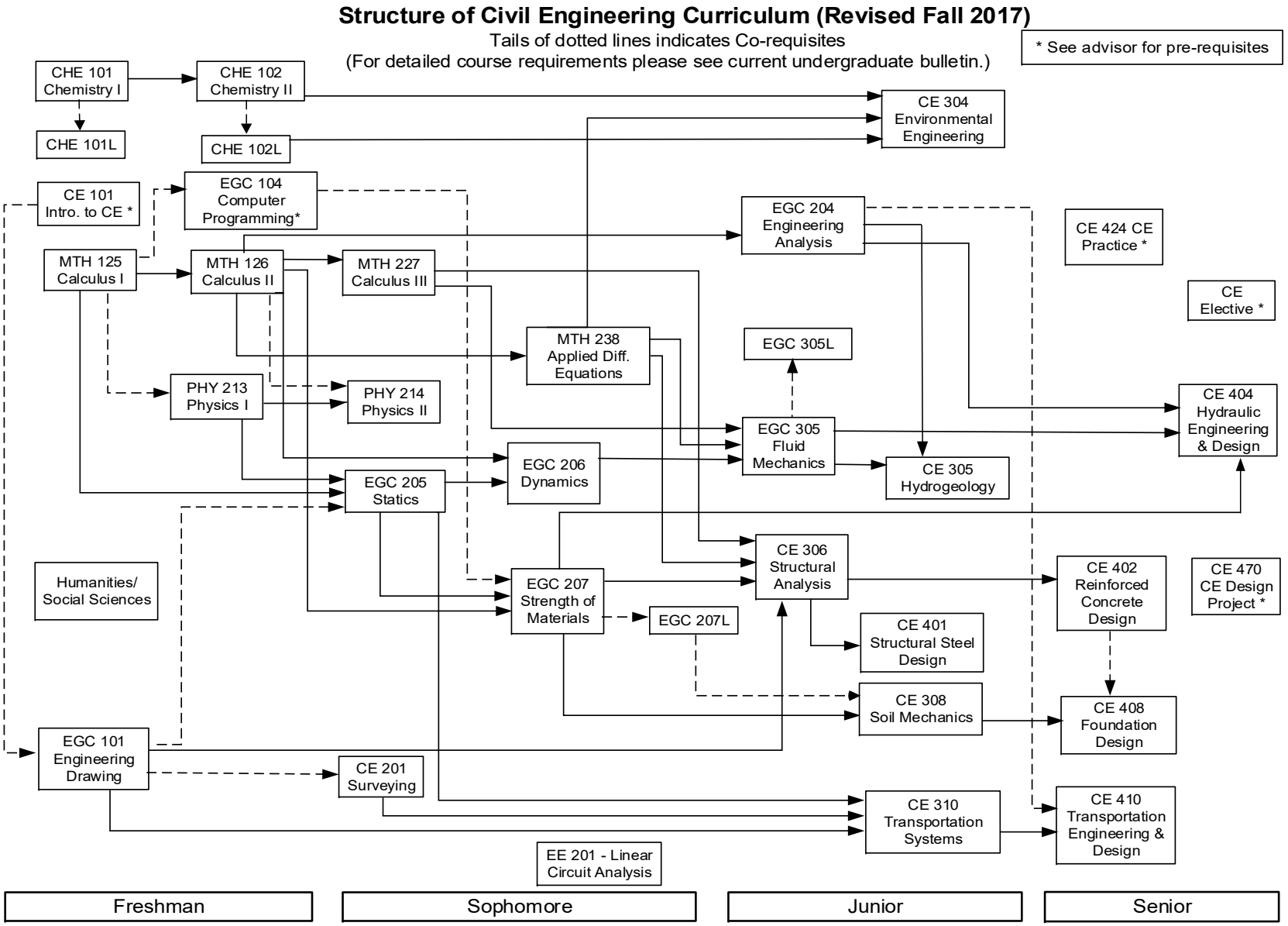
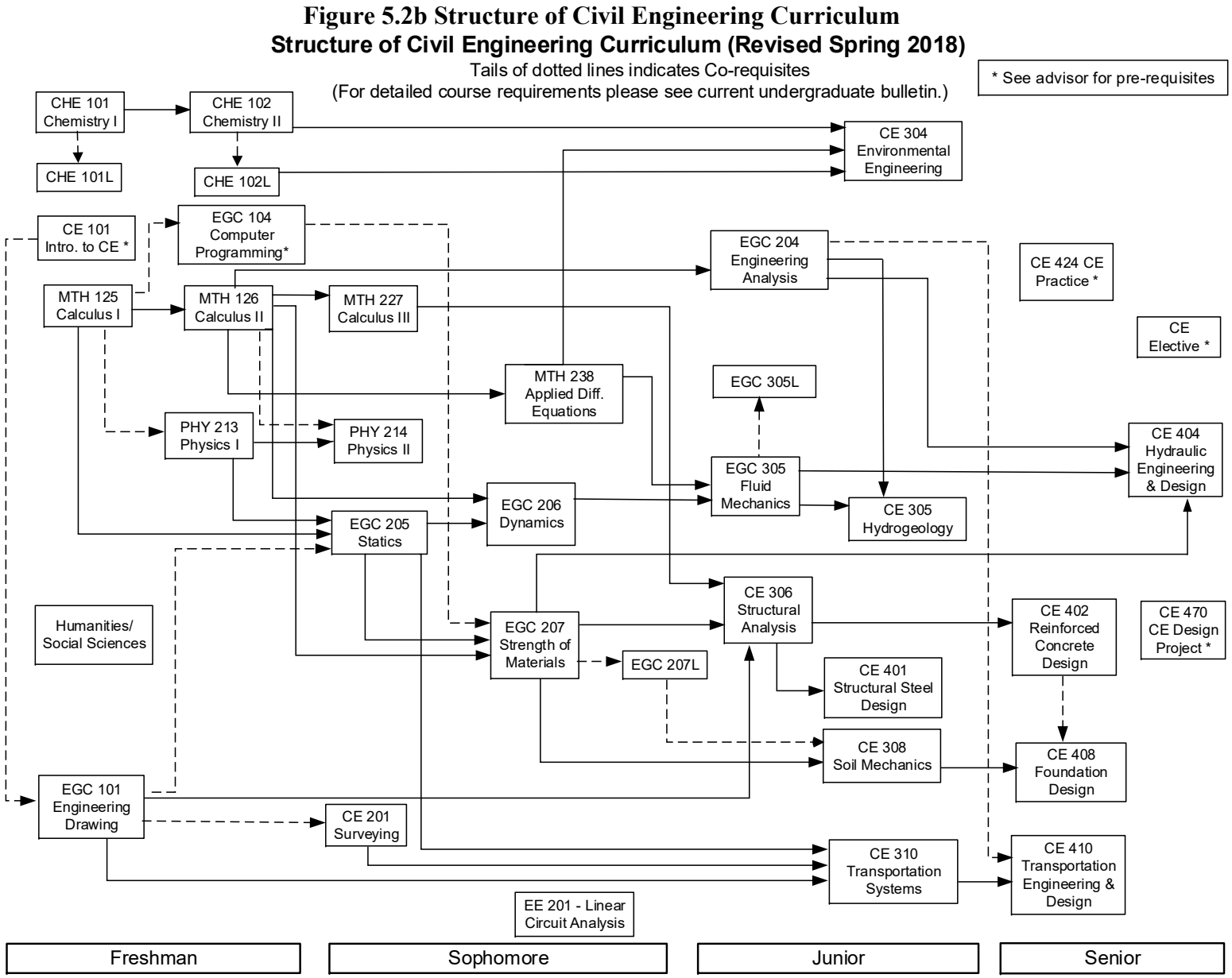


Figure 5.2b Structure of Civil Engineering Curriculum



The course credits requirements of the BSCE degree program in each of the each subject areas of the general criteria (Math & Basic Sciences, Engineering Topics, and General Education) are shown in the following:

a) One year of a combination of college-level math and basic sciences (some with experimental experience) appropriate to the discipline.

Course	Title	Credits
MTH 125	Calculus I	4
MTH 126	Calculus II	4
MTH 227	Calculus III	4
MTH 238	Applied Diff. Equations	3
EGC 204	Engineering Analysis (Probability and Statistics)	3
CEM 101	General Chemistry I	3
CEM 101L	General Chemistry I Lab	1
CEM 102	General Chemistry II	3
CEM 102L	General Chemistry II Lab	1
PHY 213	Physics I	4
CE 305	Hydrogeology*	3
PHY 214	Physics II	4
TOTAL		**37**

*satisfies additional basic science area required by ASCE program criteria

b) One and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study.

Course # & Title	Credits
CE 101 Intro. to Civil Engineering	3
EGC 205 Statics	3
CE 201 Surveying	3
EE 201 Linear Circuit Analysis I	3
EGC 206 Dynamics	3
EGC 207 Strength of Materials	3
EGC 207L Strength of Materials Lab	1
EGC 305 Fluid Mechanics	3
EGC 305L Fluid Mechanics Lab	1
CE 306 Structural Analysis	3
CE 304 Environmental Engineering	3
CE 308 Soil Mechanics	3
CE 310 Transportation Systems	3
CE 401 Structural Steel Design	3
CE 402 Reinforced Concrete Design	3
CE 408 Foundation Design	3

CE 410 Transportation Eng. & Des.	3
CE 424 Civil Engineering Practice	3
CE 404 Hydraulic Eng. & Design	3
CE 4XX OR NRE 494 Or NRE 495 Elective	3
CE 470 Civil Engg Design Project	3
TOTAL	59

c) A general education component that complements the technical content of the curriculum and is consistent with program and institution objectives.

Course # & Title	Credits
ENG 101 Composition I [1]	3
ENG 102 Composition II [1]	3
History Sequence I [3]	3
History Sequence II [3]	3
ECO 231 or 232	3
ENG 205 General Speech	3
ENG 201 or 202 or 203 or 204	3
ART 101 or 220 or 221 or MUS 101	3
TOTAL	24

d) Other component that complements the technical content of the curriculum and is consistent with program and institution objectives.

Course # & Title	Credits
ORI 101 Survival Skills	1
ORI 102 Survival Skills	1
PED/MSC/HED Elective	2
EGC 101 Eng. Drawing & Graphics	3
EGC 104 Computer Programming	3
TOTAL	10

A detailed explanation as to how the B.S. Civil Engineering curriculum meets the program criteria established by the American Society of Civil Engineers (ASCE) is included in Section "PROGRAM CRITERIA" of this self-study document. Table 5.2 includes a summary showing the number of the credit hours of coursework ascribed to each of the major curricular categories described in the program criteria. [Please note that the assignment of credit hours by category in Table5.2 is often approximate, since many courses incorporate coverage of several categories. Also, the categories overlap. For example, laboratory experiments may also represent advanced principles and practice.]

Table 5.2 A summary of the credit hours of coursework used to satisfy program-specific criteria for the B.S. degree in Civil Engineering. A narrative discussion of the program-specific criteria is provided in Section "PROGRAM CRITERIA" of this self-study document. Credit hours assigned to various categories in the table may overlap.

Category	Courses (credit hours applicable to category)	Credit Hours for Category
...mathematics through differential equations	MTH125(4),126(4),227(4),238(3), EGC204(3)	18
…calculus-based physics, chemistry, and at least one additional area of basic science	PHY105(4),106(4), CHE101(3), 102(3),101L(1),102L(1), CE305(3)	19
……four technical areas appropriate to civil engineering…		
…structural engineering	EGC205 (1), 207(1), CE306(3), 401((3), 402(3), Technical electives	>11
…geotechnical engineering	CE308(3), 408(3) Technical electives	>6
…environmental engineering and hydraulics/water resources	CE304 (3), EGC305(3), 305L(1),CE404(3), Technical electives	>10
…Transportation engineering	CE310(3), 410(3), Technical electives	>6
…conduct civil engineering experiments and analyze and interpret … data	EGC207L(1), 305L(1), CE201(3), CE308L(1), CE310(1)	>7
…design a system, component, or process in more than one civil engineering context …structural engineering …geotechnical engineering …environmental engineering and hydraulics/ water resources ...transportation engineering	CE 470(3) Technical electives CE401((1) CE402(1) CE408(1) CE404(1) CE410(1)	>8
…explain basic concepts in management, business, public policy, leadership; importance of professional licensure.	CE101(3) CE424(3) ECO231 OR 232 (3)	>9

A.3. Engineering Design Practice Through the Curriculum

Design is integrated throughout the curriculum as shown in Table 5-1 Curriculum. In addition to delivering the base of general engineering knowledge, methods, and problem solving skills required for civil engineering practice, the following courses in the curriculum typically include an open-ended design project pertinent to the specific course material: Steel Design, Reinforced Concrete Design, Foundation Design, Hydraulic Engineering Design, and Transportation Engineering and Design. Thus, beyond simple completion of exams and assignments, students are continually building their competence in integrating and applying basic science, mathematics, and principles to actual engineering practice via solution of open-ended, in-depth design problems.

The course specific design projects throughout the curriculum emphasize good engineering practice, awareness of engineering standards, consideration of ethics and effect on society, and design according to realistic constraints. In their final semester, students undertake a comprehensive civil engineering design project (CE 470). The design content of CE 470 has been substantially improved constantly. The students go through a variety of basic design experiences throughout the curriculum, culminating in this major comprehensive design project. Recent design projects have been real life projects in and around the campus, chosen by student groups under guidance from the instructor. The emphasis has been on the process and experience of designing – identifying and defining the problem, identifying data requirements, collecting data and standards by research and discussion with professional experts, performing lab experiments if needed, group discussions to develop feasible and acceptable solutions, continuous progress reporting, and final written and verbal presentation of the design. The student (or student team) presents their project concept to groups of CE Advisory Board members, CE Faculty and their peers. As the University recently launched STEM Day in each Spring.

Students are assigned to write reports as part of various design exercises in several courses such as CE 410 Transportation Engineering and Design, CE 401Structural Steel Design, and CE 408 Foundation Design. In producing their design/term project reports in these courses and in CE 470 Civil Engineering Design Project, they are asked to use a word processor, which facilitates spelling and grammar checking. They are also required to turn in a draft report sufficiently ahead of the deadline for the professor to review and return to students with comments and suggested corrections. The final report is accepted only when after the report has met the standards. To aid students, they are given handouts on report writing, given models of reports for them to emulate, and constantly reminded of the importance of professionalism in communication. Thus, the quality of the reports is constantly improved. The reports of CE 470 and other design projects will be available at the time of visit.

These aspects are again reinforced when they undertake their final design project for course CE 470. Faculty members, who are either registered professional engineers, and/or with an advanced degree (at least Masters) in Civil Engineering, teach all our design courses and the Civil Engineering Practice course. A number of faculty are Professional Engineers and/or are

involved in consulting. All faculty are involved in research and some on design committees that facilitates the latest innovations being introduced into the classroom.

Course Syllabi

The following material will be available for review during the site visit:
1. Course Syllabi (also included in Appendix A)
2. Course Notebooks with sample student work

CRITERION 6. FACULTY

Faculty Qualifications

The faculty is the heart of any educational program. As shown Table 6-1 Faculty Qualifications, the Civil Engineering faculty is well qualified. Four of the five faculty members hold doctoral degrees in Civil Engineering or related areas. The fifth faculty member is a part-time temporary faculty holds a master's degree in Civil Engineering, complimented by 5 years of industry experience. In terms of professional registration, three faculty members are registered professional engineers in the State of Alabama and other states. The majority of design courses are taught by registered faculty. Faculty members are actively involved in research and/or professional activities. The diversity of the faculty is a strength of our program. All Engineering faculty members possess excellent oral and written communication skills. These attributes are considered in the hiring process. The following is a brief biographic sketch of each faculty member, the specific data on each CE faculty member is provided in Appendix B in the form of a faculty resume.

Dr. Nesar U. Ahmed, P.E., Professor of Civil Engineering, joined the department in 1988. He is specialized in geotechnical engineering, reinforced concrete design, and structural steel design. His main teaching responsibilities are in soil mechanics and foundation design. He has taught graduate courses part-time at the University of Alabama in Huntsville. Dr. Ahmed has been a consultant to industry for the past fourteen years. Dr. Ahmed has the Professional Engineer license from several states.

Dr. Sudip Bhattacharjee joined the department in Fall 2006 as Assistant Professor. Dr. Bhattacharjee has a Ph.D. in Transportation Engineering from Worcester Polytechnic Institute (WPI), Massachusetts. His main area of research is the characterization of pavement materials, such as the virgin and recycled Hot Mix Asphalt (HMA), through laboratory tests and theoretical modeling. Since joining the department he has been actively involved in interdisciplinary research involving civil engineering and applied science areas. His research area includes traditional transportation engineering, application of smart materials for energy harvesting and theoretical modeling of time dependent mechanical and electrical behavior of materials. He obtained funding from National Science Foundation (NSF) to develop transportation laboratory and new instructional materials involving state-of-the-art design methodologies. Since joining he has published 18 research papers in top ranked journals and conference proceeding in the areas of civil engineering and applied science, including 11 first authored articles. He has regularly presented at the annual meetings of Transportation Research Board (TRB) and Alabama section of ASCE. He has successfully collaborated with the Departments of Physics and Electrical Engineering within the campus, and with outside institutions including University of Alabama in Huntsville and University of New Hampshire.

Dr. Anil Acharya, P.E., Assistant Professor in the department of Civil Engineering, joined the department in Fall 2012. He is specialized in civil and environmental engineering with a major degree in water resources engineering. Dr. Acharya has almost 5 years of consulting/contractor engineering job experience, while he has approximately 10 years of teaching and research

experiences in university and state and federally funded research projects. Dr. Acharya's major research expertise is in the field of spatial hydrology, modeling of water resources systems, weather modification, climate studies and its application to water resources and environment. Some major activities in the past incorporates studies related to streamflow disaggregation, water supply and demand forecasting, impacts of weather modification, climate, and land use/cover change on water availability (quantity/quality), modeling of water resources systems, GIS applications in water resources, and the application of water resources planning and methodologies for drought preparedness. He was also a recipient of the "2015 Outstanding Faculty Advisor Award" for the ASCE student chapter in the Southeast Region.

Dr. Mohamed Ashour, P.E., Associate Professor and Coordinator of Civil Engineering, joined the department in 2017. He teaches mostly geotechnical and structural engineering courses. He has a Ph.D. in geotechnical engineering with specialization in laterally and axially loaded piles/shafts under static and seismic loading, soil-structure interaction, soil liquefaction, soil modeling, and slope stabilization. He developed a number of design software packages (SWM and DFSAP for laterally loaded piles/shafts, PSSLOPE for pile-stabilized slopes, and WBUZPILE for axially loaded piles) used by the Washington, Nevada, West Virginia and Alabama DOTs with the California, Washington, Nevada, West Virginia and Alabama Departments of Transportation and consulting firms. He was invited speaker at a number of ASCE meetings and symposiums and taught design and training courses at Departments of Transportation (NDOT and WSDOT) and the US Army Corps of Engineers. Dr. Ashour has more than 20 years of teaching and research experience with several research project awards. He authored and co-authored numerous papers published in national and international top geotechnical journals and conferences.

Faculty Workload

The normal teaching load for engineering programs is four courses per semester. See Table 6-2 for a summary of faculty workload.

Besides teaching, faculty members are expected to engage in research and scholarly activity producing publication of articles in archival journals or the equivalent (e.g., refereed conference proceedings, book chapters, or other refereed forums) annually. In addition, they are also expected to write and submit proposals for externally funded research and/or development. For service, faculty must participate in the academic life of the university serving various committees and also play an active role in professional organizations at the national level (e.g., reviewing articles and proposals, serving on technical, conference, and editorial committees, and editing archival publications).

Faculty Size

The size of the CE faculty is adequate to cover all of the curriculum areas of the educational program, while also allowing the faculty time for research and service activities, professional

development, and interactions with industry and practitioners. All of the core courses are offered at least once a year, and at least one elective course is offered each semester. Some of the EGC courses and CE 101 and CE 470 are offered both Fall and Spring semesters. The faculty ratio is around 28:1 in the department (advising loads of 20-25 undergraduate advisees per faculty member). Although manageable, a lower number would allow for a more personalized advising experience for CE students. As of Spring 2018, there are four (4) full-time tenured or tenure-track faculty members and a part-time adjunct in the Civil Engineering program.

Interactions with Students, Student Advising and Counseling. Our faculty members have direct interaction with all students and active participation in each student's professional development. As described in Criterion I, the student advising system consists of a two-tier system; the advising is done initially collaboratively by the university college advisor and the major departmental co-advisor at the freshman and sophomore levels and then through a major advisor at the junior and senior levels. However, faculty interact closely with students in career decisions and advising, they employ NSF Undergraduate Research, and other undergraduate research students in their laboratories. Program faculty members also advise very active ASCE student chapter. All faculty members maintain an open-door policy for student office hours and consultation.

Professional Development. CE faculty members are active in the professional societies of the field, both mainline societies and others that tend to cross boundaries with other disciplines such as computational mechanics and aerospace science/engineering. In addition, several faculty members are active as consultants and in state-of-the-art research oriented capacities within the areas of structural engineering, transportation, computational fluid dynamics, CAD applications, and materials surface characterization. Moreover, the faculty is strongly encouraged to bring experiences, from these contexts, into the classroom.

All faculty members are actively involved in proposal writing seeking funded research. Faculty members continue to derive valuable information from their participation in such developmental activities or sponsored research, technical presentations, workshops, and journal publishing. Several faculty members have been successful in implementing their newly acquired knowledge into classroom activities.

Services to the University and Community. In addition, the faculty members are actively involved in providing substantial service to the University. Whether elected or appointed, members of the CE faculty have been routinely called upon to serve on important university search committees at various levels, such as the Faculty Senate, University Promotions and Tenure Committee, Grievance Committee, and for numerous other standing Committees.

The CE faculty actively supports various community activities. Several faculty members routinely participate in the local science fair and habitat program and get students involved, as well.

Interaction with Industry. Several local industries provide generous support to our CE Department in various ways. Industrial representatives are frequently invited as guest lecturers in many of the undergraduate classes. The CE Faculty routinely arranges field trips to construction

sites and environmental infrastructures through direct interaction with the involved engineers. Several local engineering firms such as ALDOT, Qualls Engineering, QORE Property Sciences,4-Site Inc, and Foster Wheeler provide internships and co-op opportunities to our students. Furthermore, several industries have established scholarship programs for our CE students. Alabama Board of Contractors provides an annual grant for student faculty and program development. Four of our faculty members are members of ASCE. CE Faculty along with the student chapter members regularly attend local ASCE branch meetings and interact directly with the local engineers. In addition, the faculty has substantial interaction with industry, government, and professional societies through their consulting and research and is thus better able to assist the professional development of their students.

The undergraduate enrollment in our programs over the 6 years is presented in Table D.1 in Appendix D.

Professional Development

Faculty members are encouraged to participate in various professional development activities to improve their teaching and research productivity. AAMU offers various on-campus teaching and research related seminars and training workshops. All these on-campus seminars are offered free to all faculty and staff.

Funds to support faculty professional development are planned when the budget is prepared. The program coordinator requests enough funds to send each faculty member to at least one professional meeting per year. Funds to support faculty travel as well as funds for speakers to come to AAMU are also available through the Civil Engineering Foundation which receives an annual grant from the Alabama Board of Contractors. University Title III grant also provides funds for faculty development.

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Civil Engineering faculty members participate in various on and off-campus professional development activities. These include participation in the local chapter of the American Society of Civil Engineers, participating in technology transfer programs, teaching Fundamentals of Engineering and Professional Engineering examination review courses, working with and helping the student chapter of ASCE in national and regional contests, and winning funded projects for research and consultancy. All our faculty have attended and presented papers at technical conferences. Some have served as panel reviewers of federal grant proposals, and as reviewers of technical and scientific journals in their areas of expertise. Several faculty are also active in professional organizations and/or technical/scientific committees. Details of these activities can be found in the faculty CVs in Appendix B.

Authority and Responsibility of Faculty

The university re-organized in the Fall 2011by merging and re-aligning several departments, schools and programs. This resulted in merging of the Civil and Mechanical Engineering departments and eliminating one Chair position. The combined department is named "Mechanical and Civil Engineering Department." Dr. Mohamed Seif of the previous Mechanical

Engineering Department has been named Chair of this new combined department. Since January 2018, Dr. Mohamed Ashour has been serving as Co-ordinator of the Civil Engineering program, while Dr. Nesar Ahmed was the program Co-ordinator from August 2016 to December 2017 after the retirement of the Co-ordinator/Chair Dr. Pabitra K. Saha.

The program coordinator is a nine month faculty member and is primarily responsible for assigning teaching responsibilities, managing the working budget of the department and general operation of the program in addition to teaching and research responsibilities. The program coordinator in collaboration with program faculty members has responsibility for and control of the program curriculum and responsibility for program development. The program coordinator is also responsible for all hiring of faculty members and other personnel in the program. The program coordinator provides input to the department head on space utilization, program needs, and any additional information needed by the administration to ensure the effective management of institutional resources.

Authority over all aspects of the civil engineering degree program rests primarily with the program faculty. With a relatively small faculty of four, the program faculty act as a “committee of the whole” to deliberate over and enact changes to curricula, educational objectives, and student outcomes. While the department chair and program coordinator coordinate the collection and basic analysis of assessment data, evaluation and assessment take place at regular faculty meetings with all faculty participating. Similarly, individual faculty prepares “Course Assessment Data” and Action Plan” documents for their courses, which are circulated to all faculty and discussed at faculty meetings. Any faculty member may propose changes to curriculum, objectives, and outcomes using the “Continuous Improvement” form. Such changes require a majority vote of the faculty.

The program coordinator plays a leading role in the continuous improvement of the program by: coordinating the collection and analysis of assessment data, setting the agenda of faculty meetings to ensure timely assessment, working with college and university committees who must consider and approve curricular changes, and coordinating the process of course assessment using “Course Assessment Data” and “Action Plan” forms. The program coordinator also conducts constituent surveys, which are essential for the assessment and evaluation of program educational objectives.

Table 6-1. Faculty Qualifications

Civil Engineering Program

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[3]	Years of Experience			Professional Registration/ Certification	Level of Activity[4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Nesar Ahmed	Ph.D., Civil Engineering, 1989	P	T	FT	18	33	30	PE	M	M	M
Sudip Bhattacharjee	Ph.D. Civil Engineering, 2005	ASC	T	FT	2	12	12		M	M	L
Anil Acharya	Ph.D., Civil Engineering, 2012	ASC	T	FT	6	6	6	PE	M	M	L
Mohamed Ashour	Ph.D., Civil Engineering, 1998	ASC	TT	FT	8	20	1.5	PE	M	M	M
Ahmed Elsayed	M.S., Civil Engineering, 2014.	A	NTT	PT	5	4	4		L	L	L

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: T = Tenured TT = Tenure Track NTT = Non Tenure Track
3. Code: FT = Full-time PT = Part-time Appointment at the institution.
4. The level of activity (high, medium or low) should reflect an average over the year prior to the visit plus the two previous years.

Table 6-2. Faculty Workload Summary

Civil Engineering

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Nesar Ahmed	FT	Fall 2017 Family Leave Spring 2018 CE 470/3, CE 401/3, EGC 205/3	80%	10%	10% (service)	100%
Sudip Bhattacharjee	FT	Fall 2017 CE 201/3, CE 410 /3, EGC 204/3, CE 470 /3 Spring 2018 CE 101/3, CE 310 /3, EGC 206 /3	75%	15%	10% (service)	100%
Anil Acharya	FT	Fall 2017 CE 101/3, CE 424/3, CE 480/3, EGC 305/3, EGC 305L/1 Spring 2018 CE 304/3, CE305/3, CE 404/3, EGC 207L/1	80%	10%	10% (service)	100%
Mohamed Ashour	FT	Fall 2017 CE101/3, CE306/3, CE408/3 Spring 2018 CE308/3, EGC104/3, EGC 207/3,	60%	20%	20% Administrative	100%
Ahmed Elsayed	FT PT	Fall 2017 CE 402/3, EGC 101/3, EGC 104/3, EGC205/3 Spring 2018 EGC101//3	100% 25%			100% 25%

FT = Full Time Faculty or PT = Part Time Faculty, at the institution
For the academic year for which the self-study is being prepared.
Program activity distribution should be in percent of effort in the program and should total 100%.
Indicate sabbatical leave, etc., under "Other."
Out of the total time employed at the institution

CRITERION 7. FACILITIES

The Engineering, Technology and Computer Science programs are hosed in the new Engineering and Technology building named Arthur J Bond Hall (AJBH) located on the South Campus of Alabama A&M University.

A. Offices, Classrooms and Laboratories

Facility Description

The AJBH comprises a gross useable area of 85,319 sq. ft. The net square footage, which is defined to be the occupiable area, is 57,253 sq. ft or about 67% of the gross area. The net area, by definition, does not include electrical and mechanical equipment rooms, storage areas, corridors, restrooms, stairs, the roof terrace or janitorial spaces. The net occupiable area contains 13 classrooms, 31 dedicated laboratories, 9 research offices/laboratories, 43 faculty offices, 6 department chair offices, and the Dean's area. There are facilities for a technical library, a student study area, student organization offices, a faculty conference room, faculty lounge and a general use auditorium. The net area is adequate for the current faculty and student population.

The AJBH contains 13 classrooms with a total area of 10,006 sq ft and an average area of 770 sq. ft. Four classrooms are convertible into two large classrooms with an area of about 1500 sq. ft. each. Classrooms can accommodate 482 students, or an average of 37 students per classroom. Eight classrooms are department dedicated and five classrooms including the two "high tech" rooms are open for overload use.

There are 31 dedicated laboratories in the AJBH: 9 computer laboratories (including 1 open computer lab), 6 Civil Engineering core curriculum laboratories, 10 Electrical Engineering core curriculum laboratories, and 7 Mechanical Engineering core curriculum laboratories. Mechanical Engineering facilities also include a machine shop located within the AJBH and an Engineering Annex located on West Campus. Computer laboratories are, with exception of the "open" computer laboratory, located on the second floor of the AJBH. CE, EE and ME all have dedicated computer laboratories. Core curriculum laboratories are located on both the first and second floor of the AJBH. Civil and Mechanical Engineering laboratories are generally located on the first floor of the AJBH. These are "high bay" rooms with un-encumbered height of 18 ft. All "high bay" laboratories are equipped with single phase and three phase power (to 480V) and natural gas. All are individually cooled and ventilated. The Mechanical Engineering Senior Design Laboratory is located on the second floor. Electrical Engineering laboratories are, with the exception of the Clean Room/Micro-Fabrication Laboratory, located on the second floor of the AJBH. These laboratories have standard 10" ceiling height. EE laboratories are equipped with 120/208V, three-phase power and are individually cooled and ventilated. There are six research offices on the first floor and three on the second floor.

The Dean's area (including a dedicated conference room) is located on the second floor. There are six Department Chair Areas (office plus support area and work area). There are forty-three Faculty offices with an average area of 130 sq. ft. per office. These are generally located on the

third floor. The Faculty conference room is located on the second floor and Faculty lounge is on the first floor. The student study area and the four student organization offices along with the engineering technical library (including a librarian's office) are located on the first floor of the AJBH. The general use auditorium, located on the second floor of the AJBH, has a capacity of over 200 persons.

Offices

The administrative office of the Civil Engineering Program (formerly Department) is located in a suite on the third floor of Arthur J Bond Hall (305 AJBH). The office is equipped with a high-capacity photocopy machine, color laser printer, and a fax machine. Two portable projectors facilitate audio/visual presentation in classrooms. The office is run by a secretary, and up to two student assistants. The office also contains the program files, reference books and office supplies cabinet. The space is adequate for a program of 5 faculty. All program faculty and staff have their own office computers and telephones. All desktop computers are connected to the campus-wide network, allowing access to the Banner system and the internet.

Every faculty member has a well-appointed private office of with an average area of 130 sq. ft. per office. This allows each faculty member to comfortably meet with and advise students. The office equipment includes standard desk, chair, bookcases, small table and two chairs for meeting with students. Each faculty member has a telephone, desktop computer/workstation, laptop and multi-function printer/copier. All faculty offices are clustered around the CE office on the third floor of Arthur J Bond Hall. There is also an office space (150 AJBH) for graduate students or adjunct faculty, if any. It has two desks, file cabinets, bookshelves, tables, a networked computer, and printer.

Classrooms

The Civil Engineering program has two reserved 30-seat classrooms in AJBH, where the program is located. The classrooms in 119 AJBH and 103 AJBH has a workstation connected to a projector for computer-based material, as well as an overhead projector, a screen, and two large whiteboards. Additional classrooms can be assigned to the program. In addition, the program has a teaching computer facility consisting of 27 personal computers, which is located in room 239 AJBH, equipped with audio-video equipment, a screen, and one large whiteboard. The facilities are adequate for instructional purposes. The capstone design class usually meets in the room 239 AJBH.

Laboratory facilities

There are 6 Civil Engineering core curriculum laboratories and 1 equipment storage that occupy an area of 5600 sq. ft of the AJBH. There is also a Computer laboratory designated for the CE program, which is located on the second floor of the AJBH. Civil Engineering laboratories located on the first floor of the AJBH include: 1) Soils/Environmental Laboratory, 2) Fluids/Hydraulics Laboratory, 3) Surveying Laboratory, 4) Concrete Laboratory, 5) Structures Laboratory, and 6) Transportation Laboratory.

The Soils/Environmental Laboratory is located in room AJBH 145. The Soils laboratory is used to determine soil characterization, gradation, density, specific gravity, permeability, soil bearing capability, strength, etc. The laboratory contains Sieve sets with Shaking Machine and splitter, Atterburg Limit Tester, Hydrometers, Pyrometers, Direct Shear Tester, Consolidation Tester, Unconfined Compression Tester, Conventional Tri-axial System, Proctor Density Compactor, Permeability Testing Machine, Soil Sampling Kit, Electric Balance, thermometers, timers and Ovens. The Environmental Laboratory is used for demonstration purposes and under continuous development. This lab consists of a Water Analysis Kit (including portable P-H Meter, TDS meter, Hardness Test Kit), Flocculator Jar Test Apparatus, Colorimeter Kit (Chlorine Test), Spectro Photometer, and Sludge Treatment Kit (Old model for Dissolved Oxygen and Settleable Matter). One Water Quality Sonde is also housed in the same lab so that students could see the updated techniques of water quality sampling and measurement in the field.

The Fluid Mechanics and Hydraulics Laboratory is located in room AJBH 149. This lab is equipped with two Hydraulic Benches (with Weirs), Tilting Flume (Open Channel), Center of Pressure Apparatus, Venturi Apparatus, Bernoulli Apparatus, Jet Apparatus, Reynolds Apparatus, Pipe Fluid Flow System, Current Meter, Cavitation Demonstration Apparatus, Orifice Flow, Gas Law Apparatus, Magdeburg Plates, and Stability Apparatus. It also contains Precision Scales, Thermometers, Viscometers, Hydrometers, and additional equipment accessories to determine basic fluid properties including density and/or specific gravity. This lab also includes one computer (with a printer) which is used for experiments that require PASCO Capstone (Datastudio) software, and includes a two-way white board for brief lecture in the class.

Laboratory for Surveying takes place outdoors. The storage for surveying equipment is located room AJBH 150. It contains state-of-the-art equipment consisting of a GPS system and three Total Stations in addition to conventional transits, chains, plumb bobs, and Dumpy levels.

The Concrete Laboratory is located in room AJBH 154. The equipment consists of one Concrete Compression testing Machine, two small Concrete Mixing Machine, one Buoyancy Balance (including Lifting Frame, Plastic tank, Electronic Balance), Concrete Test Hammer, Unit Weight Measures (Capacity-1/10 CU. FT., 1/3 CU. FT.) and Cantilever Beam Deflection set. Based on requirement basis (number of students and groups), the Soils laboratory is also used to conduct initial experiments relating to soil characterization, gradation, density and specific gravity.

The Structures Laboratory is located in room AJBH 158. The equipment consists of a high capacity loading frame with an actuator (280 kips), a smaller loading frame (80 kips) and a teaching load frame for testing small beams and trusses to determine load versus deflection. The large Load Frames are used for instructional and research purposes. The Load Frames have sophisticated Data Acquisition Systems capable of acquiring in real time Load Cell, Strain Gage, and Linear Variable Differential Transformer (LVDT) data. One technician is available in the College of Engineering, Technology, and Physical Sciences to maintain the Laboratory Equipment. Additionally, two Universal Testing Machines that belong to the Mechanical Engineering, and Technology Programs are also available for teaching and research purpose.

The Transportation Laboratory is located in room AJBH 166. The laboratory is equipped with the testing facilities to perform Superpave mix design and transportation material testing. The laboratory is equipped to perform tests according to AASHTO (American Association of State Highway and Transportation Officials) specifications. The current facilities include asphalt binder testing, asphalt mix design, asphalt mix performance testing, and aggregate testing. In addition, standard laboratory infrastructure including large convection and small electrical ovens, temperature measurement facilities etc are available. Special equipment for non-destructive testing of pavements using Portable Seismic Pavement Analyzer is also available.

B. Computing Resources

The teaching computer facility consists of 27 personal computers and is located in room AJBH 239. The computers available to undergraduate courses are more than four years old. These computers have several special purpose design software – Bentley Select Suite that includes Microstation CADD, StormCAD, WaterCAD, Site/Road Designer, ICAHD, in addition to SolidEdge CADD and AutoCAD – installed in them. All computers are connected to the Internet. The Civil Engineering Computer Laboratory is also being used to teach the Engineering General Courses (EGC), such as EGC101 Engineering Drawing and Graphics, EGC 104 Computer Programming, and CE 480 Special Topics. A full time electronic technician from the College of Engineering, Technology, and Physical Sciences is available to maintain the computers.

Opportunities to learn the use of modern engineering tools:

Students are afforded the opportunity to use Internet services and state-of-the-art software such as the Structural Design/Analysis Programs STAAD.Pro, RAMSTEEL Bentley Software System including In Roads Suite for geometric design of highways and several shareware civil engineering modules, CADD software such as Autocad, Microstation, SolidEdge, Surveying Programs WILDSOFT and LISCAD, and Hydraulic/Hydrogeology Programs HEC-HMS, Visual HEC-I, EPA NET, and WATERCAD/SEWERCAD. Some computers are also equipped with spatial software such as Geographic Information Systems (GIS). Additionally, the common PC based program MATLAB is available. Each student is assigned an e-mail account. There is an open Computer lab located on the first floor of AJBH that is open to all majors. The Engineering Library in AJBH also has several computers open to all majors. All computers in AJBH are installed with the same set of software. Several student dormitories have their own computer facilities with Internet connections. The addition of the new high capacity load frame provides student and faculty the opportunity to use modern data acquisition systems and testing devices.

Alabama A&M University operates and maintains a campus-wide wireless network through which students can access the internet. This network is accessible 24 hours a day in all academic, residential, and administrative buildings. In addition, The Alabama Super Computer provides free access for interested students and faculty. The computing facilities and resources in the college are adequate to meet the educational, scholarly, and administrative needs of the students, staff and faculty in the program.

C. Guidance

All undergraduate laboratory exercises are supervised by faculty and/or teaching assistants knowledgeable about the use of the relevant equipment or computing resources. As much as possible, students are encouraged to operate laboratory equipment for themselves. Most laboratory exercises begin with demonstration/training in the use of the experimental apparatus(es) by faculty or teaching assistants. During the exercises, faculty and/or teaching assistants monitor students as they use the laboratory equipment. Preparatory resources are available prior to the laboratory sessions, such as; the course text book which outlines fundamental principles of instrument operation; commonly accepted manuals of practice, course notes provided in class or in handout material. Safety is a primary concern in all of the CE laboratories. Safety policies are posted in various laboratories which will be made available to the ABET team during their visit. One of the primary goals of the program is to get students to work in a team environment and apply the engineering experiences they have developed in previous courses so after appropriate training, student teams can work on their projects independently and interact with the instructor and teaching assistant for help when needed.

Training in the use of computer software occurs as part of laboratory exercises in several classes. This training is supervised by faculty and teaching assistants of those courses.

D. Maintenance and Upgrading of Facilities

The university's Department of Physical Facilities is responsible for the basic maintenance of the infrastructure serving laboratory and computing facilities – water, power, custodial care, lighting, etc. Maintenance of laboratory equipment is carried out by staff, faculty, and graduate students. The college has one full-time technician/ machinist, an electronics technician, and one computer technician who service and repair equipment in the labs. They also fabricate materials and devices for instructional purposes. Maintenance costs are borne by departments as part of their normal budgets. The purchase and/or upgrading of equipment is the responsibility of each program/department. Until 2011, the CE program budget included an annual allocation for purchasing new equipment, computers and software and for repair costs for existing equipment. Recently the university has implemented a new policy by allocating equipment funds for each college while the college procures new equipment and software based on a prioritized list requested by each program/department. Recently requested prioritized list of equipment can be found in Appendix E.13.

Campus networking facilities and equipment are maintained by the Information Technology Services (ITS) of the university. The budget for ITS comes from the Provost's Office. ITS also services computers in faculty and staff offices. The cost of licenses for software programs that are used across the university (e.g., Microsoft Office, etc.) is borne by ITS.

E. Library Services

Library resources are provided centrally by the University. The main library is the

J. F. Drake Memorial Learning Resources Center (LRC) located in the north side of the AAMU campus, a short walk from AJBH and most departments. In addition, most engineering print collections are maintained by the Engineering and Technology library which in housed in the first floor of AJBH. The Engineering and Technology library contains an excellent collection of classical and standard texts, periodicals and journals in various areas of civil engineering, employs a full-time librarian for its engineering collection and services. Several copies of FE Materials, AASHTO Handbooks, Codes etc are available to students for reference and checkout.

The catalog of library resources is online and accessible from the university computing network to university employees and students. In addition to several electronic repositories of publications, there also are search engines that identify resources that are available from a variety of sources. The library is a member of state and regional consortia for sharing resources. Print material that is not available locally normally can be obtained through inter-library loan within one or two days.

Staff

College of Engineering, Technology and Physical Sciences Library (CETPSL)

Librarian – 1 Full-Time - Master's Degree in Library Science

The CETPS Library, a branch of the University library system, established specifically to focus on engineering, computer science, technology, and physical science resources that support the research and teaching programs of the College of Engineering, Technology and Physical Sciences. The CETPS Library is physically located in the Arthur J. Bond Hall. The Library seats 50 patrons and accommodates over 10,000 titles.

J. F. Drake Memorial Learning Resources Center (LRC)

Librarians – 6 Full-Time – Master's Degrees in Library Science

Support Staff – 10 Full-Time

The J. F. Drake Memorial Learning Resources Center is the central library that provides comprehensive resources and services in support of the research, teaching, and learning needs of Alabama A&M University. The LRC is a three story building containing 60,000 square feet of floor space designed to seat 1000 patrons and accommodate over 200,000 titles.

Services

Interlibrary Loan:

Interlibrary Loan (ILL) is a service provided by the Library that attempts to borrow materials from other libraries for Alabama A&M University faculty, staff and students that are not available in the University Libraries.

Research Services:

The Research Services concentrates on academic support and instruction for graduate students, faculty, and advanced undergraduates. Librarians in their capacity as subject liaisons to academic departments, programs, and centers provide instruction tailored to specific courses and assignments, as well as develop the Library's collection in support of teaching and research.

Technical Collection

The Engineering subject collection contains books, journals, audio-visuals and conference proceedings in: bioengineering, civil engineering, computer science, electrical engineering, environmental engineering, industrial engineering, materials science and engineering, mechanical engineering, nuclear engineering, operations research, and technology.

The book collection consists of titles that support the civil engineering subject areas on structural analysis and design, geotechnical engineering, environmental engineering and water resources and transportation engineering.

J. F. Drake Memorial Learning Resources Center

The current holding statistics for the LRC as of 04/03/2018 is the following:

Print Book Collection – 197,564
e-Book Collections – 149,399
Bound Journals – 27,193
Government Publications – 211,004
Microform Collection – 143,872
AV Materials – 8,068

Acquisition Process

Books:

Selection of library materials is a collaborative effort involving the University faculty and the Library staff. The faculty is largely responsible for recommending the acquisition of publications within their areas of expertise. The Library is responsible for monitoring and coordinating the development of the collection as a whole, for providing the faculty with bibliographic assistance and purchase suggestions and for ordering reference and interdisciplinary materials.

The partnership between the University faculty and Library in acquiring books requires that information between departments and the Library flow easily. Each department designates a faculty member to represent their department to the Library; the Library, in turn, assigns a member of the Library faculty to each department as that department's liaison with the Library.

The Librarian over the CETPS Library is the liaison for the College of Engineering, Technology and Physical Sciences. A faculty member may request books via the Liaison Process. He or she may also send the request directly the Acquisitions Librarian.

Periodicals:

The Library will acquire only those serial publications, which directly relate to the courses offered. New titles that are available electronically will not be purchased in print.

Electronic Access

Electronic resources are made available by the University Libraries to students, staff, faculty, and other authorized users. The electronic resources may be accessed from the public computers located anywhere on the campus. Users are provided with the following resources:

Subscribed Electronic Resources: The library has licensed over 20 electronic resources that allow faculty, students and staff to locate and access databases, indexes, and other products that are provided for research purposes.

Online Public Access Catalog: The Online Public Access Catalog is the computerized database of the Library's holdings. The OPAC may be searched in the libraries or campus wide from any computer with internet access.

> **E-Book Collections**: Alabama A&M University students, staff, and faculty have access to a variety of currently published books in electronic format. The library subscribes to netLibrary, a comprehensive collection of electronic books (eBooks) in a wide range of research, reference, and reading materials online. netLibrary can be accessed directly through its web site and in addition each book is listed in the Online Public Access Catalog with a link to its location on the World Wide Web.

Electronic Journals: The library subscribes to EBSCO*host* Electronic Journals Service (EJS) which is a gateway to e-journals subscribed to by the library containing millions of articles from hundreds of different publishers, all at one web site.

Alabama Virtual Library: The Alabama Virtual Library provides all students, teachers, and citizens of the State of Alabama with online access to essential library and information resources. It is primarily a group of online databases that have magazine, journal, and newspaper articles for research. Through the AVL, an equitable core of information sources is available to every student and citizen in Alabama, raising the level of excellence in schools and communities across the state.

Memberships

Network of Alabama Academic Libraries (NAAL) - The purpose of the Network of Alabama Academic Libraries (NAAL) is to coordinate academic library resource sharing to enhance education and research. NAAL is an unincorporated consortium of the Alabama Commission on Higher Education and Alabama's eligible public and private four-year colleges and universities.

OCLC - OCLC's purpose is to establish, maintain and operate a computerized library network and to promote the evolution of library use, of libraries themselves and of librarianship, and to provide processes and products for the benefit of library users and libraries, including such objectives as increasing availability of library resources to individual library patrons and reducing the rate-of-rise of library per-unit costs, all for the fundamental public purpose of furthering ease of access to and use of the ever-expanding body of worldwide scientific, literary and educational knowledge and information.

LYRASIS - LYRASIS partners with member libraries to create, access and manage information, while building and sustaining collaboration, enhancing library and technology operations, and increasing buying power. LYRASIS helps libraries operate more effectively by providing expanded access to valuable resources and professional expertise in content creation and management.

Overall Comments on Facilities

To ensure that our students have a safe environment to work in, all students are required to follow appropriate safety protocols whenever they are in a lab performing lab experiments or using lab equipment for a class or for research. Safety procedures appropriate to each exercise are discussed at the beginning of the lab period. Students who are unfamiliar with the operation of any piece of lab equipment or the use of any chemicals are carefully supervised by experienced lab instructors and/or graduate assistants. First aid kits, safety eye wash fountains, showers, telephones and fire extinguishers are located in the labs in case of emergency.

In addition, hazardous materials are inventoried periodically and they are always placed in safe storage. All of the research and teaching labs at the university are routinely visited by safety professionals in the Environmental Health and Safety department at AAMU. These visits are conducted with appropriate program faculty and the Department Head. The Civil Engineering program has not experienced any student injuries in many years.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

As described earlier the program is part of the College of Engineering, Technology and Physical Sciences. The day-to-day administration of the program is the responsibility of the Department Chair and a Program Coordinator. The Department administers two programs
– the Bachelor of Science in Civil Engineering and the Bachelor of Science in Mechanical Engineering. The Department Chair also serves as the Program Coordinator of Mechanical Engineering program Currently, Professor Mohamed Seif serves as Department Chair and Program Coordinator of the Mechanical Engineering Program. Associate Professor Mohamed Ashour serves as the Program Coordinator of the Civil Engineering Program. Because of the relatively small size of the faculty – 4 at present – the program has no standing committees. Most of the administrative work of the faculty can be done in regular program faculty meetings. *Ad hoc* committees for undergraduate affairs and graduate affairs are formed as needed. Committees for tenure and promotion are formed in years when there is work for such a committee. All recommendations for changing program educational objectives, student outcomes, or courses are considered by and voted upon by all full-time faculty members. The approved curriculum changes are forwarded to the College Curriculum Committee for review and approval before going to the University Academic Standards and Curriculum Committee.

The Dean of the College of Engineering, Technology and Physical Sciences, Dr. Chance M. Glenn, is responsible for all faculty hiring, budget allocations, and policy matters within the College. As the chief academic officer of the university, the Provost has the final approval of academic actions as the final step of the required academic governance and approval process. Except when overriding budgetary restrictions have been in place, historically all academic and curricular proposals from Engineering have been approved by the Provost. The leadership structure has been adequate to ensure the continuity and quality of the program, as evidenced by the increasing enrollments and the success of our graduates in recent years.

B. Program Budget and Financial Support

The engineering departments at Alabama A & M University are all financed from a basic budget provided by the State of Alabama. The Alabama Commission on Higher Education (ACHE) carries the primary responsibility for determining the mission of each degree granting program in Alabama, as well as being the primary fiduciary determinant for funding of all college and university programs. The commission uses it's own formula for determining the funding level of the various programs. The primary determinant in ACHE's formula is credit-hour production, a number derived by multiplying the number of credit hours taught by the number of students taking the class. This formula is used to establish the basic recommended budget for the engineering program. The principal source

of funding for the department comes from distribution of the University's general revenue fund that includes Federal funds, State formula funding, grants, contracts and student tuition and fee payments. The budgeting cycle follows the fiscal year starting October 1 and ending September 30 the next year. The President and the Planning and Budgeting Council begin the cycle with review of the existing program plan and budget, institutional effectiveness analysis, mission statement, priorities and goals, environmental issues, and campus master plan and analysis, all of which serve as the basis for preparation of the new program plan, priorities, and budget. Area specific priorities and goals are prepared by the Vice Presidents and distributed. Chairpersons and Unit Heads, with the involvement of faculty and staff, establish department/unit level priorities and goals and develop updated long-range plans in addition to preparing budgets. The departmental budget request is prepared by the Chairman/Program Coordinators and submitted to the Dean for approval. Factors including student enrollment, faculty size, laboratory needs, projected growth, anticipated maintenance and program goals and objectives are taken into consideration in
the preparation of the budget. With the contributions from the departments and units, Deans and Directors then update long-range school/division plans and prepare the school/division budgets. The Vice President and Provost then develop updated area long-range plans and budgets. The President, considering approved state appropriations, projected tuition and fee income and guidelines for budget allocations, submits "budget turn-around" documents to all academic and support units. "Budget turn-around" documents provide actual distributed budget amounts for the department. Chairpersons/Program Coordinators and Units Heads review the turn-around documents with the involvement of faculty/staff in the reallocation process.

In addition to the State funding, the Program maintains a Foundation account which is funded by:

- Donations from Alumni, Corporation, etc.
- An annual renewable grant from the Alabama Licensing Board for General Contractors for restricted use (scholarships, faculty development, research, etc.).

The Program allocates funding to the following activities:

1. Operation of the department, which includes photocopying costs, telephone service, instructional supplies (including basic laboratory supplies), office supplies, and preparation and printing of student materials and department forms.
2. Hiring of a full-time secretary.
3. Hiring of a student assistant for assisting the administrative staff.
4. Maintaining and upgrading the CE computing facility
5. Assisting the maintenance and continuous upgrade of undergraduate teaching laboratories in Environmental and Water Resources, Geotechnical, Transportation/Materials, and Structural, Engineering.
6. Funding travel of faculty for educational purposes and for travel to conferences and other professional meetings, and funding travel of students for participation at student competition and conferences. Additional funds from research projects are typically used to support travel of faculty members involved in their

projects.
7. All other activities, including purchase of equipment, furniture, and special supplies for faculty and staff, hosting of visitors, and support of research activities.

Teaching assistants support education by helping course instructors in lab, recitation and discussion sections. Laboratory courses have one teaching assistant per laboratory section for the purpose of laboratory safety and guidance. Teaching assistant allocations to the departments are made by the Dean, in collaboration with department chairs/ program coordinators. Teaching assistants are selected by the program among qualified graduate students.

The buildings, offices, and other infrastructure are maintained as part of the University's maintenance plan and is managed at the University level.

Laboratory equipment budget requests are submitted by program faculty with responsibilities for the laboratories on an annual basis as part of the budgeting process.

While more funding is always desired and can be profitably spent, the current funding is adequate to meet the basic teaching needs of the department. The resources described in this section are adequate to enable the students in the program to attain the student outcomes. The Civil Engineering program has been able to teach required courses at a frequency that permits any student to complete their B.S. degree program in four years. An elective course is offered every semester to complete the technical elective requirements
for the degree as well. Discretionary funds (from gifts/grants to the department) are also available, and have been used to support enrichment activities, including scholarships/prizes, student activities, undergraduate travel, and faculty development.

C. Staffing

The administrative, instructional and technical staff, and the institutional services provided to the Civil Engineering Program are adequate to enable the students in the civil engineering programs to attain the student outcomes. The Department of Mechanical and Civil Engineering Program currently employs a full-time secretary and one biweekly student assistant to assist the operation of daily business. The Program shares technicians to maintain the laboratory equipment with other departments in the College of Engineering, Technology and Physical Sciences. On some occasions, the Program issues service contracts for services and support needed beyond the availability or exceeds the capability of the technicians. The Information Technology Services supports faculty computing activities.

The university's Human Resources department offers a broad range of training programs on general skills and for specialized tools and programs staff uses. In addition, Alabama A&M University has tuition benefits, which allow full-time staff members to take courses at discounted tuition rate, either towards a degree or in a non-matriculated

fashion. Annual staff performance reviews are performed to collaboratively set annual goals, and assess their progress towards their goals.

D. Faculty Hiring and Retention

Process for Hiring New Faculty

The Dean of the College of Engineering, Technology and Physical Sciences is responsible for the staffing of all teaching and research positions within the approved budget of the College. The department chair/program coordinator makes to the Dean the case for a new faculty position. The Dean then secures the Provost's approval for a search. The department chair/program coordinator establishes a search committee for each open tenure- track or tenured faculty position and develops a search plan, which must be approved by the Office of Human Resources through which advertisements are placed in appropriate media outlets. The Office of Human Resources accepts applications through a user-friendly online application process. This automated application procedures enables efficient and timely processing of employment applications. The search committee also works pro- actively to encourage outstanding scholars from diverse backgrounds to apply for the position. A job announcement is also circulated to all the universities participating in the ASCE Department Head List-serve. The search committee's charge is to identify, screen, and interview qualified candidates. The search committee presents its recommendation to the provost through the Department Chair/ Program Coordinator and the Dean, who will choose from the candidates and make an offer of employment.

Strategies to Retain Current Qualified Faculty

Alabama A&M University seeks to retain all qualified faculty through professional development, a transparent tenure and promotion process, a sabbatical program, administrative support staff and teaching assistants, attractive facilities, and competitive benefits (health and life insurance, retirement planning, etc.).

In order to encourage faculty to pursue and obtain support for their scholarship, the office of sponsored programs provides outstanding support for faculty to identify external funding sources for their scholarship in education and/or research, prepare compelling proposals, and establish relationships with funding agencies.

E. Support of Faculty Professional Development

Faculty members may apply for a sabbatical leave once every six years. Application deadlines, procedures, and requirements are described in the university's Faculty-Staff Handbook. The Dean, in consultation with department leadership, makes his recommendation to the provost. Faculty leaves and their support are included in the regular budget process.

All faculty are encouraged to attend professional meetings to support both their teaching and research activities. Faculty development is supported by internal and external funds including Title III funds. Most planning for professional development occurs during the annual budget review process during the early spring of each year. Although state funding is limited for travel, there is travel support for each faculty member to attend

one professional meeting each year. Additional support can be requested for travel from Title III grant. CE faculty can also request additional support from the Alabama Licensing Board for General Contractors' grant. The travel using the Title III grant requires a report describing benefits to the program.

Faculty are also encouraged to join organizations such as ASCE, ASEE etc. and are provided a yearly membership in one organization and annual professional licensure fee by the program budget. An additional membership may be provided through the Alabama Licensing Board for General Contractors' grant.

PROGRAM CRITERIA

As described in the previous sections, especially in the discussions of Criterion 3, 4 & 5, the civil engineering program is designed to not only comply with the ABET EAC criteria, but to also meet the requirements of the ASCE's Program Criteria. The ABET Program requirements for Civil Engineering are reproduced below:

1. Curriculum
The program must demonstrate that graduates can: apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of science, consistent with the program educational objectives; apply knowledge of four technical areas appropriate to civil engineering; conduct civil engineering experiments and analyze and interpret the resulting data; design a system, component, or process in more than one civil engineering context; explain basic concepts in management, business, public policy, and leadership; and explain the importance of professional licensure.

2. Faculty
The program must demonstrate that faculty teaching courses that are primarily design in content are qualified to teach the subject matter by virtue of professional licensure, or by education and design experience. The program must demonstrate that it is not critically dependent on one individual.

The above criteria have been incorporated into the program educational objectives and student outcomes as outlined in the main body of this self-study report. A summary showing the number of the credit hours of coursework ascribed to each of the major curricular categories described in the program criteria is included in Table 5.2 of section A.2 of Criterion 5. A detailed explanation as to how the B.S. Civil Engineering curriculum meets the above criteria is given as follows:

…apply knowledge of mathematics through differential equations, calculus-based physics, chemistry, and at least one additional area of basic science, consistent with the program educational objectives

All undergraduate civil engineering majors receive in-depth instruction in mathematics (15 credit hours: Calculus I, II, III and Differential Equations; 3 credit hours: Probability and Statistics). Basic principles and applications of probability and statistics are covered in EGC 204 Engineering Analysis (3 credit hours). The topics include data and distributions, probability and sampling, quality control, estimation and statistical intervals, testing
statistical hypotheses, analysis of variance, experimental design, regression and correlation, and computer applications. This course is offered in Fall. In addition, problems involving

Statistics and Probability are assigned in the following courses: EGC207L Strength of Materials Lab, CE308L Soil Mechanics Lab, CE305 Hydrogeology, and CE 310 Transportation Systems and Materials (see Table 9.1 The Statistical component in the Civil Engineering Program).

Civil engineering undergraduate students are also required to take 8 credits of calculus-based physics (PHY113, PHY214) and 8 credits of general chemistry (CHE101/101L, CHE102/102L). All four physics and chemistry courses devote 1 credit hour to laboratory work.

All civil engineering majors also take CE305 Hydrogeology for 3 credits, which is claimed as the main additional area of basic science consistent with the program educational objectives 2 and 3.

…apply knowledge of four technical areas appropriate to civil engineering;

The curriculum of the civil engineering program emphasizes **structural engineering**, **geotechnical engineering**, **environmental engineering and hydraulics/water resources and Transportation engineering** as its four major technical areas. The curriculum consists of at least two courses (6 semester hours) in each of these areas, with additional electives to satisfy students' need to pursue their interests in any particular area. The students are introduced to basic and generic design concepts and problems as early as their freshmen year in Engineering Drawing and Graphics (EGC101), and Introduction to Civil Engineering (CE101). The CE101 class is frequently taken on field trips to construction/project sites to listen to professionals share their practical experience, professionalism, and ethics. The students are guided through required basic engineering science courses, such as Statics, Dynamics and Strength of Materials. Students are required to take at least 9 credits in structures (CE306 (3), CE401- Structural Steel Design, CE402- Reinforced Concrete Design), 6 credits in geotechnical engineering (CE 308(3), 408(3)), 10 credits in environmental engineering and hydraulics/water resources (CE304 (3), EGC305 (3), 305L (1), CE 404 (3)), and 6 credits in Transportation engineering (CE310- Transportation Systems, CE410- Transportation Engineering and Design). In addition, students also obtain proficiency in Surveying comprising an additional required 3 credits. All students are required to take at least 3 credits of upper- level civil engineering electives. Following three-credit electives have been offered in the last five years:

- CE415 Transportation Material Characterization and Design – Fall 2013
- CE480 Special Topics – AASHTO-LRFD Bridge Design – Spring 2013/2014 and Fall 2015
- CE480 Special Topics – Earthquake Engineering – Spring 2016
- CE480 Special Topics – Geographic Information Systems (GIS) Basics – Fall 2014/2016/2017/ 2018

…conduct civil engineering experiments and analyze and interpret the resulting data;

Students conduct laboratory experiments or field exercises in several required

civil engineering courses:

- CE201 Surveying – Field work….
- EGC207L Strength of Materials Lab- Laboratory exercises on Forming, loading to failure, and testing concrete cylinders and beams in addition to characterization and engineering properties of other engineering materials.
- EGC305L Fluid mechanics Lab- Laboratory exercises on fluid properties, Ideal Gas Law, Venturi Apparatus, Verification of Bernoulli equation, Pipe Flow, and Open Channel flow.
- CE308L/CE308 Soil Mechanics Lab - Laboratory exercises on characterization and engineering properties of soils
- CE310 Transportation Systems and Materials - Perform simple transportation material testing, e.g. viscosity of asphalt binder, specific gravity of aggregate etc. and interpret results; traffic counts to determine volume etc.

Although the amounts of lab and field experience vary from course to course, the common objective is to teach students how to conduct experiments as well as to acquire, analyze and interpret data. Students work in teams to complete lab and field assignments and prepare written
reports.

…design a system, component, or process in more than one civil engineering context;

A number of the required civil engineering courses offered in the junior and senior year have design content (see Table 5.2). These include courses in Structural (CE401, 402), Geotechnical (CE408), Hydraulics (CE404), and Transportation (CE410). The choice of technical electives is restricted to upper-level civil engineering courses to provide opportunity for additional design experience. The collective design experience in the civil engineering curriculum culminates in the senior capstone design course (CE470). The CE Design Project (CE 470) and required courses on engineering design provide a comprehensive exposure to the design of complex systems, components, and/or processes. In the capstone course, students are grouped in teams to work on "real life" civil engineering projects. They develop an understanding of the project objectives, review available information to characterize the site conditions, establish design parameters, explore alternative options and perform detailed designs.

…explain basic concepts in management, business, public policy, and leadership; and explain the importance of professional licensure.

The program objectives with regard to professional practice are addressed principally through CE 424 Civil Engineering Practice and CE 470 CE Design Project. The senior course, CE 424 Civil Engineering Practice, introduces our students to the practical concepts necessary to a practicing engineer, such as engineering ethics, engineering economics, estimating, cost analysis, contract bidding, and specification writing. Civil engineering undergraduates first learn about professional behavior and ethics in the

college gateway course CE101 Introduction to Civil Engineering. Information about professional licensure and how to become a professional engineer as well as Code of Ethics for Engineers and Engineer's Creed is provided in this course and also included in the Undergraduate Student Handbook which is distributed to every student upon entry into the program. . The link for the handbook is also available online at: http://www.aamu.edu/administrativeoffices/academicaffairs/Documents/Bulletins/Bulletin_2017-2018.pdf

Practicing engineers often deliver lectures in the senior capstone design course (CE470) and cover topics on leadership, management, business principles, professional ethics and social responsibility.

Professional licensure is encouraged through a variety of measures. Although passing is not required, students are required to take the Fundamentals of Engineering (FE) exam. Free review sessions are given in both Fall and spring semesters. All juniors and seniors in the civil engineering program are reminded and encouraged to attend these review sessions. Recent review sessions have been conducted by faculty from civil mechanical and electrical engineering departments made possible through a HBCU-UP grant from NSF. Individual instructors at the upper division level routinely discuss professional responsibility in relation to their course work. The grant also provides copies of the FE review books to the participants.

Table 9-1. The Statistical component in the Civil Engineering

Year	Course	Statistical Component	Lecture time	Homework Assignment
3	EGC204	3 semester hr course in Probability and Statistics: data and distributions, probability and sampling, point and interval estimation, testing hypotheses, analysis of variance, regression analysis, and computer applications	3 hours/week	Assigned from each chapter
2	EGC207L	Yes, Calculate mean and variance from a sample dataset; least squares regression to interpret experimental data	Two hours	Laboratory report
3	CE308L/ CE308	Yes, Calculate mean from a sample dataset used in interpretation of data generated from experiments laboratory data.	Two hours	Laboratory report
3	CE305	Histograms, using sample datasets to develop frequency distributions.	Two hours	Two
3	CE310	Yes, Calculate mean and variance from a sample dataset, least square regression analysis and interpretation of results.	Three hours, including laboratory	Assigned homework

Civil Engineering
130 Credit Hours

FRESHMAN YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ORI 101	First Year Experience	1	ORI 102	First Year Experience	1
ENG 101	Composition I[2]	3	ENG 102	Composition II[2]	3
MTH 125	Calculus I	4	EGC 104	Computer Programming[2]	3
CHE 101	General Chemistry I	3	CHE 102	General Chemistry II	3
CHE 101L	General Chemistry I Lab	1	CHE 102L	General Chemistry II Lab	1
EGC 101	Engg Drawing/Graphics[2]	3	PHY 105	Physics I	4
CE 101	Intro to Civil Engg[2]	1	MTH 126	Calculus II	4
	PED/MSC/HED Elective[1]	2			19
		18			

SOPHOMORE YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
HIS	Elective Sequence[1]	3	HIS	Elective Sequence[1]	3
MTH 227	Calculus III	4	MTH 238	Applied Differential Equations	3
PHY 106	Physics II	4	EE 201	Linear Circuit Analysis I[2]	3
EGC 205	Statics[2]	3	EE 201L	Linear Circuit Analysis I Lab[2]	1
CE 201	Surveying[2]	3	EGC 206	Dynamics[2]	3
		17	EGC 207	Strength of Materials[2]	3
			EGC 207L	Strength of Materials Lab[2]	1
					17

JUNIOR YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG 205	General Speech	3	CE 304	Environmental Engineering[2]	3
ECO	Economics Elective[1]	3	CE 305	Hydrogeology[2]	3
EGC 204	Engineering Analysis[2]	3	CE 308	Soil Mechanics[2]	3
EGC 305	Fluid Mechanics[2]	3	CE 308L	Soil Mechanics Lab	1
EGC 305L	Fluid Mechanics Lab[2]	1	CE 310	Transportation Systems[2]	3
CE 306	Structural Analysis I[2]	3	CE 401	Structural Steel Design[2]	3
		16			16

SENIOR YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG	201, 202, 203, 204	3		Fine Arts Elective[1]	3
CE 402	Reinforced Concrete Design[2]	3	CE 404	Hydraulic Engg & Design[2]	3
CE 408	Foundation Design[2]	3	CE 470	Civil Engg Design Project[2] [CS]	3
CE 410	Transportation Engg & Design[2]	3		[2]CE 4xx, [2]NRE 494, 495	3
CE 424	Civil Engineering Practice[2]	3			12
		15			

[1]See General Education Requirements section of this Bulletin for eligible courses. [2]MinGrade of C required.

Civil Engineering
130 Credit Hours

FRESHMAN YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ORI 101	First Year Experience	1	ORI 102	First Year Experience	1
ENG 101	Composition I[2]	3	ENG 102	Composition II[2]	3
MTH 125	Calculus I	4	EGC 104	Computer Programming[2]	3
CHE 101	General Chemistry I	3	CHE 102	General Chemistry II	3
CHE 101L	General Chemistry I Lab	1	CHE 102L	General Chemistry II Lab	1
EGC 101	Engg Drawing/Graphics[2]	3	PHY 105	Physics I	4
CE 101	Intro to Civil Engg[2]	1	MTH 126	Calculus II	4
	PED/MSC/HED Elective[1]	2			19
		18			

SOPHOMORE YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
HIS	Elective Sequence[1]	3	HIS	Elective Sequence[1]	3
MTH 227	Calculus III	4	MTH 238	Applied Differential Equations	3
PHY 106	Physics II	4	EE 201	Linear Circuit Analysis I[2]	3
EGC 205	Statics[2]	3	EE 201L	Linear Circuit Analysis I Lab[2]	1
CE 201	Surveying[2]	3	EGC 206	Dynamics[2]	3
		17	EGC 207	Strength of Materials[2]	3
			EGC 207L	Strength of Materials Lab[2]	1
					17

JUNIOR YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG 205	General Speech	3	CE 304	Environmental Engineering[2]	3
ECO	Economics Elective[1]	3	CE 305	Hydrogeology[2]	3
EGC 204	Engineering Analysis[2]	3	CE 308	Soil Mechanics[2]	3
EGC 305	Fluid Mechanics[2]	3	CE 308L	Soil Mechanics Lab	1
EGC 305L	Fluid Mechanics Lab[2]	1	CE 310	Transportation Systems[2]	3
CE 306	Structural Analysis I[2]	3	CE 401	Structural Steel Design[2]	3
		16			16

SENIOR YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG	201, 202, 203, 204	3		Fine Arts Elective[1]	3
CE 402	Reinforced Concrete Design[2]	3	CE 404	Hydraulic Engg & Design[2]	3
CE 408	Foundation Design[2]	3	CE 470	Civil Engg Design Project[2] [CS]	3
CE 410	Transportation Engg & Design[2]	3		[2]CE 4xx, [2]NRE 494, 495	3
CE 424	Civil Engineering Practice[2]	3			12
		15			

[1]See General Education Requirements section of this Bulletin for eligible courses. [2]MinGrade of C required.

Civil Engineering
130 Credit Hours

FRESHMAN YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ORI 101	First Year Experience	1	ORI 102	First Year Experience	1
ENG 101	Composition I[2]	3	ENG 102	Composition II[2]	3
MTH 125	Calculus I	4	EGC 104	Computer Programming[2]	3
CHE 101	General Chemistry I	3	CHE 102	General Chemistry II	3
CHE 101L	General Chemistry I Lab	1	CHE 102L	General Chemistry II Lab	1
PHY 213	Physics I	4	EGC 101	Engg Drawing/Graphics[2]	3
CE 101	Intro to Civil Engg[2]	3	MTH 126	Calculus II	4
		19			18

SOPHOMORE YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
HIS	Elective Sequence[1]	3	HIS	Elective Sequence[1]	3
MTH 227	Calculus III	4	MTH 238	Applied Differential Equations	3
PHY 214	Physics II	4	EE 201	Linear Circuit Analysis I[2]	3
EGC 205	Statics[2]	3	EGC 206	Dynamics[2]	3
CE 201	Surveying[2]	3	EGC 207	Strength of Materials[2]	3
	PED/MSC/HED Elective[1]	2	EGC 207L	Strength of Materials Lab[2]	1
		19			16

JUNIOR YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG 205	General Speech	3	CE 304	Environmental Engineering[2]	3
ECO	Economics Elective[1]	3	CE 305	Hydrogeology[2]	3
EGC 204	Engineering Analysis[2]	3	CE 308	Soil Mechanics[2]	3
EGC 305	Fluid Mechanics[2]	3	CE 310	Transportation Systems[2]	3
EGC 305L	Fluid Mechanics Lab[2]	1	CE 401	Structural Steel Design[2]	3
CE 306	Structural Analysis I[2]	3			15
		16			

SENIOR YEAR

First Semester			Second Semester		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ENG	201, 202, 203, 204	3		Fine Arts Elective[1]	3
CE 402	Reinforced Concrete Design[2]	3	CE 404	Hydraulic Engg & Design[2]	3
CE 408	Foundation Design[2]	3	CE 470	Civil Engg Design Project[2] [CS]	3
CE 410	Transportation Engg & Design[2]	3		[2]CE 4xx, [2]NRE 494, 495	3
CE 424	Civil Engineering Practice[2]	3			12
		15			

[1]See General Education Requirements section of this Bulletin for eligible courses. [2]MinGrade of C required.

Civil Engineering
130 Credit Hours

FRESHMAN YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
ORI 101	First Year Experience	1	ORI 102	First Year Experience	1
ENG 101	Composition I[2]	3	ENG 102	Composition II[2]	3
MTH 125	Calculus I	4	EGC 104	Computer Programming[2]	3
CHE 101	General Chemistry I	3	CHE 102	General Chemistry II	3
CHE 101L	General Chemistry I Lab	1	CHE 102L	General Chemistry II Lab	1
PHY 213	General Physics with Calculus I	4	EGC 101	Engg Drawing/Graphics[2]	3
CE 101	Intro to Civil Engg[2]	3	MTH 126	Calculus II	4
		19			18

SOPHOMORE YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
	HIS Sequence – See GenEd Listing[1]	3		HIS Sequence – See GenEd Listing[1]	3
MTH 227	Calculus III	4	MTH 238	Applied Differential Equations	3
PHY 214	General Physics with Calculus II	4	EE 201	Linear Circuit Analysis I[2]	3
EGC 205	Statics[2]	3	EGC 206	Dynamics[2]	3
CE 201	Surveying[2]	3	EGC 207	Strength of Materials[2]	3
	PED/MSC/HED – See GenEd Listing[1]	2	EGC 207L	Strength of Materials Lab[2]	1
		19			16

JUNIOR YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
	Hum/Fine Art – See GenEd Listing[1]	3	CE 304	Environmental Engineering[2]	3
	Economics – See GenEd Listing[1]	3	CE 305	Hydrogeology[2]	3
EGC 204	Engineering Analysis[2]	3	CE 308	Soil Mechanics[2]	3
EGC 305	Fluid Mechanics[2]	3	CE 310	Transportation Systems[2]	3
EGC 305L	Fluid Mechanics Lab[2]	1	CE 401	Structural Steel Design[2]	3
CE 306	Structural Analysis I[2]	3			15
		16			

SENIOR YEAR					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Hrs**	**Course No.**	**Course Title**	**Hrs**
	Literature – See GenEd Listing[1]	3		Fine Arts – See GenEd Listing[1]	3
CE 402	Reinforced Concrete Design[2]	3	CE 404	Hydraulic Engg & Design[2]	3
CE 408	Foundation Design[2]	3	CE 470	Civil Engg Design Project[2] [CS]	3
CE 410	Transportation Engg & Design[2]	3		[2]CE 4xx, [2]NRE 494, 495	3
CE 424	Civil Engineering Practice[2]	3			12
		15			

[1]See General Education Requirements section of this Bulletin for eligible courses. [2]MinGrade of C required.

Appendix A – Course Syllabi

CE 101 Introduction to Civil Engineering (Required)
Fall Semester 2017

2017 – 2018 Catalog Data:	*CE 101: Intro. to CE- 3 hours*. Introduction to civil engineering profession and societies; basics of civil engineering including structural, transportation, geotechnical, environmental and water resources engineering, sketching and drawing, ethics, principles of design; local field trips and guest lectures are also included.
Prerequisites:	None
Textbook:	"Introduction to Infrastructure: An Introduction to Civil and Environmental Engineering" 1st edition, 2011, Michael R. Penn and Philip J. Parker, Wiley. ISBN-13: 978-0470411919, ISBN-10: 0470411910. "Visualization & Engineering Design Graphics with Augmented Reality", by Jorge Dorribo Camba et.al, Schroff Development Corporation, 2014. Additional handouts/lecture notes during class.
Reference:	Engineering Your Future "A brief Introduction to Engineering," 8th Edition, 2013, William Oakes, Oxford University Press.
Course Objectives:	1. To understand the fundamentals of civil engineering, engineering profession and ethics. 2. To understand the basic concepts of civil engineering design.
Topics Covered:	1. The natural environment and infrastructure. 2. Fundamentals of engineering principles, planning, analysis and design. 3. Structural, transportation and geotechnical engineering. 4. Engineering profession and ethics.
Course Outcomes:	Numbers in parentheses correspond to ABET Student Outcome in Table 2. Upon completion of the course, students should be able to: 1. Understand the functions of the engineer (5) 2. Know the relationship of the engineering disciplines (5) 3. Know the educational requirements of a civil engineer (5) 4. Understand professionalism and ethics (5)
Assessment Tools:	1. Performance on weekly homework. 2. Performance on hourly and comprehensive examinations. 3. Evaluation based on case studies, field trip, and design project

CE 101 Introduction to Civil Engineering (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives	CE 101
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	X

Table 2. Relationship of Course to Program Outcomes	CE 101
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
5a	Able to conduct literature search using library and internet for assignment	Home Works, Case Studies, Project Reports
5b	Demonstrated professional membership and attendance at professional seminars, meetings, and field trips	Valid Membership Cards, Minutes of Meetings, Reports
5c	Understand the importance of professional licensing (FE & PE).	Home Works, Project reports

Class/Lab Schedule: Two 80-minute lectures per week

Professional Component: Engineering Topics: 3 Cr. Hrs

Prepared by: Dr. Anil Acharya/Mohamed Ashour Date: Fall 2017

CE 201 Surveying (Required)

Fall Semester 2017

2017 – 2018 Catalog Data	Surveying – 3 credit hours. (1 clock hour lecture and 3 clock hour lab period per week). A study of measurement and error calculation, leveling, traverse and area computation, topographic mapping, triangulation, highway, public land and construction surveying. Computer applications are included. Prerequisite: None. Co-requisites: EGC 101 or instructor consent.
Prerequisites	Prerequisite: None. Co-requisites: EGC 101 or instructor consent.
Textbook	B. F. Kavanagh and T. Mastin; "Surveying," Pearson, 2006. ISBN: 978-0-13-700940-4
Reference	Handouts
Course Objectives	After finishing the course, the students will: 1. become familiar with the basic surveying techniques, and 2. be able to analyze and interpret survey data.
Topics Covered	1. Leveling 2. Distance Measurement 3. Angles and Directions 4. Total Stations 5. Traverse Survey 6. Topographic and Hydrographic Surveying and Mapping 7. Control Survey
Course Outcomes	Numbers in parentheses correspond to ABET Student Outcome in Table 2. Upon completion of the course, students should be able to: 1. acquire and analyze survey data using surveying instruments (2b), and 2. solve survey problems using instruments (7b)
Assessment Tools	Homework, Exam, Class Participation Field Work Report Field Work Participation

CE 201 Surveying (Continued)
Fall Semester 2017

Relationship to Course to CE Educational Objectives	
CE Educational Objectives	**CE 201**
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	**CE 201**
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data	X
3. Communicate with multidisciplinary teams	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions	
5. Continue their education and professional development; Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	
7. Use any modern engineering tools necessary for engineering practice	X

Table 3. Student Outcome Assessment Methods		
Student Outcome	**Performance Criteria**	**Assessment Methods**
2b	Knowledge of equipment, sensors and data acquisition methods	Field Report, Exams
7b	Able to use modern equipment to solve engineering problem through laboratory Experiment or field work	Field Report

Class/Lab Schedule: One 90-minute lecture and one 3 hours field work every week.

Professional Component: Engineering Design: 3 Cr. Hrs.

Prepared by: Dr. Sudip Bhattacharjee Date: Fall 2017

CE 304 Environmental Engineering (Required)
Spring Semester 2018

2017-2018 Catalog Data:	CE 304: Environmental Engineering-3 credit hours. A survey of environmental pollution and control involving the air, land, and water environments; the management of the environment; and other problems concerning water and sewage treatment, solid waste disposal and treatment.
Prerequisites:	CHE 102/102L General Chemistry and Lab, MTH 238 Applied Differential Equations or consent of the instructor.
Textbook:	"Introduction to Environmental Engineering", 3rd edition, 2010, by P. Aarne Vesilind, Susan M. Morgan and Lauren G. Heine, CENGAGE learning, ISBN-13:9780495295839; ISBN-10:0495295833.
Reference:	"Principles of Environmental Engineering and Science", 2nd Edition, 2009, by M. L. Davis and Susan J. Masten, McGraw-Hill.
Course Objectives:	1. To introduce the fundamentals of environmental engineering. 2. To introduce the principles of mass and energy balances as applied to environmental problems. 3. A survey of environmental pollution and control involving the air, land, and water environments.
Topics Covered:	1. Identifying and Solving Environmental Problems 2. Engineering Decisions 3. Engineering Calculations 4. Material Balances and Separations 5. Reactions and Reactors 6. Energy Flows and Balances 7. Ecosystems 8. Water Quality and Treatment 9 Wastewater Treatment 10. Air quality and Control 11. Solid Waste and Hazardous waste 12. Noise Pollution
Course Outcomes:	Upon completion of the course, students should be able to: 1. Understand the basic concepts of environmental engineering. 2. Describe and apply mass and energy balance principles to real world scenarios. 3. Demonstrate knowledge of the cost effectiveness, limitations, pollution abatement and management.
Assessment Tools:	1. Performance on weekly homework. 2. Performance on hourly and comprehensive examinations.

CE 304 Environmental Engineering (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	CE 304
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Demonstrated Capability (ABET EC 2000 Criterion 3)	CE 304
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	X
5. Continue their education and professional development (i, j);	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1b	Solve engineering problems using the principles of science - physics and chemistry.	Home Works, Quizzes, Exams.
4a	Aware of energy conservation, safety and environmental impact	Home Works
5a	Able to conduct literature search using library and Internet for assignments	Home Works, Reports

Class/Lab Schedule: Three 1-hour lectures per week; Lab demonstrations.

Professional Component: Engineering Topics: 3 Cr. Hrs

Prepared by: Dr. A. Acharya Date: Spring 2018

CE 305 Hydrogeology (Required)
Spring Semester 2018

2017 –2018 Catalog Data:	3 credit hrs. The study of a hydrologic cycle with emphasis on precipitation and runoff, stream flow and groundwater distribution. Geology of groundwater occurrence, groundwater contamination, development and management are also covered.
Prerequisites:	EGC 305 Fluid Mechanics and EGC 204 Engineering Analysis
Textbook:	Applied Hydrogeology, C. W. Fetter 4th Edition, ISBN: 0-13-088239-9
Reference:	"Hydraulic Engineering", 2nd Edition, Roberson, Cassidy, and Chaudhary, 1998, John Wiley & Sons, Inc. Additional Lecture Handouts
Course Objectives:	To apply the principles of fluid mechanics to the flow of water during the hydrologic cycle. 1. To study the different elements of the hydrological cycle. 2. To study the rainfall–runoff relationship 3. To study the principles of ground-water flow and aquifers 4. To study ground-water flow to wells
Topics Covered:	1. Elements of the hydrologic cycle 2. Properties of aquifers 3. Rainfall runoff relationship, Hydrographs. 4. Principles of ground-water flow 5. Ground-water flow to wells and Slug tests 6. Soil Moisture and Ground-Water Recharge
Course Outcomes:	Upon completion of the course, students should be able to: 1. Understand basic components of hydrology/hydrogeology, determine stream hydrographs, and rainfall-runoff relationship (1, 2) 2. Understand aquifer characteristics and perform feasibility studies of aquifers (1, 2, 3) 3. Apply the principles of ground-water flow (1,2) 4. Understand basic principles of a groundwater model and analyze the effects of flow, recharge and contaminant transport (1,2,3)
Assessment Tools:	1. Performance on weekly homework. 2. Performance on hourly and comprehensive examinations. 3. Evaluation of design projects

CE 305 Hydrogeology (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	CE 305
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, e.t.c.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Program Outcomes	CE 305
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering.	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	X
3. Communicate with multidisciplinary teams.	X
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1b	Solve engineering problems applying the theorems of Mathematics and using principles of science	Home Works, Quizzes, Exams.
2c	Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data	Home Works, Quizzes, Exams.
3a	Individual contributes to team project, work.	Home Works, Class Project.

Class schedule: Two 80-minute lectures per week

Professional Component: Additional Basic Science: 3 Cr. hrs

Prepared by: Dr. Anil Acharya Date: Spring 2018

CE 306 Structural Analysis (Required)
Fall Semester 2017

2016 – 2017 Catalog Data	3 credit hours. An analysis of stresses and deflections in statically determinate structures caused by fixed and moving loads. Study of influence lines and loading criteria for beams and plane trusses. Introduction to classical analysis of indeterminate structures including the slope deflection and moment distribution methods. Application of computer techniques to structural problems is required.
Prerequisites:	EGC 207 and MTH 238 and MTH 227
Textbook:	Fundamentals of Structural Analysis, 4th Edition By Kenneth Leet, Chia-Ming Uang and Anne Gilbert
Reference:	Structural Analysis Using Classical and Matrix Methods, 4th Edition, Jack C. McCormac, Wiley
Course Objectives:	The course must serve the purpose of providing the student with a reasonable understanding of analysis of determinate structures as well as preparing him adequately for subsequent advanced Structural Analysis courses by introduction of the classical indeterminate analysis methods. While proceeding from the classical hand methods, the course also acquaints the student with the representation of structural concepts in matrix format with computer applications.
Topics Covered:	1. Structural Loads, System Loading and Behavior 2. Reactions 3. Shear Force and Bending Moment 4. Plane Trusses; 3-D or Space Trusses 5. Deflections of Beams and Frames: Moment-Area, Conjugate Beam Methods 6. Work-Energy Methods
Course Outcomes:	Number in parentheses corresponds to program educational outcomes in **Table 2**. Upon completion of the course, students: 1. should be able to solve determinate structural analysis problems analytically. 2. should be able to demonstrate a reasonable understanding of classical indeterminate analysis methods and recognize the need for a subsequent advanced Structural Analysis course. 3. should be able to use computers and packaged software that use matrix methods to solve problems. (7)
Assessment Tools:	1. Performance on Homework and assignments. 2. Performance on Exams and Quizzes. 3. Performance on Project report.

CE 306 Structural Analysis (Continued)
Fall Semester 2017

Table 1/ Relationship of Course Educational Objectives	CE 306
1. Successfully practice civil engineering in industry and/or government.	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	CE 306
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	X

Table 3. Expected Course Outcomes and Assessment Methods		
Student Outcomes	Performance Criteria	Assessment Methods
7c	Able to use computer software for engineering analysis, design, or experimental work	Home Works and Project Report

Class/Lab Schedule: Two 80-minute lectures per week

Professional Component: Engineering Design: 3 Cr. Hrs

Prepared by: Dr. Mohamed Ashour, P.E. Date: Fall Semester 2017

CE 308 Soil Mechanics (Required)
Spring Semester 2018

2017 -20183 Catalog Data	3 credit hours. A study of origin, formation, classification, identification and subsurface exploration of soil. Physical and mechanical properties of soils, shear strength, consolidation, settlement, and bearing capacity are also covered. Laboratory is included. Prerequisites: EGC 207. Co-requisites: EGC 207L.
Prerequisites:	Pre-requisite: EGC 207; Co-requisite EGC 207L.
Textbook:	"Fundamentals of Geotechnical Engineering" by Gary Norris "Soil Mechanics Laboratory Manual" by Braja Das, 9th Edition
Reference:	1. Principles of Geotechnical Engineering, 7th Edition, by Baraja M. Das. 2. NAVFAC (1982). "Foundations and Earth Retaining Structures Design manual." Dept. of Navy, DM 7.2, Alexandria, Va.
Course Objectives:	1. To understand the geological and physical origins of soils 2. To describe/characterize the soils in terms of their grain distribution, plasticity, and weight-volume relationships for engineering purposes. 3. To understand soil compaction and its effect on soil performance. 4. To analyze the flow of water and porewater pressure through soils using flow nets (seepage). 6. To understand and calculate effective and total stresses in soil 7. To assess the soil compressibility and settlement. 8. To calculate the soil strength and soil strength parameters 9. To provide basic Lab experiments that will demonstrate the principles of Soil Mechanics and to familiarize the students with common Geotechnical test methods, test standards, and terminology.
Topics Covered:	1. Introduction to Soil Mechanics 2. Phase relationships, Grain size distribution, Soil properties 3. Atterberg limits 4. Soil classification 5. Subsurface investigation 6. Capillary rise 7. Soil compaction 8. Permeability and seepage 9. Principles of effective stress 10. Consolidation settlement 11. Strength parameters 12. Performing basic lab experiments related to the above topics
Course Outcomes:	Numbers in parentheses correspond to learning outcomes in **Table 2**. Upon completion of the course, students should be able to: 1. Design and conduct experiments in the soil mechanics domain and to analyze and interpret data (2) 2. Utilize computer and apparatus in the soil lab (7).
Assessment Tools**:**	Homework and assignments, Exams, Lab reports

CE 308 Soil Mechanics (Continued)
Spring Semester 2018

Table 1/ Relationship of Course Educational Objectives	CE 308
3. Successfully practice civil engineering in industry and/or government.	X
4. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	CE 308
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	X
3. Communicate with multidisciplinary teams.	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	X

Table 3. Expected Course Outcomes and Assessment Methods

Student Outcomes	Performance Criteria	Assessment Methods
2a	Able to formulate and design an Experiment to obtain data in support of an engineering problem	Analysis and process of lab test data, and lab report
2b	Knowledge of equipment, sensors and data acquisition methods	Performing lab test and collecting data
2c	Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data	Lab report
7b	Able to use modern equipment to solve engineering problem through laboratory Experiment or field work	Lab report

Class/Lab Schedule: Two 50-minute lectures and 3-hour lab per week

Professional Component: Engineering Design: 3 Cr. Hrs

Prepared by: Dr. Mohamed Ashour, P.E. Date: Spring 2018

CE 310 Transportation Systems and Materials (Required)
Spring 2018

2016 – 2017 Catalog Data	Transportation Systems and Materials – 3 hrs. Transportation systems including land and air transportation for passenger movement; functions of transportation systems; vehicles and controls; transportation system planning, operation, maintenance, safety and transportation material testing are addressed in this course. Prerequisites: EGC 101, 205, CE 201.
Prerequisites	Prerequisites: EGC 101, EGC 205, CE 201.
Textbook	"Fundamentals of Transportation Engineering; A Multimodal Systems Approach", by Jon D. Fricker and Robert K. Whitford, published by Pearson Prentice Hall, 2004, ISBN: 978-0130351241
Reference	Handouts
Course Objectives	After finishing the course, the students will: 1. become familiar with standard terminologies and resources involved in multimodal transportation engineering, 2. be able to analyze the basic traffic characteristics, 3. be familiar about laboratory characterization of transportation materials
Topics Covered	1. Traffic theory 2. Highway safety and design for safety 3. Demand and supply 4. Planning and Evaluation 5. Public transportation 6. Transportation Materials
Course Outcomes	Numbers in parentheses correspond to ABET Student Outcome in Table 2. Upon completion of the course, students should be able to: 1. Understand basic principles of transportation systems and solve problems related to traffic volume and characterization. 2. Use numerical methods, including computer programs, to solve problems related to traffic characterization (7a)
Assessment Tools	Homework, Exam, Class activities

CE 310 Transportation Systems and Materials (Continued)
Spring 2018

Table 1. Relationship to Course to CE Educational Objectives	
CE Educational Objectives	**CE 310**
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	**CE 310**
Student Outcome	
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data	
3. Communicate with multidisciplinary teams	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions	
5. Continue their education and professional development; Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	
7. Use any modern engineering tools necessary for engineering practice	X

Table 3. Expected Course Outcomes and Assessment Methods		
Student Outcomes	Performance Criteria	Assessment Methods
7a	Able to write a computer program to solve engineering problem	Homework

Class/Lab Schedule: Three 50-minute lectures per week including laboratory

Professional Component: Engineering Design: 3 Cr. Hrs.

Prepared by: Dr. Sudip Bhattacharjee Date: Spring 2018

CE 401 Structural Steel Design (Required)
Spring Semester 2018

2017 – 2018 Catalog Data:	3 credit hours. Introduction to the design of steel structures to include behavior of members and their connections. Theoretical and practical bases for proportioning members are addressed
Prerequisites:	CE 306 Structural Analysis
Textbook:	1. "Structural Steel Design: LRFD Method," by Jack C. McCormac., 5th Ed., Prentice Hall, New Jersey. 2. " Steel Construction Manual " – 14th Edition by American Institute of Steel Construction, Inc., Chicago. 3. Commercial Software Training: STAAD-Pro, SDS/2, and TEKLA
Reference:	"Structural Steel designer's Handbook" 3rd. Ed., Roger L. Brockenbrough and Frederick S. Merritt, 1999.
Course Objectives:	1. Analyze and investigate simple steel structures. 2. Analyze and design beams, columns, and connections of simple steel structures. 3. Investigate and design steel roof trusses.
Topics Covered:	1. Introduction to Structural Design, Loads, Building Codes, Design Specifications, Structural Steel, Standard Cross-Sectional Shapes. 2. Concepts in Structural Steel Design: AISC Specifications and Manual, LRFD, ASD. 3. Tension Members 4. Compression Members 5. Beams 6. Beam-Columns 7. Simple Connections 8. Eccentric Connections 9. Plate Girders
Course Outcomes:	Numbers in parentheses correspond to program educational outcomes in **Table 2.** Upon completion of the course, students: 1. should be able to analyze and design steel structural members subjected to moments, shears, and axial forces. (5, 6) 2. should be able to use computers and packaged software to solve problems. (7) 3. should be able to make written and oral presentation effectively. (6) 4. will be exposed to contemporary issues in steel design specifications and in the fabrication of steel members (5). 5. should be able to recognize the need for life-long learning as they exposed to the dynamic changes in the steel industry (5).
Assessment Tools:	Homework assignments, reports, Design Project, Exams.

CE 401 Structural Steel Design (continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	CE 401
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	CE 401
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	X
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	X
7. Use any modern engineering tools necessary for engineering practice.	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
3a	Acknowledgement of sources	Design Project Report
5b	Demonstrated professional membership and attendance at professional membership, seminars, meetings, and field trips	Home Works and Project Reports 6b
6b	Alternative Designs	Exams, Quizzes, Home Works and Project Reports
7c	Able to use computer software for engineering analysis, design, or experimental work	Home Works and Project Report

Class/Lab Schedule: 3 hours lecture

Professional Component: Engineering Design: 3 Cr. hrs

Prepared by: Dr. Nesar Ahmed, P.E. Date: Spring 2018

CE 402 Reinforced Concrete Design (Required)
Fall Semester 2017

2017 – 2018 Catalog Data: 3 credit hours. A study of the theory and design of reinforced concrete members. Design consideration for concrete bridges and buildings are included. Prerequisite: CE 306

Prerequisite: CE 306 Strength of Materials

Textbook: **"**Reinforced Concrete – A Fundamental Approach**",** 6th Ed, ACI 318-08 Code Edition, by Edward G. Nawy, Prentic Hall, Inc, 2009.
"Building Code Requirements for Reinforced Concrete (ACI 318 -08) and Commentary**"**, by American Concrete Institute (ACI).

Reference: Design of Reinforced Concrete**",** 8th Ed, ACI 318-08 Code Ed, by Jack C. McCormac and Russel Brown, John Wiley & Sons, Inc.,2009. **"**Design of Concrete Structures**"**, 13th Ed, by H. Nilson, David Darwin and Charles W. Dolan, McGraw Hill.

Course Objectives:
1. Analyze and design reinforced concrete members subjected to moments, shears and axial forces.
2. The course must serve dual purpose of providing a reasonable understanding of design and behavior of reinforced concrete structures to the student who does not take any more course in the area of structural concrete and also provide a sound background for student who elects to take additional courses in the area.

Topics Covered:
1. Introduction-Safety, Design Codes, Reinforced Concrete Behavior.
2. Flexural Analysis and Design of Beams
3. Shear and Diagonal Tension in Beams
4. Serviceability – Deflection of Beams & One way slabs
5. Combined Compression and Bending: Columns
6. Bond, Anchorage, and Development Length
7. Columns
8. Footing Design
9. Introduction to LRFD AASHTO Bridge Design
10. Professional code of ethics.

Course Outcomes: Numbers in parentheses correspond to Student educational outcomes in **Table 2.** Upon completion of the course, students should be able to:
1. Analyze and design reinforced concrete members subjected to moments, shears, and axial forces. (6)
2. Use computers and packaged software to solve problems. (5, 6)
3. Make written and oral presentation effectively. (3, 5)

Assessment Tools:
1. Performance on weekly homework.
2. Performance on comprehensive examinations and design project

CE 402 Reinforced Concrete Design (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives The Program Educational Objectives of the Civil Engineering program are to produce graduates who, after the first few years of their graduation, have:	**CE 402**
1. Successfully practiced civil engineering in industry and/or government	X
2. Continued to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	X
3. Recognized the need for scholarship, leadership, and service to society	

Table 2. Demonstrated Capability (ABET EAC Criterion 3)	**CE 402**
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	**X**
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	**X**
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	**X**
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
3b	Individual – Takes responsibility and values other team members	Design Project
5b	Demonstrated professional membership	ACI membership
6a	Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis	Design Project , homework
6c	Demonstrates knowledge of professional code of ethics and acknowledges sources	Homework

Class/Lab Schedule: 3 hours lecture

Professional Component: Engineering topics: 3 Cr. Hrs

Prepared by: Ahmed Elsayed Date: Fall 2017

CE 404 Hydraulic Engineering and Design (Required)
Spring Semester 2018

2017 – 2018 Catalog Data:	CE 404 Hydraulic Engineering and Design – 3 hrs. A study of the similitude, and flow measurement; open channel flow, pipe flow and their applications; and design of various elements of hydraulic structures.
Prerequisites:	EGC 204 Engineering Analysis EGC 207 Strength of Materials EGC 305 Fluid Mechanics
Textbook:	"Hydraulic Engineering", 2nd Edition, Roberson, Cassidy, and Chaudhary, 1998, John Wiley & Sons, Inc.
Reference:	"Engineering Fluid Mechanics", 10th Edition, 2012, by Crowe, Elger, Williams & Roberson, John Wiley & Sons, Inc. (ISBN 978-1-118-16429-7). "Water Resources Engineering", 2nd Edition, Larry W. Mays, 2010, Wiley and Sons.
Course Objectives:	To study applications of Fluid Mechanics, including; 1. To review basic principles of fluid statics and fluid flow 2. Study of flow through pipes, open channels, gates, e.t.c. 3. Study of hydraulic machinery, their performance, and various applications
Topics Covered:	1. Hydrologic Cycle/Rainfall Runoff Relationship/Hydrographs (In 2. troduction) 3. Flow in Open Channels 4. Flow in Closed Conduits 5. Dimensional Analysis and Similitude 6. Pump Station Design 7. Dam Design and other Hydraulic Structures
Course Outcomes:	Upon completion of this course, students should be able to Understand and apply the basic principles of hydrology. 1. Perform the design of hydraulic structures. 2. Perform design of pump stations. 3. Able to design gravity dams, retaining walls, retention ponds. 4. Understand the concept of models and prototype and design principles. 5. Work with a group in a design project. Able to make technical presentations orally and written employing state-of-the-art equipment.
Assessment Tools:	1. Performance on weekly homework. 2. Performance on hourly and comprehensive examinations. 3. Evaluation of design projects.

CE 404 Hydraulic Engineering and Design (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	CE 404
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc)	
3. Recognize the need for scholarship, leadership, and service to society	X

Table 2. Relationship of Course to Student Outcomes	CE 404
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	X
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
5. Continue their education and professional development.	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	

Table 3. Expected Course Outcomes and Assessment Methods		
Student Outcomes	Performance Criteria	Assessment Methods
3a	Individual - Contributes to team project, work	Exams, Home Works, Quizzes, Design Project
3b	Individual – Takes responsibility	Exams, Home Works, Quizzes, Design Project

Class/Lab Schedule: 3 hours lecture

Professional Component: Engineering Design: 3 Cr. hrs

Prepared by: Dr. A. Acharya Date: Spring 2018

CE 408 Foundation Design (Required)
Fall Semester 2017

2016 – 2017 Catalog Data	3 credit hours. The study of shallow and deep foundation elements, determination of bearing capacity of spread footings, mat and pile foundation This course also includes instruction on drilled caissons and piers as well as lateral earth pressure and design of retaining structures.
Prerequisites:	CE 402 Reinforced Concrete Design (Co-Requisite) CE 308 Soil Mechanics.
Textbook:	Foundation Design: Principles and Practices, third Edition by Donald Coduto, William Kitch and Man-chu Yeung. Third edition, Pearson.
Reference:	Bowles, E., Foundation Analysis and design, Chapters 3, 4, 5, 6, 7, 16, 17, 18, 19. NAVFAC (1986). "Foundations and Earth Retaining Structures Design manual." Dept. of Navy, DM 7.02, Alexandria, Va.. NAVFAC (1986). "Soil Mechanics Design manual" Dept. of Navy, DM 7.01, Alexandria, Va.
Course Objectives:	To introduce students about the bearing capacity of soil, and the mechanism developed under the over burden and an applied load. Introduce the methodology of the design of foundations of structures. They will also learn to present/defend their teamwork design effort with the help of written report and verbal presentation, and develop a sense of leadership.
Topics Covered:	1. Geotechnical properties of soil 2. Bearing capacity 3. Sub-surface exploration 4. Shallow foundation 5. Mat foundation 6. Lateral earth pressure 7. Retaining wall 8. Sheet pile walls 9. Pile foundation
Course Outcomes:	**Table 2.** Upon completion of the course, students should be able to: 1. Analyze and design foundation and retaining walls subjected to soil pressures and superstructure loads. (1,3, 5) 2. Use computers and packaged software to solve problems. (7) 3. Make written and oral presentation effectively. (6)
Assessment Tools:	Homework assignments, project reports, Exams.

CE 408 Foundation Design (Continued)
Fall Semester 2017

Table 1/ Relationship of Course Educational Objectives	CE 408
1. Successfully practice civil engineering in industry and/or government.	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	CE 408
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	X
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	X
5. Continue their education and professional development.	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
7. Use any modern engineering tools necessary for engineering practice.	

Table 3. Expected Course Outcomes and Assessment Methods		
Student Outcomes	Performance Criteria	Assessment Methods
3a	Individual – Contributes to team project, work	Design Project Report
3c	Acknowledgement of sources	Homework
4a	Aware of energy conservation, safety and environmental impact	Design Project Report
4c	Understands contemporary technical issues in the field related case studies	Design Project Report

Class/Lab Schedule: Two 80-minute lectures per week

Professional Component: Engineering Design: 3 Cr. Hrs

Prepared by: Dr. Mohamed Ashour, P.E. Fall Semester 2017

CE 410 Transportation Engineering and Design (Required)
Fall Semester 2017

2017 – 2018 Catalog Data:	Transportation Engineering and Design – 3 hrs. A study of engineering and design basics for highway transportation; elements of highway transportation and their characteristics; drivers; vehicles, volume, density, speed, and travel time; design for safety, service, and economy; highway alignment, cross section and geometric design elements. Prerequisites: CE 310. Co-requisites: EGC 204.
Prerequisites:	CE 310 Transportation Systems and Materials. Co-requisites: EGC 204 Engineering Analysis.
Textbook:	"Principles of Highway Engineering and Traffic Analysis", by F. L. Mannering, S. S. Washburn and W. P. Kilareski, published by Wiley, 2008, 4th Edition, ISBN: 978-0470290750
Reference:	Handouts
Course Objectives:	After finishing the course, the students will be able to: 1. Design highways for capacity (level of service design) 2. Design highway for structural performance (pavement design) 3. Design highway materials for performance
Topics Covered:	10. Transportation design – outline 11. Design for safety 12. Design for capacity 13. Design for structural performance 14. Design for transportation materials
Course Outcomes:	After completion of the course, students should be able to (numbers in parenthesis represent program outcomes): 1. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (2) 2. Consider contemporary issues and mutual global and societal influence on the engineering solutions (4) 3. Continue their education and professional development (5) 4. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (6)
Assessment Tools:	Homework and Assignments, Exams, Project Report, Class Activities

CE 410 Transportation Engineering and Design (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives	CE 410
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Program Outcomes	CE 410
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	X
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	X
5. Continue their education and professional development (i, j);	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	X
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Program Outcome Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
2c	Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data	Lab Report and/or Project Report
4c	Understands contemporary technical issues in the field related case studies	Homework
5a	Able to conduct literature search using library and Internet for assignments	Homework
6a	Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis	Project Report, Homework, Tests
6b	Alternative Designs	Homework

Class/Lab Schedule: Three 50-minute lectures per week

Professional Component: Engineering Design: 3 Cr. Hrs.

Prepared by: Dr. Sudip Bhattacharjee Date: Fall 2017

CE 415 Transportation Materials Characterization and Design (Elective)
Fall Semester 2013

2017-2018 Catalog Data:	Transportation Materials: Characterization and Design – 3 hrs. Covers the characterization and design of transportation materials: asphalt binder, aggregates, and hot mix asphalt; properties of aggregates, asphalt binder and hot mix asphalt; AASHTO characterization of aggregates and binder; Superpave mix design; Superpave performance tests; pavement performance and maintenance; practical applications and recent developments; transportation laboratory will be used for this course. Prerequisites: CE 310 or consent of instructor. Senior Standing or Consent of instructor
Prerequisite:	CE 310 or consent of instructor.
Textbook:	Hot Mix Asphalt Materials, Mixture Design & Construction", by F. L. Roberts, National Asphalt Pavement Association, 3 rd Edition, ISBN: 978-0914313014
References	Handouts
Course Objectives:	After finishing the course, the students will be able to: 1. Understand the properties of transportation materials (aggregates, asphalt binder and hot mix asphalt) used for pavement construction 2. Characterize aggregates, binder and hot mix asphalt according to AASHTO specifications 3. Design hot mix asphalt based on Superpave mix design criteria aboratory tests for characterization
Topics Covered:	Superpave mix design; asphalt binder; aggregates; hot mix asphalt properties; AASHTO testing protocol; pavement performance
Course Outcomes:	1. After completion of the course, students should be able to (numbers in parenthesis indicate the Student outcomes): 2. Use equipment in the laboratory for transportation material characterization (2b) 3. Design asphalt mixture for desired highway performance using Superpave mix design principle (4c) Performance on every homework, exams (1 hr./ mid-term/final), design project, and class works/activities.
Assessment Tools	Performance on assignments, homework, exams and laboratory reports

CE 415 Transportation Materials Characterization and Design (continued)
Fall Semester 2013

Table 1. Relationship of Course to CE Educational Objectives	CE 415
1. Practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	CE 415
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	X
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	X
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
2b	Knowledge of equipment, sensors and data acquisition methods	Lab Report
4c	Understands contemporary technical issues in the field related case studies	Homework

Class Schedule: Two 80-minute lectures per week including laboratory

Professional Component: Engineering Design: 3 Cr. Hrs.

Prepared by: Dr. Sudip Bhattacharjee Date: Fall 2013

CE 424 Civil Engineering Practice (Required)
Fall Semester 2017

2017-2018 Catalog Data:	CE 424- CE Practice- 3 hrs. An introduction to the practical concepts necessary for a practicing engineer, such as engineering ethics, engineering economics, estimating, cost analysis, contracts bidding and specification writing.
Prerequisite:	Senior Standing or Consent of instructor
Textbook:	1. "Engineering Economic Analysis", Donald G. Newnan, et al, Oxford University Press, 12th Edition, 2013, ISBN 978-0-19-933927-3. 2. "Fundamentals of Construction Estimating", David Pratt, ITP/Delmar, 3rd Edition. ISBN-13: 9781439059647; ISBN-10: 1439059640 Additional Reading: 1. "Ethical Issues in Engineering", Deborah G. Johnson, Prentice Hall. 2. "Civil Engineering Practice", David D. A. Piesold, McGraw Hill.
Course Objectives:	1. To make students aware of ethical issues 2. To help students understand the economic aspects of engineering projects and how they apply to their personal finances. 3. To help students become proficient in the economic evaluation of engineering projects 4. To introduce students to the methods of quantity surveying and cost estimating of projects.
Topics Covered:	1. Engineering economy: Time value of money, Interest formulas and equivalence, Economic analysis of alternatives 2. Estimating, cost analysis 3. Professional engineering practice: Current trends, Ethics, professionalism, Case studies to highlight ethical, safety, economic and social aspects of current projects
Course Outcomes:	Upon completion of this course, students should be able to 1. Perform economic studies and engineering analysis of various projects. 2. Compare alternative projects based on cost evaluation (life cycle costing) and different analysis techniques. 3. Understand principles of measuring work, estimate quantity take offs (including drawings), and total cost estimate for a project. 4. Understand estimating process (including bidding), project delivery systems, and general contractor's work,
Assessment Tools	Homework, exams, design project, and class works/activities.

CE 424 Civil Engineering Practice (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives	CE 424
1. Practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	X

Table 2. Relationship of Course to Student Outcomes	CE 424
1. Formulate and solve engineering problems in practice by applying fund mental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	X
5. Continue their education and professional development (i, j);	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h);	X
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	ssessment Methods
4b	Understand engineering economics	Quizzes, and Reports
5c	Understand the importance of Professional licensing (FE and PE) (H)	Home Works and Project Reports
6c	Demonstrated knowledge of professional code of ethics and acknowledge sources.	Home Works and Project Reports

Class Schedule: 3-hour session per week

Professional Component: Engineering Topics
Prepared by: Dr. Anil Acharya Date: Fall 2017

CE 470 Civil Engineering Design Project (Required)
Spring Semester 2018

2017 – 2018 Catalog Data:	3 credit hours. An individualized or grouped civil engineering design project completed under supervision of instructor. Prerequisite: Must have completed at least two CE design courses or Consent of instructor.
Prerequisites:	Must have completed at least two CE design courses or Consent of instructor.
Textbook:	"Minimum Design loads for Building and other Structures", ASCE 7-10, 2010, Manual of Steel Construction, AISC,13th Ed, ASD and LRFD, 2005.
Reference:	"IBC-2009", International Building Code, Int'l Code Council, 2009. "STAAD-Pro-2004 Manual -Getting Started and Tutorials, Research Engineers Internationals, 2004 SDS/2 Detailing Tutorial, SDS/2 Step by step Instruction manual by Design Data, 2001 VULCRAFT Steel Roof & Floor Deck, NUCOR Vulcraft Group, 2008
Course Objectives:	1. To get comprehensive design experience. 2. To reinforce the engineering and design knowledge and skills obtained through education up to this point. 3. To develop the skills needed to work as a team if a group project is offered.
Topics Covered:	1. Overview of civil engineering practice, field survey and use of surveying equipment, 2. Design for safety, economy, and utility 3. Design for durability and maintainability 4. Use of design software, standards and codes, and comprehensive design of a civil engineering facility or system of student's choice
Course Outcomes:	Numbers in parentheses correspond to Student educational outcomes in **Table 2.** Upon completion of the course, students should be able to: 1. Successfully complete a comprehensive a civil engineering design project which requires the application of knowledge and skills throughout the program and additional research. (6) 2. Apply the engineering and design knowledge, and skills obtained through education up to this point. (6) 3. Work as a team. (3) 4. To recognize the designer needs to address safety and environmental issues. (4) 5. Make visual and /or verbal presentations at periodic stages of the design.(3) 6. Recognize that the designer is confronted with challenges that are on the leading edge of technology and require additional training to be able to handle them. (5,6)

Assessment Tools:
1. Performance on the Proposal Report
2. Performance on Mid-Term Progress Report
3. Performance on the Final Project Report and its Oral Presentation

Table 1. Relationship of Course to CE Educational Objectives	CE 470
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc)	X
3. Recognize the need for scholarship, leadership, and service to society	X

Table 2. Relationship of Course to Student Outcomes	CE 470
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering.	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	
3. Communicate with multidisciplinary teams.	X
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	X
5. Continue their education and professional development.	X
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	X
7. Use any modern engineering tools necessary for engineering practice.	

Program Outcomes	Table 3. Performance Criteria
3a	Individual - Contributes to team project, work
3b	Individual – Takes responsibility
3c	Understands contemporary technical issues in the field related case studies
4b	Awareness of business and engineering economics and global impact
5a	Able to conduct literature search using library and Internet for assignments
5b	Demonstrated professional membership and attendance at professional seminars, meetings, and field trips
5c	Understand the importance of professional licensing (FE & PE)
6a	Ability to select design solution based on project needs, technical and economic criteria & considering relevant constraints & perform necessary technical analysis
6b	Alternative Designs
6c	Demonstrates knowledge of professional code of ethics & acknowledges sources

Class/Lab Schedule:	Two 80 -minute class per week; computer based lab work built into the course. Use of CAD, STAAD-Pro, SDS/2, TEKLA and other design packages and software & fieldtrip as appropriate to the design project chosen
Professional Component	Engineering Design: 3 Cr. hrs
Prepared by	Dr. Nesar Ahmed, P.E. Date: Spring 2018

EGC 101 Engineering Drawing & Graphics (Required)
Spring Semester 2018

2017 – 2018 Catalog Data:	3 credit hrs. A study of principles of design drafting, and graphics as applied to engineering, geometric constructions and multi-view drawing using computer graphics package. Co-requisite: CE 101.
Prerequisites:	Basic Geometry: properties of triangles, circles etc. Personal computer literacy – Windows, file concepts, etc.
Textbook:	Harnessing MicroStation V8i, Krishnan, Taylor – Delmar/Cengage, 2010 & Handouts.
Reference:	"Visualization & Engineering Design Graphics with Augmented Reality", by Jorge Dorribo Camba et.al, Schroff Development Corporation, 2014.
Course Objectives:	1. Ability to make and read correct graphical representation of engineering designs. 2. Basic habits of every successful engineer, namely: speed and accuracy. 3. Ability to think and to visualize in three dimensions. 4. Ability to use computer-aided drafting techniques.
Topics Covered:	1. Drawing by CAD Basics 2. Shape Visualization and Description 3. Multi-view projection and contouring 4. Detailed drawing by Computer Aided Design (CAD)
Course Outcomes:	Numbers in parentheses correspond to Student educational outcomes in **Table 2**. Upon completion of the course, students should be able to: 1. Make and read correct graphical representation of engineering designs.(7) 2. Think and to visualize in three dimensions.(7) 3. Use computer-aided drafting techniques.(7)
Assessment Tools:	1. Performance on weekly Assignments. 2. Performance on hourly and comprehensive examinations.

EGC 101 Engineering Drawing and Graphics (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	EGC 101
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	EGC 101
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	
7. Use any modern engineering tools necessary for engineering practice (c, k).	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	A assessment Methods
7c	Able to use computer software for engineering analysis, design, or experimental work	Home Works, Weekly assignments and Exams

Class/Lab Schedule: 3 hours lecture and lab

Professional Component: Computer and Engineering topics: 3 Cr. hrs

Prepared by: Ahmed Elsayed Spring 2018

EGC 104 Computer Programming (Required)
Spring Semester 2018

2016 -2017 Catalog Data:	3 credit hours. An introduction to the use of the computer as a tool in engineering. Systems and utility programs, programming techniques, recent developments in computing, and practice in solving engineering problems are included.
Co-requisites:	MTH125 Calculus I
Textbook:	"MATLAB An Introduction with Applications", by Amos Gilat, John Wiley & Sons, Inc., 5th edition.
Reference:	"Learning MATLAB 7.0" by the MathWorks, Inc.
Course Objectives:	1. Introduce students to the MATLAB as a technical computing tool. 2. Usage of MATLAB in problem solving. 3. Programming by using MATLAB.
Topics Covered:	1. Starting with MATLAB 2. Creating Arrays 3. Mathematical Operations with Arrays 4. Script Files 5. Two-Dimensional Plots 6. Programming in MATLAB 7. User-defined Functions and Function Files 8. Polynomials, Curve Fitting, and Interpolation 9. Applications in Numerical Analysis
Course Outcomes:	Numbers in parentheses correspond to program educational outcomes in **Table 2.** Upon completion of the course, students should be able to: 1. Understand the fundamentals of MATLAB programming language. 2. Write a computer program using MATLAB to solve engineering problem. (7)
Assessment Tools:	1. Performance on Homework assignments, and Programming assignments. 2. Performance on in-class on-the-pc programming tests. 3. Performance on exams and final exam.

EGC 104 Computer Programming (Continued)
Spring Semester 2018

Table 1. Relationship of Course Educational Objectives	EGC 104
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	EGC 104
4. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering (a, e);	
5. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
6. Communicate with multidisciplinary teams (d, f, g);	
7. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
8. Continue their education and professional development (i, j);	
9. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h)	
10. Use any modern engineering tools necessary for engineering practice (c, k).	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
7a	Able to write a computer program to solve engineering problem.	Programming assignments, Exams, homework.

Class/Lab Schedule: 3 hours lecture and lab

Professional Component: Computer and Engineering topics: 3 Cr. Hrs

Prepared by: Dr. Mohamed Ashour, P.E. Spring Semester 2018

EGC 204 Engineering Analysis (Required)
Fall Semester 2017

2017 – 2018 Catalog Data	Engineering Analysis – 3 credit hours. An introduction to statistics and data analysis, probability and sampling distributions, quality control, estimation and statistical intervals, testing statistical hypotheses, the analysis of variance, experimental data, regression and correlation, and computer applications in Civil Engineering. Prerequisites: MTH 126.
Prerequisites:	MTH 126.
Textbook:	R. A. Johnson; "Miller & Freund's Probability And Statistics For Engineers," Pearson, 8th Edition, 2010; ISBN: 978-0321640772.
Reference:	Handouts
Course Objectives:	After finishing the course, the students will be able to: 1. apply various statistical methods to analyze engineering data, and 2. apply engineering judgment on the obtained data by interpreting results of statistical analysis
Topics Covered:	Introduction, Treatment of Data Probability Probability Distributions Probability Densities Sampling Distribution Inferences Concerning Means: Hypothesis Testing Curve Fitting and Regression Analysis Statistical Quality Control and Reliability
Course Outcomes:	Numbers in parentheses correspond to ABET Student Outcome in Table 2. Upon completion of the course, students should be able to: 1. Apply various statistical methods to analyze and solve engineering problems (2c).
Assessment Tools:	Homework, Exam, Class activities.

EGC 204 Engineering Analysis (Continued)
Fall Semester 2017

Table 1. Relationship to Course to CE Educational Objectives	
CE Educational Objectives	**EGC 204**
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	
Student Outcome	**EGC 204**
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data	X
3. Communicate with multidisciplinary teams	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions	
5. Continue their education and professional development	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities	
7. Use any modern engineering tools necessary for engineering practice	

Table 3. Expected Course Outcomes and Assessment Methods		
Student Outcome	**Performance Criteria**	**Assessment Methods**
2c	Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data.	Homework, Exam

Class/Lab Schedule:	Three 50-minute lectures per week	
Professional Component:	Math & Basic Science Topics: 3 Cr. Hrs.	
Prepared by:	Dr. Sudip Bhattacharjee	Date: Fall 2017

EGC 205 Statics (Required)
Spring Semester 2018

2016-2017 Catalog Data:	. Fundamental definitions and the concept of static equilibrium; systems of forces and couples; application to solution of trusses and frames, friction, centroids and moments of inertia are covered in this course.
Prerequisites:	MTH 125 Calculus I, PHY 213 General Physics I.
Co-requisite.	Engineering Drawing & Graphics
Textbook:	Mechanics: Static, 14th Edition, by R. C. Hibbeler. Pearson Prentice Hall.

Course Objectives: (Student Learning Outcomes)

1. To develop the ability to think logically and to analyze problems.
2. To visualize the forces on objects by using free-body diagram.
3. To study equilibrium forces on structures at rest.
4. To prepare the student for courses in structural analysis and design.

Topics Covered:

1. General Principles
2. Force Vectors
3. Equilibrium of a Particle
4. Force System Resultants
5. Equilibrium of a Rigid Body
6. Structural Analysis
7. Internal Forces
8. Friction
9. Center of Gravity and Centroid
10. Moments of Inertia

Course Outcomes: Numbers in parentheses correspond to program educational outcomes in **Table 2**. Upon completion of the course, students should be able to:

5. Visualize the forces on objects by using free-body diagram (1).
6. Analyze mechanical and structural systems using the concept of equilibrium. (1)

Assessment Tools:

3. Performance on weekly homework.
4. Performance on hourly and comprehensive examinations.

EGC 205 Statics (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	EGC 205
1. Successfully practiced civil engineering in industry and/or government	X
2. Continued to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	
3. Recognized the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Program Outcomes	EGC 205
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h);	
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1a	Identify necessary basic physical principles and/or theorems and use them to formulate problems as mathematical (or experimental) problems.	Home Works, Quizzes, Exams.

Class/Lab Schedule: Three 50-minute lectures/week

Professional Component: Engineering Topics: 3 Cr. Hrs

Prepared by: Dr. Nesar U. Ahmed Date: Spring 2018

EGC 206 Dynamics (Required)
Spring Semester 2018

2016-2017 Catalog Data:	Dynamics – 3 hrs. A study of kinematics of a particle; moment of inertia of masses; translation, rotation and plane motion of rigid bodies; principles of work and energy, impulse, and momentum, as applied to engineering problems. Prerequisites: EGC 205, MTH 126.
Prerequisites:	EGC 205 Statics and MTH 126 Calculus II
Textbook:	echanics: Dynamics, 14th edition, by R. C. Hibbeler. Prentice Hall, 2015, ISBN-13: 978-0133915389
Reference:	
Course Objectives: (Student Learning Outcomes)	The primary objective of this course is to introduce students to the concepts of dynamics. The students are expected to develop working skills in the dynamic analysis of both particles and rigid bodies.

Topics Covered:

1. Kinematics of a Particle
2. Kinetics of a Particle: Force and Acceleration
3. Kinetics of a Particle: Work and Energy
4. Kinetics of a Particle: Impulse and Momentum
5. Planar Kinetics of a Rigid Body
6. Planar Kinetics of a Rigid Body: Force and Acceleration
7. Planar Kinetics of a Rigid Body: Work and Energy
8. Planar Kinetics of a Rigid Body: Impulse and Momentum

Course Outcomes: Numbers in parentheses correspond to program educational outcomes in **Table 2**. Upon completion of the course, students should be able to:

1. Solve problems involving the geometry of motion. (1)
2. Solve Problems involving the kinetics of a particle using force and acceler-tion, work and energy, and impulse and momentum. (1)
3. Solve Problems involving the kinetics of a rigid body using force and ac-celeration, work and energy, and impulse and momentum. (1)
4. Solve Problems involving mass moment of inertia. (1)

Assessment Tools: Homework, Exams, Class Activities.

EGC 206 Dynamics (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	EGC206
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Program Outcomes	EGC 206
1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering (a, e);	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h); and	
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Program Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1a	Identify necessary basic physical principles and/or theorems and use them to formulate problems as mathematical (or experimental) problems.	Homework, Exams.

Class/Lab Schedule: Three 50-minute lectures/week

Professional Component: Engineering Topics: 3 Cr. Hrs

Prepared by: Dr. Sudip Bhattacharjee Date: Spring 2018

EGC 207 Strength of Materials (Required)
Spring Semester 2018

2016-2017 Catalog Data:	. Concepts of stress and strain, combined stresses, analysis of stresses and deformation in bodies loaded by axial, torsional, and bending loads.
Prerequisites:	EGC 205 Statics, MTH 126
Co-requisites	EGC 104, EGC 207L (Lab)
Textbook:	f Materials," 6th Edition, by Beer, Johnston, DeWolf, and Mazurek, McGraw Hill.
Reference:	lecture slides uploaded on Blackboard learn. Mechanics: Static, 14th Edition, by R. C. Hibbeler. Pearson Prentice Hall.

Course Objectives: After finishing the course, the students will be able to:
1. Utilize and demonstrate the skills in problem solving in the subject of strength of materials
2. Apply the basic principles of strength of materials to the design of structural members

Topics Covered:
1. Introduction to mechanics of materials
2. Concept of stress
3. Stress and strain under axial loading
4. Torsion
5. Pure bending
6. Analysis and design of beams for bending
7. Shear stresses in beams and thin-walled members
8. Transformations of stress and strain
9. Deflection of beams
10. Columns

Course Outcomes: After completion of the course, students should be able to:
1. Solve engineering problems applying the theorems of mathematics (calculus and statistics) and using the principle of science (1b of Student outcomes)
2. Able to write a computer program to solve engineering problems (7a of Student outcomes)

Assessment Tools:
1. Performance on homework.
2. Performance on Exams.

EGC 207 Strength of Materials (Continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives The Program Educational Objectives of the Civil Engineering program are to produce graduates who, after the first few years of their graduation, have:	**EGC 207**
1. Successfully practiced civil engineering in industry and/or government	X
2. Continued to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses, etc.)	
3. Recognized the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Program Outcomes	**EGC 207**
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering (a, e);	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h);	
7. Use any modern engineering tools necessary for engineering practice (c, k).	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1b	Solve engineering problems applying the theorems of mathematics (calculus and statistics) and using the principles of science	Homework, Exams.
7a	Able to write a computer program to solve engineering problem	Homework

Class/Lab Schedule: Two 80-minute lectures per week

Professional Component: Engineering Design: 3 Cr. Hrs

Prepared by: Dr. Mohamed Ashour, P.E. Date: Spring Semester 2018

EGC 207L Strength of Materials Laboratory (Required)
Spring Semester 2018

2017 – 2018 Catalog Data:	*EGC 207L Strength of Materials Lab – 1* hr. The purpose of this course is to present a selection of experiments that will demonstrate the principles of Mechanics of Materials. A laboratory manual for this course will be used for performing these experiments.
Prerequisites:	Co-requisite: EGC 207 Strength of Materials
Textbook:	Laboratory manuals, notes and handouts
Reference:	Handouts
Course Objectives:	After finishing the course, the student will be able to: 4. Utilize and demonstrate the skills of designing and performing an experiment to obtain data related to strength of civil engineering materials and analyze and interpret the data.
Topics Covered:	Material properties, Concrete mix design, Concrete cylinder tests-compressive strength of concrete, Concrete split-cylinder tests – tensile strength of concrete, Beam tests – bending strength of concrete, Deflection of cantilever beams, Deflection of simply supported beams, Tensile strength test of metal.
Course Outcomes:	After completion of the course, students should be able to design and perform experiment to obtain data related to strength of civil engineering materials and analyze the data.
Assessment Tools:	Performance on lab activities, final assignments, and laboratory reports.

EGC 207L Strength of Materials Laboratory (continued)
Spring Semester 2018

Table 1. Relationship of Course to CE Educational Objectives	EGC 207L
1. Successfully practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc)	
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Relationship of Course to Student Outcomes	EGC 207L
3. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering.	
4. Design and conduct experiments within the civil engineering domain and to analyze and interpret data.	X
5. Communicate with multidisciplinary teams.	
6. Consider contemporary issues and mutual global and societal influence on the engineering solutions.	
7. Continue their education and professional development.	
8. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.	
9. Use any modern engineering tools necessary for engineering practice.	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
2a	Able to formulate and design an experiment to obtain data in support of an engineering problem	Laboratory Report
2b	Knowledge of equipment, sensors, and data acquisition method	Laboratory Report
7b	Able to use modern equipment to solve engineering problem through laboratory experiment or field work	Laboratory Report

Class/Lab Schedule: One 170 - minute laboratory session per week

Professional Component: Engineering Topics: 1 Cr. (3 contact Hrs.)

Prepared by: Dr. A. Acharya Date: Spring 2018

EGC 305 Fluid Mechanics (Required)
Fall Semester 2017

2017 – 2018 Catalog Data: 3 credit hrs. A study of the properties of fluids and fundamental principles governing fluid motion, including fluid statics; conservation of mass momentum and energy with application to pipe and channel flow of incompressible fluids.

Prerequisites: EGC 206 Dynamics, MTH 227 Calculus III, MTH 238 Applied Differential Equations. Co-requisites: EGC305L Fluid Mechanics Lab.

Textbook: "Engineering Fluid Mechanics", 10th Edition, 2012, by Crowe, Elger, Williams & Roberson, John Wiley & Sons, Inc.

Reference: "Fluid Mechanics - Fundamentals and Applications", 2nd Edition, 2010, by Cengel and Cimbala, McGraw Hill.

Course Objectives: To help students develop the ability to:

1. understand the laws of fluid statics, determine forces on sub-merged bodies
2. maintain the basic habits of every successful engineer, namely neatness, speed and accuracy
3. understand Archimedes principle and Pascal's law
4. determine flow rates in closed conduits.
5. determine flow rates in open channels.
6. understand and use the momentum principle
7. understand and use the energy principle

Topics Covered: Introduction , Fluid Properties, Fluid Statics,
Flowing Fluids, Bernoulli Equation, and Pressure Variation
Control Volume Approach and Continuity Equation
Momentum Equation
The Energy Equation
Dimensional Analysis and Similitude
Flow in Conduits
Flow in Open Channels
Flow Measurements

Course Outcomes: Numbers in parentheses correspond to program educational outcomes in **Table 2**. Upon completion of this course, students should be able to

1. determine forces on submerged bodies (1)
2. determine flow rates in closed conduits and open channels (1)
3. use the momentum principle to determine forces on bends in closed conduits. (1)

Assessment Tools: Performance on weekly homework and class participation.
Performance on hourly and comprehensive examinations.

EGC 305 Fluid Mechanics (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives	EGC 305
1. Practice civil engineering in industry and/or government	X
2. Are able to pursue graduate degrees	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Demonstrated Capability	EGC 305
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering (a, e);	X
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h);	
7. Use any modern engineering tools necessary for engineering practice (c, k).	

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
1a	Identify necessary basic physical principles and/or theorems and use them to formulate problems as mathematical (or experimental) problems.	Exams, Home Works, Quizzes, ClassWorks
1b	Solve engineering problems applying the theorems of Mathematics (Calculus and Statistics) and using the principles of Science.	Exams, Home Works, Quizzes, ClassWorks

Class/Lab Schedule: Two 80-minute lectures per week

Professional Component: Engineering Topics: 3 Cr. hrs

Prepared by: Dr. A. Acharya Date: Fall 2017

EGC 305L Fluid Mechanics Lab (Required)
Fall Semester 2017

2017-2018 Catalog Data:	EGC 305L *Fluid Mechanics Laboratory* - 1 hr. The purpose of this course is to present a selection of experiments that will demonstrate the principles of Fluid Mechanics. A Laboratory Manual for this course will be used for performing these experiments. **Co-requisite:** EGC 305.
Prerequisites:	Co-requisite: EGC 305 Fluid Mechanics.
Textbook:	Lecture Notes and Lab Manual.
Reference:	"Engineering Fluid Mechanics", 12th Edition, 2015, by Crowe, Elger, Williams & Roberson, John Wiley & Sons, Inc.
Course Objectives: (Student Learning Outcomes)	1. To provide basic Lab experiments that will demonstrate the principles of Fluid Mechanics. 2. To provide hands on lab experience for students to verify conservation principles on mass, momentum and energy. 3. To apply related computer software to do analysis for project.
Topic Covered	I. Introduction to Fluid Mechanics Lab II. Cleanliness and Safety III. Report writing IV. Computer as a tool **V. Lab Experiments** 1a. Length, Area, Volume, Density Measurement 1b. Buoyant Force 2. Ideal Gas Law 3. Center of Pressure 4. Venturi Apparatus 5. Verification of Bernoulli equation 6. Impact of a Jet 7. Reynolds Apparatus and Transitional Flow 8. Student-designed experiment (e.g. Specific Gravity, Viscosity, Metacentric Height, e.t.c.) 9. Pipe Flow/Major and Minor Head Loss Experiment 10. Open Channel Flow, Flow Measurement

EGC 305L Fluid Mechanics Lab (Continued)
Fall Semester 2017

Table 1. Relationship of Course to CE Educational Objectives	EGC 305L
1. Practice civil engineering in industry and/or government	X
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)	X
3. Recognize the need for scholarship, leadership, and service to society	

Table 2. Demonstrated Capability	EGC 305L
1. Formulate and solve engineering problems in practice by applying funda mental knowledge of mathematics, science and engineering (a, e);	
2. Design and conduct experiments within the civil engineering domain and to analyze and interpret data (b, e, g, k);	X
3. Communicate with multidisciplinary teams (d, f, g);	
4. Consider contemporary issues and mutual global and societal influence on the engineering solutions (h, j);	
5. Continue their education and professional development (i, j);	
6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities (c, e, f, g, h);	
7. Use any modern engineering tools necessary for engineering practice (c, k).	X

Table 3. Expected Course Outcomes and Assessment Methods		
Program Outcomes	Performance Criteria	Assessment Methods
2a	Able to formulate an engineering experiment to obtain data in support of an engineering problem	Lab Report
2b	Knowledge of equipment, sensors and data acquisition methods	Lab Report
7b	Able to use modern equipment to solve engineering problem through laboratory experiment or field work	Lab Reports

Class/Lab: One 3-hr lab/week

Professional Component Engineering Topics: 1 Credit Hr.

Prepared by A. Acharya Fall 2017

Appendix B – Faculty Vitae

1. **Name:** **Nesar U. Ahmed, Ph.D., P.E.**

2. **Education:**
   Ph.D. Department of Civil Engineering, Vanderbilt University, Nashville, Tennessee (1989)
   M.S. Department of Civil Eng., Bangladesh Univ. of Eng. & Tech., Dhaka, Bangladesh (1984)
   B.S. Department of Civil Engineering, Bangladesh University of Eng. and Technology (1981)

3. **Academic experience**
   Professor of Civil engineering, Department of Mechanical and Civil Engineering, Alabama A&M University (1996-Present)
   Associate Professor, Department of Mechanical and Civil Engineering, Alabama A&M University (1993-1996)
   Associate Professor, Department of Mechanical and Civil Engineering, Alabama A&M University (1988-1993)

4. **Non-academic experience**

- **Consultant** (1992 – Present)
  Sami Engineering, Inc., Huntsville, Alabama; (2) Engineering Design & Software Inc., Decatur, Alabama Mesa Associates Inc. (Engineers and Consultants), Madison, Alabama
  Bureau of Research, Testing and Consultation, Dhaka, Bangladesh (1982 – 1984).

5. **Certification or professional registrations:**
   Registered Professional Engineer of the States of Alabama, Texas, Louisiana, Mississippi, Florida, Georgia, Tennessee, South Carolina, North Carolina, Virginia, Kentucky, Ohio, Missouri, Kansas, and California.

   Certified - Structural and Misc. Steel Detailer, Class-I,
   Certified - Steel Bridge Detailer, Class - II.

6. **Current membership in professional organizations**
   American Society of Civil Engineers (ASCE), American Institute of Steel Construction (AISC), Bangladesh Earthquake Society (BES), Institute of Engineers Bangladesh (IEB).

7. **Honors and awards**
   Professor of the Year 1993 nominated by the Dean of School of Engineering, AAMU, April 1993.
   AABEA Achievement Award-2012, nominated by New York Chapter of by American Association of Bangladeshi Engineers & Architects (AABEA), and selected by Central Executive Committee of AABEA, and award presented in Biennial convention in Phoenix, AZ.
   "Implementation Project: Advancing Success in STEM Undergraduate Research and Education (AASUR), National Science Foundation (NSF) –(Award # 1436572, 2014-2019, ($ 1,749,995.00) (Co-PI)
   Scholarship for Underrepresented Minority Engineering, Technology and Computer Science Students", funded by National Science Foundation (NSF 09-567) S-STEM program, 2009-2014, ($ 600,000.00) (Co-PI)
   Strategic Plan to Enhance STEM Education and Research at AAMU", funded by National

Science Foundation (NSF 09-512) STEM HBCU-UP program, 5 yrs period, 2009-2014, ($ 2,163,679.00)(Co-PI).

Health Monitoring, Failure Analysis and Damage Assessment of Aerospace and Advance Structures" by Office of Naval Research (ONR) , 2007-2008, ($499,999)(Co-PI)

8. Service activities (within and outside of the institution)

9. The most important publications of past five years:

M. Hassan, T. Tsegaye, N. U. Ahmed, and S. Khan; "Rainfall Prediction Model Improvement by Fuzzy Set Theory" Journal of Water Resources and Prediction, 5, 1-11 (2013).

N. U. Ahmed and P. K. Basu; "Higher Order Finite Element Modeling of Laminated Composite Plates," International Journal for Numerical Methods in Engineering, 37, 123-139, January 1994.

10. The most recent professional development activities

1. **Name:** Sudip Bhattacharjee

2. **Education:**
   A. Ph.D., Civil Engineering (Transportation Engineering), Worcester Polytechnic Institute, Worcester, MA, USA, 2005.
   B. M.Sc (Eng), Civil Engineering (Structural Engineering), Indian Institute of Science, Bangalore, India, 2001.
   C. B.C.E., Civil Engineering, Jadavpur University, Calcutta, India, 1997.

3. **Academic Experience:**
   A. Alabama A&M University, Associate Professor, 2012-present, full time.
   B. Alabama A&M University, Assistant Professor, 2006-2012, full time.
   C. University of New Hampshire, Research Associate, 2005-2006, full time.

4. **Non-Academic Experience:**

5. **Certifications or Professional Registrations:**

6. **Current Membership in Professional Organizations:**
   A. American Society of Civil Engineers (ASCE)
   B. Transportation Research Board (TRB)

7. **Honors and Awards:**

8. **Service Activities:**
   A. Faculty Senator from Civil Engineering
   B. College of Engineering Promotion and Tenure Appeal Committee
   C. University Promotion and Tenure Appeals Committee
   D. Department faculty hiring committee (2011, 2016)
   E. Ph.D. dissertation committee at Civil Engineering, IIT, Delhi, India

9. **Most Important Publications and Presentations From the Past Five Years:**

1. Bhattacharjee, S. (2017). "Probabilistic Modeling of Material Properties of Flexible Pavements for Mechanistic Empirical and Reliability Analysis." *Proceedings of Geotechnical Frontiers 2017: Transportation Facilities, Structures, and Site Investigation*, ASCE, Orlando, Florida, March 12-15, 281-290.
2. Bhattacharjee, S. (2017). "Incorporating Uncertainties in Flexible Pavement Design." *Transport*: *Proceedings of the Institution of Civil Engineers*, 170(3), 158-170.
3. Bhattacharjee, S. (2016). "Imperfect Preventive Maintenance Strategy for Flexible Pavements Based on Threshold Reliability, Cost Optimization and Mechanistic Empirical Analysis." *Transportation Research Record*, Transportation Research Board, 2589, 32-39.
4. Alim, M. A., Budak, S., and Bhattacharjee, S. (2016). "The AC (Alternating Current) Electrical Behavior of Multi-layered Thermoelectric Devices." *Journal of Electronic Materials*, Springer, 1-12, doi: 10.1007/s11664-016-4839-0.

5. Budak, S., Alim, M. A., Bhattacharjee, S., and Muntele, C. (2015). "Effects of Mev Si Ions and Thermal Annealing on Thermoelectric and Optical Properties of SiO_2/SiO_2+Ge Multi-Nanolayer Thin Films." *Physics Procedia*, Elsevier, 66, 321-328.
6. Bhattacharjee, S., and Alim, M. A. (2015). "Frequency Dependent Impedance and Admittance (immittance) Data-Handling and Interpretation Using Complex Plane Formalisms Via Nonlinear Regression Analysis for Smart Electronic Materials and Devices: Overview and Case Studies." *Journal of Materials Science: Materials in Electronics*, Springer, 26(7), 4521-4540.
7. Budak, S., Gulduren, E., Allen, B., Cole, J., Lassiter, J., Colon, T., Muntele, C., Alim, M. A., Bhattacharjee, S., and Johnson, R. B. (2015). "Thermoelectric Generators from SiO_2/SiO_2 + Ge Nanolayer Thin Films Modified by MeV Si Ions." *Solid-State Electronics*, Elsevier, 103, 131-139.
8. Alim, M. A., Bhattacharjee, S., and Herring, J. (2014). "The Immittance Response of Escherichia Coli Bacteria." *Journal of Bacteriology and Mycology*, Austin Publishing, 1(2), 1-6.
9. Alim, M. A., Bhattacharjee, S., Khanam, S., Runa, S., and Muna, N. (2014). "The Behavior of the ZnO-Bi_2O_3-Based Varistor Capacitance." *Journal of Active and Passive Electronic Devices*, Old City Publishing, 9(2/3), 157-184.
10. Bhattacharjee, S. (2013). "Assessment of Reliability and Load Factor Design Approach Against Fatigue Cracking in Flexible Pavements." *Transportation Research Record*, Transportation Research Board, 2368, 56-65.
11. Bhattacharjee, S., and Mallick, R. B. (2012). "Determining Damage Development in Hot-Mix-Asphalt with Use of Continuum Damage Mechanics and Small-Scale Accelerated Pavement Test." *Transportation Research Record*, Transportation Research Board, 2296, 125-134.
12. Batra, A., Bhattacharjee, S., Chilvery, A., and Stephens, J. (2012). "Energy Harvesting Via Pyroelectric Transducer." *Sensors & Transducers Journal*, International Frequency Sensor Association (IFSA) Publishing, 138(3), 114-121.
13. Bhattacharjee, S., and Mallick, R. B. (2012). "Effect of Temperature on Fatigue Performance of Hot Mix Asphalt Tested under Model Mobile Load Simulator." *International Journal of Pavement Engineering*, Taylor and Francis, 13(2), 166-180.
14. Bhattacharjee, S., Swamy, A. K., and Daniel, J. S. (2012). "Continuous Relaxation and Retardation Spectrum Method for Viscoelastic Characterization of Asphalt Concrete." *Mechanics of Time Dependent Materials*, Springer, 16(3), 287-305.
15. Bhattacharjee, S., and Mallick, R. B. (2012). "Determination of Damage Development in Asphalt Concrete using Small Scale Accelerated Pavement Testing via Frequency Domain Analysis Approach." *Journal of Transportation Engineering*, American Society of Civil Engineers, 138(6), 723–731.

10. <u>Most Recent Professional Development Activities:</u>

A. Attended TRB annual meeting at Washington, D.C., 2018.
B. Presented at TRB annual meeting, 2012, 2013, 2014, 2015, 2016, 2017.

1. **Name:** **Anil Acharya, Ph.D., P.E.**

2. **Education:**
   Ph.D. Civil and Environmental Engineering, University of Nevada Las Vegas (2011)
   M.S. Water Engineering and Management, Asian Institute of Technology (2006)
   B.S. Civil Engineering, Tribhuvan University (2003)

3. **Academic experience:**
   Assistant Professor, Alabama A and M University (2012-Present)
   Postdoctoral Research Associate, Idaho Water Center University of Idaho (2011-2012)
   Research/Teaching Assistant, University of Nevada Las Vegas (2007-2011)

4. **Non-academic experience:**
   Design/Resident Engineer, ITECO NEPAL (P) LTD (Branch Office of ITECO Ingenieurunternehmung AG, Switzerland), Kathmandu, Nepal (2007)

   Instructor, Kantipur Engineering College, Kathmandu, Nepal (2006)

   Civil/Resident Engineer, Tundi Constructions (P) Ltd., Kathmandu, Nepal (2003-2004, 2006)

5. **Certification or professional registrations:**
   Registered Professional Engineer of the State of Alabama and Nevada

6. **Current membership in professional organizations:**
   American Society of Civil Engineers (ASCE) (2008-present)
   Environment and Water Resources Congress (EWRI) (2008-present)
   American Geophysical Union (AGU) (2008-present)
   Nevada Water Resources Association (NWRA) (2010-present)
   American Water Resources Association (2012-2013)
   Nepal Engineering Council (NEC) (2003-present)

7. **Honors and awards:**
   Biography featured/included in the 70th Platinum Anniversary Edition of Marquis "Who's Who in America", 2016.
   "Outstanding Faculty Advisor Award" for the ASCE student chapter in the SouthEast Region (2015)
   Nominated for the "University wide Faulty Award)" by the Department of Mechanical and Civil Engineering, AAMU (2013-2014)
   Recipient of 'Royal Thai King's Scholarship' for Master's degree at AIT, Thailand.
   Awarded top second position in Bachelor in Civil Engineering (B.E) in I.O.E., Batch of 2003.
   Institutional fellowship for academic excellence for four years undergraduate degree at IOE, Nepal.

8. Service activities (within and outside of the institution):

Faculty Advisor, Student Chapter of ASCE at A&M, (Sep 2012-present)
Committee Member, Scholarship Committee for CETPS at AAMU. (Sep 2014- present)
CE Graduate Advisor (CE department) for Graduate Program in Engg (FA 2016- present).
Member of the Assessment Committee of the University (FA 2016-Present; Term- 2 years).
Undergraduate Faculty Advisor for civil engineering department.
Committee Member and Judge for the STEM committee at A&M (2013-present).

Executive Committee Member, Nepalese Asso. in North Alabama (NANA) (2013-2017).
Judge, ASCE Regional Competitions.
Review Panels for EPA STAR Fellowship Program (2015).
Reviewer for College Board Advanced Placement (AP) Engineering Courses (2015).
Reviewer for FE(EIT) and PE exam questions for Production Pub. Inc. (2016-present).
Reviewer for more than 10 peer reviewed and highly referenced water related journals.

9. The most important publications of past five years:

Acharya, A. (2017). Quantification of modeled streamflows under climate change over the Flint River watershed in northern Alabama. *J. Hydrologic Engineering, 22(9):04017032.*

Acharya, A. and T.C. Piechota (2016). Analysis of past storm events and their contribution to flooding for the Clark County wetlands park. *I. Journal of Modern Engineering*, 6(1):5-16.

Acharya, A. (2015). Modeled hydrologic response under climate change impacts over the BankHead National Forest in Northern Alabama. *European Scientific Journal, November 2015/SPECIAL/edition: 140-154, ISSN:1857-7881 (Print) e-ISSN 1857-7431*.

Ryu, J, M. Sohrabi and **A. Acharya,** (2014). Toward mapping gridded drought indices to evaluate local drought in a rapidly changing global environment. *Water Resources Management*, 28(11):3859-3869.

Acharya, A. and J.H. Ryu, (2014). Simple method for streamflow disaggregation. *Journal of Hydrologic Engineering,* 19(3): 509-519.

Acharya, A., K. Lamb, and T.C. Piechota, (2013). Impacts of climate change on extreme precipitation events over Flamingo Tropicana watershed. *J. AWRA,* 49(2): 359-370.

10. The most recent professional development activities:

2 days ASCE training on "Culvert Design for Peak Flow and Aquatic Organism Passage" in Portland, OR, February 23-24, 2017.
Training on scheduling software program "Primavera P6 102", organized by Primavera Scheduling, Construction Science, LLC, January 5-8, 2016, Rocklin, CA.
Training Participant: "Managing Multiple Priorities and Projects", organized by National Seminars Training, May 18-19, 2015, Tulsa, OK.
Participant for "EPA/PC SWMM 2D Modeling" 3-day online training conducted by Computational Hydraulic Institute (CHI), Jan 26-30, 2015.
Training Participant: "Management Training for First Time Supervisors", organized by National Seminars Training, Nov 6-7, 2013, Wichita, KS.

1. **Name:** **Mohamed Ashour, Ph.D., P.E.**

2. **Education:**
   Ph.D. Civil (Geotechnical) Engineering, University of Nevada, Reno (1998)
   M.S. Civil Engineering, Mansoura University, Egypt, Egypt (1991)
   B.S. Civil Engineering, Mansoura University, Egypt (1986)

3. **Academic experience:**
   Associate Professor and Coordinator of Civil Engineering program, Department of Mechanical and Civil Engineering, Alabama A&M University (2017-Present)
   Professor and Head of Building & Construction Program, Department of Structural Engineering, Mansoura University, Egypt (2013-2016)
   Associate Professor, Department of Civil and Environmental Engineering, University of Alabama, Huntsville (2008-2013)
   Assistant Professor, Civil Engineering Department, West Virginia University, Institute of Technology (2005-2008)
   Research Assistant Professor, Department of Civil and Environmental Engineering, University of Nevada, Reno, (1999 - 2004)

4. **Non-academic experience:**
   Geotechnical Lab Manager, State of Nevada Central Geotechnical Lab, Carson City, Nevada (2004-2005)

   Consultant on several national and international projects (1999-present):
   Seismic Retrofit of the existing Dear Run Road Bridge, Carson City, Nevada
   Foundation Design of the New Dear Run Road Bridge, Carson City, Nevada
   Liquefaction analysis for soil at the Galena Bridge site, Washoe County, Nevada
   Short drilled shaft foundations of CSUS Parking Structures, California
   Sound Transit Rail Way project, Seattle, Washington
   Large diameter short shafts in liquefiable soils (Design Manual and Computer Program DFSAP) Washington State, Department of Transportation (WSDOT)
   Design of battered pile foundations of electric power towers, Crux Subsurface, Inc., Spokane, Washington.
   Design of pile foundations of Solar Power Facility, Montalto di Castro, Italy.

5. **Certification or professional registrations:**
   Registered Professional Engineer of the State of California

6. **Current membership in professional organizations:**
   American Society of Civil Engineers (ASCE)
   Deep Foundation Institute (DFI)
   The Geotechnical and Foundation Committee of the Egyptian Code

7. **Honors and awards:**
   Improving Strain Wedge Model Capabilities in Analyzing Large Diameter Drilled Shafts Subjected to Lateral Loading in Nevada Soils, Nevada Dept. of Transportation (NDOT), 2015-2017 ($184,800) (Co-PI)

   Landslides and Slopes Stabilized Using One Row of Piles, Deep Foundation Institute (DFI),

2012-2013. ($28,168) (PI)
Load and Resistance Factor Design (LRFD) for Deep Foundations with Reliability Analysis and Design Method Calibration, Alabama Department of Transportation (ALDOT), 2012-2013. ($197,355) (PI)
Pilot Project: Retaining Walls – Inventory and Inspection, Alabama Department of Transportation (ALDOT), 2011-2012. ($143,915) (Co-PI)
Upgrade of Axially Loaded Pile-Soil Modeling with the Implementation of the LRFD Design Procedure, Alabama Department of Transportation (ALDOT), 2009-2011. ($106,658) (PI)

8. Service activities (within and outside of the institution):

Interim Coordinator of the Civil Engineering Program
Member of Promotion and Tenure Committee
Reviewer for a number of top geotechnical engineering journals (ASCE Geotechnical Journal, ASCE Bridge Engineering Journal, Journal of Computers and Geotechnics, Journal of Soils and Foundations, --------

9. The most important publications of past five years:

Ashour, M., and Helal, A. (2017) "Pre-Liquefaction and Post-Liquefaction Responses of AxiallyLoaded Piles in Sands." International Journal of Geomechanics, **ASCE**, Vol. 17, No. 9, ISSN 1532-3641.
Ibrahiem, A., Ashour, M., and El-Tahrany, A. (2017) "Pile Response under Axial Tension Forces in Sandy Soils." Journal of Bridge Engineering, **ASCE**, Journal of Bridge, Vol. 22, No. 11, SSN 1084-0702.
Ashour, M., and Helal, A. (2014) "Contribution of Vertical Skin Friction to the Lateral Resistance of Large Diameter Shafts" Journal of Bridge Engineering, ASCE, Vol. 19, No. 2, pp. 289–302. .
Ashour, M., and Ardalan, H. (2012). "P-y Curve and Lateral Response of Piles in Fully Liquefied Sands." Canadian Geotechnical Journal, Vol. 49, pp. 633-650.
Ashour, M., and Ardalan, H. (2012) "Analysis of Pile Stabilized Slopes Based on Soil-Pile interaction." Journal of Computers and Geotechnics, ELSEVIER, Vol. 39, No. 1, pp. 85-97.
Ashour, M., and Ardalan, H. (2011) "Piles in Fully Liquefied Soils with Lateral Spread." Journal of Computers and Geotechnics, ELSEVIER, Vol. 38, No. 5, pp. 821-833.
Ashour, M., and Ardalan, H. (2011) "The Employment of the P-multiplier in Pile Group Analysis." Journal of Bridge Engineering, **ASCE,** Vol. 16, No. 5, pp. 612-623.

10. The most recent professional development activities:

Development of the large dimeter shaft design computer code "SWM6.2C" for the Nevada Department of Transportation (NDOT) (May-2018).
Full-day Seminar and Training session on the design of large dimeter shafts in caliche materials, Nevada Department of Transportation (NDOT).
Ashour, M., Singh, J. P., and AlaaEldin, A. (2018). "Behavior of battered piles under lateral loads in sandy soils." Deep Foundation Institute (DFI) 43rd Annual Conference on Deep Foundations, October 24 – 27, 2018, Anaheim, CA.
Ashour, M., Sing, J. P., and Abbas, A. (2018). "Load transfer curve of piles in sands under uplift forces." Deep Foundation Institute (DFI) 43rd Annual Conference on Deep Foundations, October 24 – 27, 2018, Anaheim, CA.
The author of the Vibro-Compaction chapter in the (2017) Soil and Foundations Egyptian Code.

Appendix C – Equipment

Soils/Environmental Laboratory (AJBH 145)
The Soils/Environmental Laboratory is located in room AJBH 145. The Soils laboratory is used to determine soil characterization, gradation, density, specific gravity, permeability, soil bearing capability, strength, etc. The laboratory contains Sieve sets with Shaking Machine, Atterburg Limit Tester, Hydrometers, Pyrometers, Direct Shear Tester, Unconfined Compression Tester, Consolidation Tester, Conventional Tri-axial System, Proctor Density Compactor, Permeability Testing Machine, Soil Sampling Kit, Electric Balance, and Ovens.

The Environmental Laboratory consists of a Water Analysis Kit (including portable P-H Meter, TDS meter, Hardness Test Kit), Flocculator Jar Test Apparatus, Colorimeter Kit (Chlorine Test), Spectro Photometer, and Sludge Treatment Kit (Old model for Dissolved Oxygen and Settleable Matter). One Water Quality Sonde is also housed in the same lab so that students could see the updated techniques of water quality sampling and measurement in the field.is under development.

Fluid Mechanics and Hydraulics Laboratory (AJBH 149)
The Fluids/Hydraulics Laboratory is located in room AJBH 149. It contains two Hydraulic Bench, Tilting Flume, Center of Pressure Apparatus, Venturi Apparatus, Bernoulli Apparatus, Jet Apparatus, Reynolds Apparatus, Pipe Fluid Flow System, Current Meter, Cavitation Demonstration Apparatus, Orifice Flow, Gas Law Apparatus, Magdeburg Plates and Stability Apparatus. It also contains Precision Scales, Thermometers, Viscometers, Hydrometers, and additional equipment accessories to determine basic fluid properties including density and/or specific gravity.

Concrete Laboratory (AJBH 154)
The Concrete Laboratory is located in room AJBH 154. The equipment consists of one Concrete Compression testing Machines, two small Concrete Mixing Machine, one Buoyancy Balance (including Lifting Frame, Plastic tank, Electronic Balance), Concrete Test Hammer, Unit Weight Measures (Capacity-1/10 CU. FT., 1/3 CU. FT.) and Cantilever Beam Deflection set.

Structures Laboratory (AJBH 158)
The Structures Laboratory is located in room AJBH 158. The equipment consists of a high capacity loading frame with an actuator (280 kips), a smaller loading frame (80 kips) and a teaching load frame for testing small beams and trusses to determine load versus deflection. The large Load Frames are used for instructional and research purposes. The Load Frames have sophisticated Data Acquisition Systems capable of acquiring in real time Load Cell, Strain Gage, and Linear Variable Differential Transformer (LVDT) data.

Additionally, two Universal Testing Machines that belong to the Mechanical Engineering, and Technology Programs are also available for teaching and research purpose.

Surveying Laboratory (Outdoor Use)
Laboratory for surveying takes place outdoors. The storage for surveying equipment is located room AJBH 150. It contains state-of-the-art equipment consisting of a GPS system and three Total Stations in addition to conventional transits, chains, plumb bobs, and Dumpy levels.

Transportation Laboratory (AJBH 166)

The Transportation Laboratory is located in room AJBH 166. The laboratory is fully equipped with the state-of-the-art testing facilities to perform Superpave mix design and standard transportation material testing. It has been developed with the funding obtained from National Science Foundation and State of Alabama. The laboratory is equipped to perform tests according to AASHTO (American Association of State Highway and Transportation Officials) specifications. The current facilities include asphalt binder testing, asphalt mix design, asphalt mix performance testing, and aggregate testing. In addition, standard laboratory infrastructure including large convection and small electrical ovens, temperature measurement facilities etc. are available. Special equipment for non-destructive testing of pavements using Portable Seismic Pavement Analyzer is also available. Currently, the laboratory is being used in the following courses: CE 310 Transportation Systems and Materials, CE 410/510 Transportation Engineering and Design, CE 415/515 Transportation Material Characterization and Design, and EGC 207L Strength of Materials Laboratory.

equipment for the laboratory. The laboratory is equipped to perform tests according to AASHTO (American Association of State Highway and Transportation Officials) specifications. The current facilities include asphalt binder testing, asphalt mix design, asphalt mix performance testing, and aggregate testing. In addition, standard laboratory infrastructure including large convection and small electrical ovens, temperature measurement facilities etc are available. Special equipment for non-destructive testing of pavements using surface waves is also available. Currently, the laboratory is being used in the following courses: CE 310 Transportation Systems and Materials, CE 410/510 Transportation Engineering and Design, CE 415/510 Transportation Material Characterization and Design, and EGC 207L Strength of Materials Laboratory.

Appendix D – Institutional Summary

1. The Institution

a. Name and address:

Alabama A&M University
P. O. Box 1357
4900 Meridian Street
Normal, AL 35762

b. Name and title of the chief executive officer: Dr. Andrew Hugine, Jr.
President, Alabama A&M University

c. Name and title of the person submitting the self-study report: Dr. Chance M. Glenn, Dean
College of Engineering, Technology, and Physical Sciences

d. Alabama Agricultural and Mechanical University, AAMU, is accredited by the Southern Association of Colleges and Schools' Commission (SACS) on Colleges to award baccalaureate, master's, educational specialist, and doctoral degrees. AAMU became fully accredited by the Southern Association of Colleges and Schools in 1963. The last accreditation was 2004 and the next evaluation is scheduled to occur in 2014. Contact the commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call (404) 679-4500 for questions about the accreditation of AAMU.

2. Type of Control

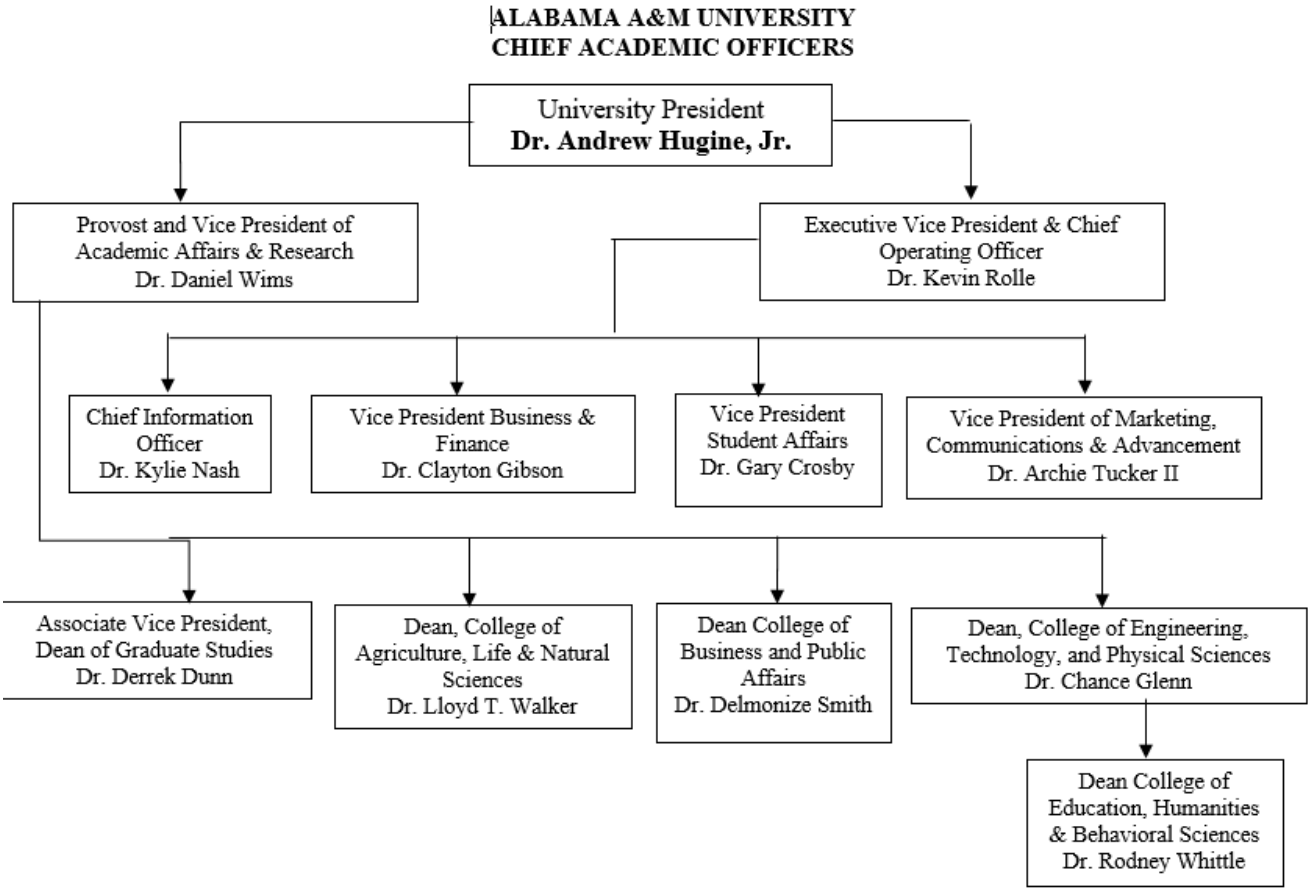
The Alabama Agricultural and Mechanical University is a land-grant university. Its support comes from the state of Alabama and federal funds appropriated to assist in carrying on work stipulated by the Morrill Acts of 1862 and 1890. The University is under the control of a board of trustees appointed by the governor of the State who serves as ex-officio chairman.

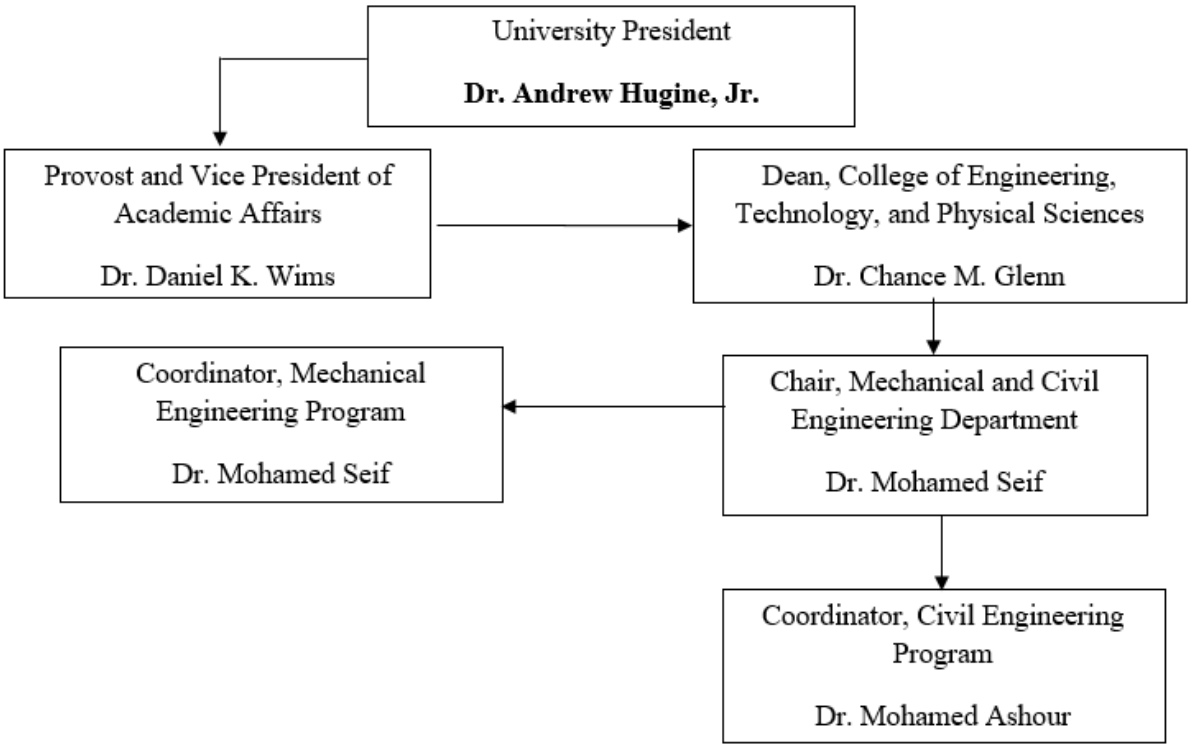
3. Educational Unit

The program is located within the Department of Mechanical and Civil Engineering, a unit of the College of Engineering, Technology, and Physical Sciences. The department currently offers degree programs in Mechanical Engineering, and Civil Engineering. The university re- organized in the Fall 2011by merging and re-aligning several departments, schools and programs. This resulted in merging of the Civil and Mechanical Engineering departments and eliminating one Chair position. The

combined department is named "Mechanical and Civil Engineering Department." Dr. Mohamed Seif is the Chair of the Mechanical and Civil Engineering program and Dr. Mohamed Ashour is the Co-ordinator of the Civil Engineering program.

Day-to-day administration of the program is done by the coordinator of the program whose primary responsibilities are to serve as the ABET program director, to be the interface between the faculty and the chair of the Mechanical and Civil Engineering Department, and to do course scheduling. The civil engineering program is part of the Mechanical and Civil Engineering Department, overseen by the department chair. The department chair reports to the dean of the College of Engineering, Technology, and Physical Sciences who reports to the Provost and Vice President for Academic Affairs, who reports to the President of the University.




University President
Dr. Andrew Hugine, Jr.
Provost and Vice President of Academic Affairs
Dr. Daniel K. Wims
Dean, College of Engineering, Technology, and Physical Sciences
Dr. Chance M. Glenn
Coordinator, Mechanical Engineering Program
Dr. Mohamed Seif
Chair, Mechanical and Civil Engineering Department
Dr. Mohamed Seif
Coordinator, Civil Engineering Program
Dr. Mohamed Ashour

4. Academic Support Units

- Required courses in chemistry, mathematics, and physics are the responsibility of Dr. Chance Glenn, Dean of the College of College of Engineering, Technology, and Physical Sciences.

- General education component are the responsibility of Dr. Rodney Whittle, Dean of the College of Education, Humanities, and Behavioral Sciences.

- Courses in macroeconomics and microeconomics are acceptable options as a partial fulfillment of the general education component, and these are the responsibility of Dr. Delmonize Smith**,** Dean of the College of Business & Public Affairs.

5. Non-academic Support Units

a. Library services: Annie Payton, Ph.D., MLS,
b. Information Technology Services: Dr. Kylie Nash
   Interim, Chief Information Officer
c. Career Development Services: Yvette S. Clayton, Director
d. Office of Retention & Academic Support (ORAS): Leatha M. Bennett, Ph.D.,
   Director

6. Credit Unit

One semester credit represents one class hour or three laboratory hours per week. Each standard semester is fifteen weeks long followed by one week of final examinations.

7. Tables

Shown below in Table D-1 is program enrollment and degree data. Personnel head count data are presented in Table D-2.

Table D-1. Program Enrollment and Degree Data

Civil Engineering - Alabama A&M University

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current Year	2017	FT	51	29	18	12	0	110			5		
		PT											
1	2016	FT	54	31	12	15	0	112			6		
		PT											
2	2015	FT	45	25	12	18		100			11		
		PT											
3	2014	FT	38	14	11	24	0	87			14		
		PT											
4	2013	FT	35	13	11	32		91			20		
		PT											

FT--full time
PT--part time

Table D-2.
Personnel

Civil Engineering - Alabama A&M University

Year: _2017-2018

	HEAD COUNT		FTE
	FT	PT	
Administrative	0.25		0.25
Faculty (tenure-track)	1.75		1.75
Other Faculty (excluding student Assistants)	2.5		2.5
Student Teaching Assistants		2	1
Student Research Assistants			
Technicians/Specialists			
Office/Clerical Employees	1		1
Others			

E.1 Prerequisite Verification Form

PREREQUISITE VERIFICATION FORM
Department of Mechanical and Civil Engineering

Course Number & Title: **EGC 207** Strength of Materials Term: Spring 2018
Instructor: **M. Ashour**

Attention Students:
Please verify your name, student number, and major. Place a ***check mark*** in the spaces under the required prerequisite courses that you have passed. Note that you must withdraw from this class if you have not passed the prerequisite courses as shown in the table.

S.N.	**Student Name (E-mail Address)**	**Student #** (Phone #)	**Signature**	**Pre-requisite (MTH 126)**	**Co-requisite (EGC 104, EGC 207L)**
1					
2					
3					
4					
5					
6					
7					

E.2 Efforts to Improve FE Passing Rate –Minutes of Advisory Board Meeting

Advisory Board Meeting
Department of Civil Engineering
College of Engineering, Technology & Physical Sciences
Alabama A&M University

November 17, 2017

MINUTES

1. The meeting began 8:30 a.m. with the following members present:

A. Acharya, AAMU	A. Elsayed, AAMU
M. Ashour, AAMU	James Foreman, Retired
L. Balay, AAMU	A. Hall, City of Birmingham
S. Bhattacharjee, AAMU	M. Seif, AAMU
P. Saha - Retired	G. Liaw, Retired
K. Albritton, Student	D. Leonard, Alumni
C. Walters, Alumni	

2. Dr. Ashour introduced himself and thanked the Board for their assistance with ABET visit next year. Mr. Walters will need to check if he can commit as the chair.

3. Minutes of the last meeting held in on 4/27/2017 approved.

4. See attached total number of freshmen registered for Civil Engineering Program from 2012 – 2017. It shows retention percentage, students changing their major, or stopped attending AAMU over this period of time. For Fall 2017, 63 registered for CE 101, 17 stopped attending AAMU, 5 changed their major, 32 students continued on with CE major, and retention was 59.3%. There were 39 students were enrolled in CE 101 for Fall 2017.

   It was suggested that changes can be made to retain students by considering Freshmen, Sophomore, Junior, and Senior, where each class has their own issues to address. For example, hold weekend courses and then take a survey of students to discover what their academic needs are to enhance our program.

   Statics course may be difficult for students making them to drop engineering completely and change their major.

   We need accurate data from the Registrar telling us which students were accepted but then never attended AAMU and went to another university. We have few students on the roster who never attended our CE 101 course. There are real reasons why students don't remain in school, such as, economic and personal issues, as well as, when students have academic issues with math they may change their major.

5. Recruitment from high school will be beneficial for our program. Dr. Ashour sent out flyers to students who have admission to AAMU asking students to come CE office. There hasn't been any response from them. We have Mr. Vines going to high schools along with AAMU admissions representing Engineering to recruit. It was suggested that Ramsey and Carver Technology High schools in Birmingham be contacted and any other STEM High Schools. We can contact the counselors or Principals in the high schools who may be AAMU alumni to give information on engineering.

   Dr. Liaw noted that we had Chinese students attend in the past and that will be a good resource.

   Mr. M. Moran thought of dual enrollment with high schools, such as, AP Math but the Introduction to Engineering course will not work.

6. Dr. Saha suggested social media such as Twitter or Facebook to advertise our program. We could post photos or brief video of alumni speaking about their career.

7. FE Review – It is noted that the FE passing rate is low and need to be increased. The students are not attending the current review and not taking the FE exam on time. Therefore a mandatory FE review is proposed. The Advisory Board overwhelmingly approves the idea of mandatory FE review. Under this policy, the FE review should be mandatory for the students. A zero credit hour FE review course will be provided by the Civil Engineering faculty members to the students in every semester which will review the FE topics. Each faculty will teach according to his/her area of expertise. The Civil Engineering curriculum will be changed to include the policy of mandatory attendance in the FE review course. The Advisory Board want to make sure that the changes in the curriculum are implemented before the ABET visit. The application for the change of curriculum will be presented to the next University Academic Standards Committee meeting, possibly in January 2018.

   It was noted that the registrar doesn't accept zero credit courses at the university. Also, Dr. Ashour stated students can take the FE exam during senior year and as an incentive the department can refund the registration fee if they pass the first time. They should take FE immediately upon graduating.

8. ASCE President K. Albritton talked about attending ASCE Regional Conference in Gainesville, Florida. They will participate in the Mystery Competition, and the Reinforce Concrete Rodeo needing three concrete cylinders and will need 2-4 students to join. Then there is Surveying and Transportation.

Also, there are 22 paid members and she will encourage the freshmen to join. There will be fun raising with raffle tickets. Will tour NASA with the UAH students and read with Martin Luther King Elementary school with reading.

Since she will graduate this semester a motivated President will be needed to take over her position.

9. ABET visit for 2018 – Collect data on how program interacts with industry. Should we move outcome from one course to another through the faculty discussion? Should we add a science course but can't increase credit hours over 130 credit hours. Then STAR requires Chemistry and Physics to transfer whether your degree requires it in your program. The STARS program are guidelines where courses are transferred from community colleges to universities in its section AREA IV. Is Hydrogeology more important than Biology? It was observed that we should leave it alone for now.

10. There will be no Senior Design Project presented because it is early for them. There were four students graduating and the Board will conduct exit interview.

11. The next advisory board meeting will be April 2018, and the Final ABET Report will be in June 2018.

12. The meeting was adjourned at 9:30 a.m.

E.3 Undergraduate Student Brochure

Pictured below is our Civil Engineering Alumnus, Claudinette Purifoy, who was awarded Distinguished Engineer of the Year, and is currently Project Manager at the U.S. Army Corps of Engineers.

Claudinette Purifoy
Project Manager
U.S. Army Corps of Engineers
Civil Engineering Alumnus
Society of Women Engineers

FACULTY and STAFF

Nesar Ahmed, Ph.D., P.E.
Professor

Mohamed Ashour, Ph.D., P.E.
Associate Professor, Coordinator

Sudip Bhattacharjee, Ph.D.
Associate Professor

Anil Acharya, Ph.D., P.E.
Assistant Professor

Ahmed Elsayed, M.S.
Instructor

Lisa Balay
Senior Secretary

CONTACT US

Phone: (256) 372-5577
Email: nesar.ahmed@aamu. edu
Visit:
http://www.aamu.edu/academics/engineering-technology/cme/ce/pages/default.aspx

STRUCTURAL ENGINEERING

Structural engineers design structures to support their own weight and to resist forces like hurricanes and earthquakes. They are involved in designing everything from houses, office buildings, skyscrapers, and bridges to stadiums, arenas, space platforms, and roller coasters.

GEOTECHNICAL ENGINEERING

Geotechnical engineers investigate, test and analyze the properties of soil and rock for projects ranging from dams and building foundations to the landfills and the ground below roads. Geotechnical engineering is required in all aspects of civil engineering because most projects are supported by the ground.

TRANSPORTATION ENGINEERING

Transportation engineers deal with the challenge of meeting increasing travel needs on the land, air and sea. They design, construct and maintain all types of transportation facilities, including highways, railroads, airfields, and ports. They also work to improve traffic control and mass transit by using new transportation methods, such as high-speed trains and people movers.

ENVIRONMENTAL and WATER RRESOURCES ENGINEERING

Environmental engineers care about the planet. They make our water safe to drink, purify our air, and clean up contaminated site. Water resources engineers are involved in design, construction and maintenance of hydroelectric power facilities, canals, dams, pipelines, pumping stations, locks and seaport facilities.

Civil Engineering

College of Engineering, Technology and Physical Sciences
Alabama A&M University

Accredited by ABET

Accreditation Board for Engineering and Technology, Inc.

OUR PROGRAM

Civil Engineering is the oldest of the traditional engineering professions. It is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, while providing aesthetically pleasing surroundings. A civil engineer plans, designs, constructs and maintains physical works and facilities that are deemed essential to modern life.

Alabama A&M University's Civil Engineering Program offers Civil Engineering major leading to the Bachelor of Science in Civil Engineering, and provides the basic and advanced elective courses in all of the following areas of Civil Engineering:

- ✓ Structural Engineering
- ✓ Geotechnical Engineering
- ✓ Transportation Engineering
- ✓ Environmental and Water Resources Engineering
- ✓ Construction Engineering

Edmund Pettus Bridge, Selma, Alabama

ABET Engineering Accreditation Commission

WHY ABET ACCREDITATION MATTERS

- ✓ ABET is a trusted standard for employers worldwide.
- ✓ Demonstrates commitment to quality education.
- ✓ Employers prefer graduates from ABET accredited programs.
- ✓ Prepares graduates to enter workforce through professional licensure, registration and certification.
- ✓ Salary $65 K - $130 K (median $82 K, source: US Bureau of Labor Statistics, https://www.bls.gov)
- ✓ Learn more about ABET: www.abet.org

MISSION

The Civil Engineering Program is committed to preparing its students for immediate entry into the engineering profession, as well as the graduate programs of study. The Program is also committed to research and development in order to place its faculty and students at the forefront of development in the profession of civil engineering at the state and national levels. The latest advances are brought into the classroom through continued research, thereby positioning the students on the cutting edge of the profession.

The program offers opportunities to students with previous limited access to education the training needed to make professional contributions to the civil engineering enterprise.

EDUCATIONAL OBJECTIVES

The **objective** of the Civil Engineering program is to produce graduates who,

1. Successfully practice civil engineering in industry and/or government,
2. Continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.), and
3. Recognize the need for scholarship, leadership, and services to society.

FACULTY & FACILITIES

The Program's faculty members have a broad range of experience in the academic and industrial environment. Each faculty has significant involvement in research or consultancy activities. The Department receives research grants from NASA, Army, Air Force, AMCOM, FHWA, ORNL, ALDOT, and other agencies.

The Program is housed in a modern Engineering Building and is continuously housing state-of-the-art laboratories and computing facilities, equipment, and other modern engineering tools to meet the requirements of the of the industry.

The program provides the following laboratories for teaching/research purposes:

- CAD/Microcomputer laboratory with cutting edge civil engineering design software packages
- Surveying
- Soil Mechanics (Geotechnical) and Environmental
- Concrete
- Structures
- Transportation/Material Testing
- Hydraulics

All of these laboratories provide undergraduate students an excellent opportunity to obtain a comprehensive learning experience in civil engineering. In addition, our small class sizes provide exceptional individualized learning opportunities for our students.

CAREER OPPORTUNITIES

What jobs are available for the civil engineering graduates? Many professional career opportunities in Transportation, Structural, Construction, Environmental, Geotechnical, Municipal, Industrial and Consulting Engineering, Architecture, Engineering Management, and Military Services are available for civil engineering graduates.

FINANCIAL AID AVAILABLE

Financial aid is available through scholarships, assistantships, and campus jobs, funded through federal, state, industrial endowment and research projects.

STUDENT ACTIVITIES

There are professional organizations available for CE students.

These organizations benefit the students through networking and by attending workshops and conferences, and national competitions.

E.4 Continuous Improvement of Civil Engineering Program

Continuous Improvement of the Civil Engineering Program
Alabama A&M University
Changes to CE 308

Office of Academic Affairs
Alabama A&M University

Modify Course Inventory/ Curricula Form Rev. 11/2014

Program: Civil Engineering (Name) | Mechanical and Civil Engineering (Department) | Engineering, Technology and Physical Sciences (College)

CURRENT

Course: CE (Subject) | 308 (Number) | 3 (Credit Hrs) | 3 (Contact Hrs) | Soil Mechanics (Title)

Soil Mechanics – 3 hrs. A study of origin, formation, classification, identification and subsurface exploration of soil. Physical and mechanical properties of soils, shear strength, consolidation, settlement, and bearing capacity are also covered. Prerequisites: EGC 207. Co-requisites: EGC 207L, CE 308L.

Course: Prerequisites: EGC 207 Co-requisites: EGC 207L, CE 308L (Pre-requisites) | C (Pass Grade) | SPRING (Frequency Offered) | 14.0802 (CIP Code) | ☐ yes (Cross-listed?) | (Course)

MODIFICATIONS REQUESTED **Effective Date:** 08/15/2015 **Bulletin/Catalog Yr:** 2015-16

☐ Addition to . . . ☐ Inventory ☐ Curriculum ☐ Deletion from . . . ☐ Inventory ☐ Curriculum

☑ Revision to course . . . ☐ Number ☐ Title ☐ Credit Hrs ☑ Contact Hrs ☑ Description ☑ Pre-reqs

☐ Active to Inactive ☐ Inactive to Active ☐ Other (explain in Rationale below)

PROPOSED

Course: CE (Subject) | 308 (Number) | 3 (Credit Hrs) | 4 (Contact Hrs) | Soil Mechanics (Title) (limited to 30 characters/spaces total)

Soil Mechanics – 3 hrs. A study of origin, formation, classification, identification and subsurface exploration of soil. Physical and mechanical properties of soils, shear strength, consolidation, settlement, and bearing capacity are also covered. Laboratory is included. Prerequisites: EGC 207. Co-requisites: EGC 207L

Course: Prerequisites: EGC 207. Co-requisites: EGC 207L (Pre-requisites) | C (Pass Grade) | SPRING (Frequency Offered) | 14.0802 (CIP Code) | ☐ yes (Cross-listed?) | (Course)

List as . . . ☐ GenEd ☑ Major ☐ Elecs ☐ Conc ☐ Minor ☐ Core ☐ Specialization

Rationale: (If special funding required, explain source. If equivalent/similar course in inventory, explain why needed and state equivalent course.)

The laboratory component has been included in the course. The contact hours have been increased to four (4) hours (2 hours lecture + 2 hours laboratory). Some of the topics covered in CE 308 Soil Mechanics are also covered in CE 408 Foundation Design. Therefore, no loss of theoretical content of CE 308 is expected because of the loss of one (1) lecture hour.

Department Committee — 1-26-15 (Date)

Department Chairperson — 01/26/2015 (Date)

College Committee — 01/26/2015 (Date)

College Dean — 1/27/15 (Date)

Dean, Graduate Studies — Date
*** Required for graduate programs ***

Approved: ☑ yes ☐ no — Graduate Council — Date

Provost & Vice President, Academic Affairs — Date
*** Required for undergraduate programs ***

Approved: ☐ yes ☐ no — Academic Standards & Curriculum Committee — Date

Continuous Improvement of the Civil Engineering Program
Alabama A&M University
Removal of CE 308L

Office of Academic Affairs
Alabama A&M University

Modify Course Inventory/ Curricula Form

Rev. 11/2014

Program: Civil Engineering (Name) | Mechanical and Civil Engineering (Department) | Engineering, Technology and Physical Sciences (College)

CURRENT

Course: CE | 308L | 1 | 3 | Soil Mechanics Laboratory
(Subject | Number | Credit Hrs | Contact Hrs | Title)

Soil Mechanics Lab. – 1 hr. The purpose of this course is to present a selection of experiments that will demonstrate the principles of Soil Mechanics. A Laboratory Manual for this course will be used for performing these experiments. Prerequisites: EGC 207. Co-requisites: CE 308.

Course: Prerequisites: EGC 207. Co-requisites: CE 308 (Pre-requisites) | C (Pass Grade) | SPRING (Frequency Offered) | 14.0802 (CIP Code) | ☐ yes (Cross-listed?) | ____ (Course)

MODIFICATIONS REQUESTED **Effective Date:** 08/15/2015 **Bulletin/Catalog Yr:** 2015-16

☐ **Addition to . . .** ☐ **Inventory** ☐ **Curriculum** ☑ **Deletion from . . .** ☐ **Inventory** ☑ **Curriculum**

☐ **Revision to course . . .** ☐ **Number** ☐ **Title** ☐ **Credit Hrs** ☐ **Contact Hrs** ☐ **Description** ☐ **Pre-reqs**

☐ **Active to Inactive** ☐ **Inactive to Active** ☐ **Other** (explain in Rationale below)

PROPOSED

Course: | | | | | (Subject | Number | Credit Hrs | Contact Hrs | Title (limited to 30 characters/spaces total))

Course: (Pre-requisites) | (Pass Grade) | (Frequency Offered) | (CIP Code) | ☐ yes (Cross-listed?) | (Course)

List as . . . ☐ **GenEd** ☐ **Major** ☐ **Elecs** ☐ **Conc** ☐ **Minor** ☐ **Core** ☐ **Specialization**

Rationale: (If special funding required, explain source. If equivalent/similar course in inventory, explain why needed and state equivalent course.)

Experiments performed in the soil mechanics laboratory can be included in CE 308 Soil Mechanics course. CE 308 Soil Mechanics course outline has been updated to include the laboratory.

Department Committee — 1-26-15 (Date)
Department Chairperson — 01/26/2015 (Date)
College Committee — 01/26/2015 (Date)
College Dean — 1/27/15 (Date)
Dean, Graduate Studies — Date
*** Required for graduate programs ***
Approved: ☐ yes ☐ no — Graduate Council — Date
Provost & Vice President, Academic Affairs — Date
*** Required for undergraduate programs ***
Approved: ☐ yes ☐ no — Academic Standards & Curriculum Committee — Date

Change Prerequisite for EGC 305

Topic	Modify the pre-requisite for EGC 305 Fluid Mechanics to be EGC 206 (Dynamics) and MTH 238 (Differential Equations) by removing MTH227 (Calculus III).
Rationale	Fluid Mechanics (EGC 205) is 3-credit hour-course with current pre-requisite EGC 206, MTH 238 and MTH227. The content of the removed prerequisite course (MTH 227) is not directly related to the course EGC 305 Fluid Mechanics. The removal of the prerequisite will improve students' progress through the curriculum and help them take higher level courses earlier and graduate on time. EGC 305 Fluid Mechanics- 3 credit hours with prerequisite
Initiated by	Dr. Mohamed Ashour
Initiation Date	Spring 2018
Action Taken	The Civil Engineering faculty decided to remove MTH 227 (Calculus III) as pre-requisite for EGC 305.
Recommendation	Effective Fall 2018, the new pre-requisite will be applied. The revised catalogue description will be included in the next catalogue.
Approved by	CE Departmental Curriculum Committee.
Approval Date	Spring 2018
Attachments	

Continuous Improvement of the Civil Engineering Program
Alabama A&M University

New FE Course CE 440

Topic	Add new zero-credit hour course CE 440 (Fundamentals of Engineering)
Rationale	The course provides a review on the fundamentals of civil engineering as presented in the FE exam. The objective of this course is to improve the FE exam passing rate of the CE students. The course enhances the student ability to practice and solve basic problems on statistics, statics, dynamics, materials, transportation, hydraulics, soil mechanics and foundations, structural analysis and reinforced concrete.
Initiated by	Dr. Mohamed Ashour
Initiation Date	Spring 2018
Action Taken	The Civil Engineering faculty decided that the one-hour class (CE 440) will be offered once a week in the fall and spring semesters. The CE faculty members will participate in teaching the course topics based on their specialties. Attending the course is mandatory to graduate. The class grade is Pass/Fail.
Recommendation	Effective Fall 2018 the course is offered. The revised catalogue description will be included in the next catalogue.
Approved by	CE Departmental Curriculum Committee.
Approval Date	Spring 2018
Attachments	

Continuous Improvement of the Civil Engineering Program
Alabama A&M University
New Elective Geotechnical Course CE 473

Topic	Add new elective geotechnical course (CE 473) of 3 credit hours
Rationale	The course provides the student with an introduction to the principles of geotechnical analysis and design of axially/laterally loaded piles, lateral earth pressures and applications in the design of retaining walls including cantilever, gravity and mechanically stabilized earth, and sheet piles. The course also includes methods of stability analyses for retaining walls, earth slopes and embankments. The CE curriculum needs an elective course in the area of geotechnical engineering. The course enhances the knowledge of the students on the design of some soil structures and related failures in the geotechnical engineering field.
Initiated by	Dr. Mohamed Ashour
Initiation Date	Spring 2018
Action Taken	The Civil Engineering faculty decided to add CE 473 as a 3-hour credit elective course in the CE curriculum.
Recommendation	The revised catalogue description will be included in the next catalogue**.**
Approved by	CE Departmental Curriculum Committee.
Approval Date	Spring 2018
Attachments	

E.5 Approval of

New Zero-Credit Hour Course – CE440
New 3-Credit Hour Elective Course – CE473
Modify Pre-requisite for EGC 305 and CE 306

Excerpt from the Minutes of AAMU Academic Standards and Curriculum Committee Meeting

Academic Standards and Curriculum Committee Meeting
April 12, 2018
Learning Resource Center (LRC), Multipurpose Room
Dr. Daniel Wims, Presiding

Present:

Dr. Paula Barnes
Dr. Satilmis Budak
Dr. Barbara Cady
Dr. Horace Carney
Dr. Derrick Davis
Dr. Tonya Davis
Dr. Tyesha Farmer
Dr. Chance Glenn
Dr. Kaveh Heidary
Dr. Berneece Herbert
Dr. Josh Herring
Dr. Jeanette Jones
Dr. Maurice Mangum
Dr. Larry McDaniel
Dr. Tonya Perry
Dr. Mohammad Robbani
Dr. Marius Schamschula
Dr. Mohamed Seif
Dr. Qian Shen
Dr. Del Smith
Dr. Cynthia Smith
LTC. Taurus Smith
Ms. Melody Tiemann
Dr. Martha Verghese
Dr. Lloyd Walker
Dr. Lena Walton
Dr. Rodney Whittle
Ms. Brenda Williams
Dr. Daniel Wims

I. Call to Order

The meeting was called to order by Dr. Daniel K. Wims, Provost and Vice President of Academic Affairs and Research at 2:10 p.m. in the Learning Resource Center Multipurpose Room.

II. Approval of the Agenda and Minutes

Dr. Wims called for a motion to approve the agenda. Hearing no additions, a motion was made by Dr. Larry McDaniel and seconded to approve the agenda as printed. The motion passed. Dr. Wims called for a motion to approve the February 8, 2018 Meeting Minutes. Hearing no additions or corrections a motion was made by Dr. Lloyd Walker and seconded to approve the February 8, 2018 Minutes as submitted. The motion passed.

b. **Request to Remove MTH 227 Calculus III as a prerequisite for EGC 305 Fluid Mechanics**

Presentation of Request: Dr. Mohamed Ashour

Rationale: The content of MTH 227 is not directly related to EGC 305 Fluid Mechanics. The change will help students' progress through the curriculum.

Motion: The request to Remove MTH 227 Calculus III as a prerequisite for EGC 305 Fluid Mechanics was approved by General Consent of the Committee

Action: Approved by Unanimous Vote of Aye

c. **Request to Remove MTH 238 Applied Differential Equations and EGC 101 Engineering Drawing and Graphics as prerequisites for CE 306 Structural Analysis**

Presentation of Request: Dr. Mohamed Ashour

Rationale: The content of MTH 238 Applied Differential Equations and EGC 101 Engineering Drawing and Graphics are not directly related to the course CE 306 Structural Analysis. This change will improve students' progress through the curriculum.

Motion: The request to Remove MTH 238 Applied Differential Equations and EGC 101 Engineering Drawing and Graphics as prerequisites for CE 306 Structural Analysis was approved by General Consent of the Committee

Action: Approved by Unanimous Vote of Aye

d. **Request to Add New Course CE 440 Fundamentals of Engineering to the Inventory**

Presentation of Request: Dr. Mohamed Ashour

Rationale: To improve the FE exam passing rate of the CE students. CE Faculty will participate in teaching the course based on their specialties.

Motion: Made by Dr. Marius Schamshula and seconded to approve the request to Add New Course CE 440 Fundamentals of Engineering to the Inventory

Action: Motion Approved

e. **Request to Add New Course CE 473 Earth Structures Engineering to the Inventory/Elective Block**

Presentation of Request:

Rationale: CE Curriculum lacks an elective course in the area of geotechnical engineering which is one of the CE program's four major disciplines.

Motion: Made by Dr. Marius Schamshula and seconded to approve the request to Add New Course CE 473 Earth Structures Engineering to the Inventory/Elective Block

Action: Motion Approved

E.6 Alumni Survey Forms – Spring 2018

Constituent Survey for Civil Engineering Program Objectives
Alumni

The Civil Engineering Department is continuously improving its program. As a constituent your input is essential for developing/modifying our program.
Please e-mail answers to mohamed.ashour@aamu.edu or fax to (256) 372-5909. Alternatively you can print this survey out and mail it to Dr. Mohamed Ashour, Civil Engineering Dept., Alabama A&M University, P.O. Box 367, Normal, AL 35762. We look forward to your response.

Name and Organization (Voluntary): _____

E-mail (Voluntary): _____

1. Produce graduates who successfully practice civil engineering in industry and/or government.
Should this be an objective? __Yes __No __Yes with modification(s) stated in (A) below
To what extent did the department fulfill this objective for its students/ graduates?
__High __Medium __Low __Not Observed

2. Produce graduates who continue to pursue lifelong learning through professional development or completion of advanced studies (graduate degree, short courses etc.)
Should this be an objective? __Yes __No __Yes with modification(s) stated in (A) below
To what extent did the department fulfill this objective for its students/ graduates?
__High __Medium __Low __Not Observed

3. Produce graduates who recognize the need for scholarship, leadership and service to society.
Should this be an objective? __Yes __No __Yes with modification(s) stated in (A) below
To what extent did the department fulfill this objective for its students/ graduates?
__High __Medium __Low __Not Observed

Please respond to the following questions as well:

A. What are your expectations from the program? Please provide any changes/modifications to the existing program objectives given above and add any new ones you would like to propose.

B. What relative priority do you hold? Please prioritize program objectives including any new ones you may want to propose.

C. How will you be satisfied? Please provide an assessment method you would like to use in determining how well your expectations have been achieved.

D. When will you be satisfied? Please provide a time frame within which you would like your expectations to be achieved.

E. Additional Comments/Suggestions:

E.7 Highlights of Exit Interview, Alumni and Student Survey

Highlights of Fall 2017 and Spring 2018 Comments

Strengths

- Good professors with professional experience
- Good class sizes
- The professors are willing to help, Faculty encouragement
- Applied design, Building projects, challenging work, excellent projects
- Labs hands-on, Labs and facility, Learning facilities, Drawing classes
- The job fair opportunities for students are excellent and the availability of computer labs
- Career opportunities; Nice learning environment.

Weakness

- Some courses could be rushed through with minimal understanding.
- Limited exposure to research opportunity.
- Not much help to obtain intern and co-op positions
- Little attention is given to improvement of written and oral communication skills
- Help to pass FE exam by offering a class on FE will be good idea
- Need improvement on helping the students to pursue graduate degrees and professional development.
- Limited time accessibility to computer lab after hours

Program Improvement

- More time and examples are given to Teach STADD PRO
- More association. Professor to student engagement
- Offering a new mandatory class on FE exam
- Continuous updates and improvement for laboratory equipment and tools
- More career resources.
- More resources and tutors
- More opportunities for mentorship
- Provide personalized information and recommendations on scholarships, internships, co-ops.
- Alabama A&M University - Civil Engineering Program

E.8 Senior Exit Survey form and Analysis - Fall 2017

Fall 2017
School of Engineering and Technology
Alabama A&M University
Graduating Senior Survey

Perceptions and Assessment of Education	Strongly	Agree	Neutral	Disagree	Strongly Disagree
The advice given me by the engineering faculty advisors was accurate and of high quality					
The computing and simulation tools I needed to get my work done were readily available in my department.					
Engineering faculty members encouraged students to study in group environments.					
Lab courses were beneficial in helping to understand concepts taught in the lectures					
Courses taken in my department required that I analyze and interpret data.					
I was taught to design a system, component or process to meet a specific need.					
I was taught to function on multi-disciplinary teams.					
Ethical social and global economic and environmental issues in engineering were discussed in my undergraduate courses					
My assignments required that I apply math, science and technology principles.					
My engineering assignments required that I solve realistic problems with multiple constraints.					
Oral and written communication skills were required in my courses.					
I made use of library and internet resources in solving problems.					
My instructors encouraged me to further my education beyond the undergraduate level.					
I plan to take the Fundamentals of Engineering examination.					
I plan to enhance my education by attending workshops and enrolling in graduate school.					
Engineering professors, department chairmen and the Dean's office were helpful in obtaining intern and co-op					
Overall, I feel that I have obtained a quality education here at the University.					
I would recommend AAMU to my family and friends.					

Post Graduate Employment	Yes	No
I have a post graduation job offer.		
The number of job offers I received allowed me to be both job and location selective.		
I am satisfied with the salary offered.		

Fall 2017
College of Engineering, Technology and Physical Sciences
Alabama A&M University
Graduating Senior Survey

Perceptions and Assessment of Education	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	% Attainment	SLO
The advice given me by the engineering faculty advisors was accurate and of high quality	2	2				100%	
The computing and simulation tools I needed to get my work done were readily available in my department.	1	2	1			75%	7
Engineering faculty members encouraged students to study in group environments.	3	1				100%	
Lab courses were beneficial in helping to understand concepts taught in the lectures	3	1				100%	
Courses taken in my department required that I analyze and interpret data.	3	1				100%	2
I was taught to design a system, component or process to meet a specific need.	3		1			75%	6
I was taught to function on multi-disciplinary teams.	1	3				100%	3
Ethical social and global economic and environmental issues in engineering were discussed in my undergraduate courses.	2		2			50%	4
My assignments required that I apply math, science and technology principles.	3	1				100%	1
My engineering assignments required that I solve realistic problems with multiple constraints.	3	1				100%	6
Oral and written communication skills were required in my courses.	3	1				100%	3
I made use of library and internet resources in solving problems.	4					100%	5
My instructors encouraged me to further my education beyond the undergraduate level	3	1				100%	5
I plan to take the Fundamentals of Engineering examination.	4					100%	5
I plan to enhance my education by attending workshops and enrolling in graduate school.	3	1				100%	5
Engineering professors, department chairmen and the Dean's office were helpful in obtaining intern and co-op positions and other technical employment.	2		1	1		50%	
Overall, I feel that I have obtained a quality education here at the University.	2	2				100%	
I would recommend AAMU to my family and friends.	3	1				100%	

Post Graduate Employment	Yes	No					
I have a post graduation job offer.	3	1	SLO-1	100%	SACS=>	SLO-1=1,6	94%
The number of job offers I received allowed me to be both job and location selective.	2	2	SLO-2	100%		SLO-2=2,3,7	92%
I am satisfied with the salary offered.	3	1	SLO-3	100%		SLO-3=4,5	75%
			SLO-4	50%			
			SLO-5	100%			
			SLO-6	88%			
			SLO-7	75%			

E.9 Exit Interview Questionnaire and Sample Exit Interview Report from CE Advisory Board-Fall 2017

November 17, 2017

Exit Interviews of the Four Civil Engineering Graduates

The Following CE Department Advisory Board Members conducted the interview on November 17, 2017:

Mike Moran
G. Liaw
D. Leonard

Learning Outcome: 2. Design and Conduct Experiment within Civil Engineering Domain and to Analyze and Interpret Data

Lab Classes include: EGC 101, EGC 104, EGC 207L, EGC 305L, CE 201 & CE 308L

- Should we change things at the Department to help acquire a better ability?
- What do we need to Change?

Overall Rating of 7.5 on a Scale 1 (Very Poor) to 10 (Excellent)

Suggest more "real life" experience and training

Significant improvement in lab equipment (very good) and lab materials availability

Learning Outcome: 3: Communicate with Multidisciplinary teams

- Should we modify curriculum to help you acquire a better ability?
- What do we need to change? Do you think a required Technical Writing course is necessary?

Overall Rating of 8 on a Scale 1 (Very Poor) to 10 (Excellent)

Request more time to work on design/application softwares
There is a general agreement on the need to improve the technical writing but without being a course requirement

Learning Outcome: 4. Consider contemporary issues and mutual and societal influence on the engineering solutions

- What are contemporary issues? (These are current events that affect the practice of engineering: e.g., environmental issues, social concerns, economics, politics, computing and information technology; etc.)
- Were you exposed to contemporary issues in any of your classes? Did seminars or field trips expose you to contemporary issues?

- What is the best way to help you acquire knowledge of contemporary issues?

Overall Rating of 6 on a Scale 1 (Very Poor) to 10 (Excellent)

Consensus was positive that the CE program did a good job in enhancing student communication and functioning abilities within multi discipline teams.

Requests to have more speakers from the industry with professional backgrounds. Suggestion to include multi disciplinary requirements into the existing CE course.

Learning Outcome: 5. Continue their education and professional development.

- What is life-long learning?
- Soon you will have a B.S. Some of you may be going to graduate school. So do you stop learning after you leave school?
- If necessary, explain engineering technology is constantly evolving. Always a good idea to stay abreast through continuing education (workshops, conferences, technical journals, etc.)
- Did curriculum shed light on the importance of life-long learning?

Overall Rating of 7.5 on a Scale 1 (Very Poor) to 10 (Excellent)

The graduates' observations included:

More and early attention given by the faculty on the importance of the FE exam

More focus on lab work and preparation

Limited number of summer internships are announced or facilitated by the Department of Civil Engineering.

There was not much emphasis to pursue graduate studies.

More participating in students' conferences (such as ASCE)

Learning Outcome: 6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.

- Which classes included discussions on this topic, and if so, which included assignments?

Senior design project class (CE470). Many disciplines in CE courses were compiled in the design project. **Overall Rating of 8 on a Scale 1 (Very Poor) to 10 (Excellent)**

- Describe the assignments.

The students had some information about the assignments. **Overall Rating of 5 on a Scale 1 (Very Poor) to 10 (Excellent)**

- Are you familiar with any code of ethics?
  The students were aware of the ASCE code of ethics. **Overall Rating of 6 on a Scale 1 (Very Poor) to 10 (Excellent)**

- Have you heard about the following professional practice issues:
  (a) procurement of work; **(No)**
  (b) bidding vs. quality based selection process
  (Yes) but without practice
  (c) how design and construction people interact to construct a project
  (Yes) and the students had the chance to be exposed to construction field work through a site visit or video presentation.
  (d) importance of licensure
  (Yes), the graduates were well familiar with the importance of passing the FE and obtaining the professional Engineer (PE) license. Graduates expressed that there was a lot of emphasis from the faculty on this subject.

E.10 Student Class Evaluation form

Competency Summary

Competency	Your Score	Standard Deviation	Min	Max
Instructor's Support of Student Learning	3.60	+/-0.52	2.00	4.00
Overall, I rate this as a good course.	3.60	+/-0.52	3.00	4.00
Instructor's Organization and Preparation	3.63	+/-0.59	2.00	4.00
Instructor's Communication Skills	3.65	+/-0.58	2.00	4.00
Total Score	3.62			

Instructor's Organization and Preparation

Frequency Distribution

	Response Count	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
The instructor's objectives for the course have been made clear.	10	6	4	0	0	3.60	0.52
The instructor began and ended class on time.	10	7	3	0	0	3.70	0.48
The instructor has current professional knowledge and abilities.	10	8	2	0	0	3.80	0.42
The instructor was well-prepared for each class.	10	6	3	1	0	3.50	0.71
The instructor exhibits professional dispositions at all times.	10	7	2	1	0	3.60	0.70
The instructor seemed to enjoy teaching.	10	7	2	1	0	3.60	0.70
The instructor engages in continuous professional development.	10	7	2	1	0	3.60	0.70

Instructor's Communication Skills

Frequency Distribution

	Response Count	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
The instructor made class polices, such as attendance, grading, behavior, etc., clear at the beginning of the semester.	10	7	2	1	0	3.60	0.70
The instructor presented the subject matter in a clear and organized manner.	10	7	2	1	0	3.60	0.70
The pace at which the instructor covered the subject matter was appropriate.	10	8	2	0	0	3.80	0.42
The instructor is a proficient and effective communicator.	10	6	4	0	0	3.60	0.52

Instructor's Support of Student Learning

Frequency Distribution

	Response Count	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
The instructor creates and maintains a positive and supportive learning environment.	10	6	3	1	0	3.50	0.71
The instructor effectively assesses the student learning.	10	7	3	0	0	3.70	0.48
The instructor returned tests and assignments within a reasonable amount of time.	10	6	4	0	0	3.60	0.52
The instructor effectively facilitates learning by all students.	10	7	3	0	0	3.70	0.48
The instructor was available for extra help.	10	4	6	0	0	3.40	0.52
The instructor seemed genuinely concerned with students' progress.	10	6	4	0	0	3.60	0.52
The instructor was open to students' viewpoints.	10	6	4	0	0	3.60	0.52
The instructor is available during office hours.	9	6	3	0	0	3.67	0.50

Rating scale questions, top and bottom ranks for Instructor Questions

Strengths		
1	The instructor has current professional knowledge and abilities.	3.80
2	The pace at which the instructor covered the subject matter was appropriate.	3.80
3	The instructor began and ended class on time.	3.70

Areas for Improvement		
1	The instructor was available for extra help.	3.40
2	The instructor was well-prepared for each class.	3.50
3	The instructor creates and maintains a positive and supportive learning environment.	3.50

E.11 CE Student Outcome Assessment Rubrics

Learning Outcome Rubric

Learning Outcome: 1. Formulate and solve engineering problems in practice by applying fundamental knowledge of mathematics, science and engineering

Assessment Semester: FALL 20__ SPRING 20__

	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
1a	**Identify necessary basic physical principles and/or theorems and use them to formulate problems as mathematical (or Experimental) problems.**	Most of the relevant principles and theorems identified are missing and problems formulated incorrectly	Sufficient relevant principles and theorems identified and problems formulated but 1-2 minor ones missing.	All relevant principles and theorems identified and problems formulated correctly	**70%**
1b	**Solve engineering problems applying the theorems of Mathematics (Calculus and Statistics) and using the principles of Science.**	No significant ability	Sufficient ability	Agile ability	**70%**
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**70%**
	AVERAGE SCORE **REQUIRED**	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	**AVERAGE**

Learning Outcome Rubric

Learning Outcome: 2. Design and Conduct Experiment Within Civil Engineering Domain and to Analyze and Interpret Data

Assessment Semester: FALL 20__ SPRING 20__

Sr. No.	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
2a	**Able to formulate and design an Experiment to obtain data in support of an engineering problem**	Some or no evidence of being able to formulate and design an Experiment	Able to formulate and design a successful Experiment	Formulate and design with all constraints involved which provides the intended outcome	70%
2b	**Knowledge of equipment, sensors and data acquisition methods**	Do not understand the principle; can use very limited way with the help of co-workers;	Can use the equipment safely within a group; understand the principles to some degree	Can use the equipment independently, safely and successfully according to the instructions	70%
2c	**Able to demonstrate the knowledge of data analysis including statistical error analysis and draw reasonable conclusions by interpreting data**	No statistical analysis was performed or an attempt was made to use statistical method; not clear ; all or some important conclusions are missing	Evidence of some statistical method used with supporting result and some conclusions are valid; some missing	The method is clearly stated and result is supported by data through step by step analysis; all conclusions are valid and Explain the results clearly	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

Learning Outcome Rubric

Learning Outcome: 3. Communicate with Multidisciplinary teams

Assessment Semester: FALL 20__ SPRING 20__

Sl. No	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
3a	**Individual – Contributes to team project, work**	Does not collect relevant information; no useful suggestions or ; tries to offer some ideas, but not well developed, and not clearly Expressed	Collect basic, useful information related to project; occasionally offers useful ideas	Collects and presents relevant information; offers well-developed and clearly Expressed ideas relevant to	70%
3b	**Individual – Takes responsibility and values other team Members**	Does not perform assigned tasks; misses meetings, needs many reminders; does not say anything constructive; relies on others to do work Often argue with teammates; doesn't let anyone else talk; occasional personal attacks and "put downs"; wants to have things done his way and does not listen to alternate approaches; Consistently unprofessional	Performs all assigned tasks; attends meetings regularly and usually participates effectively; generally reliable; Generally listen to others' points of view; uses appropriate and respectful language; makes effort to understand others' ideas; Generally professional	Performs all tasks effectively; attends all meetings and participate enthusiastically; very reliable; Always listen to others and their ideas; helps them develop their ideas while giving them full credit; always helps team reach a fair decision; Always professional	70%
3c	**Acknowledgement of sources**	Does not always acknowledge information source or assistance of others	Generally acknowledges information source or assistance of others	Always acknow-ledges and documents information source or assistance of	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

Learning Outcome Rubric

Learning Outcome: 4. Consider contemporary issues and mutual and societal influence on the engineering solutions

Sl. No.	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
4a	**Awareness of energy conservation, safety and environmental impact**	Most or some relevant principles and theorems identified but at least 1-2 important ones missing	Sufficient relevant principles and theorems identified but 1-2 minor ones missing	All relevant principles and theorems identified	70%
4b	**Awareness of business and engineering economics and global impact**	None or some ability	Sufficient ability	Agile ability	70%
4c	**Understands contemporary technical issues in the field related case studies**	None or some ability	Sufficient ability	Agile ability	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

Learning Outcome Rubric

Learning Outcome: 5. Continue their education and professional development.

Assessment Semester: FALL 20__ SPRING 20__

Sl. No.	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
5a	**Able to conduct literature search using library and Internet for assignments**	Little or Some knowledge of how to use library or Internet to conduct literature search for assignments.	Adequate knowledge of how to use library or Internet to conduct literature search for	Effective use of library or Internet to conduct literature search for assignments.	70%
5b	**Demonstrated professional membership and attendance at professional seminars, meetings, and field trips**	Attended none or few available professional activities.	Attended most of the available professional activities and gained knowledge from them.	Attended all available professional activities and gained knowledge from them.	70%
5c	**Understand the importance of professional licensing (FE & PE)**	Attended none or few FE review sessions.	Attended most of the FE review sessions.	Attended all FE review sessions and passed the FE Exam.	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

Learning Outcome Rubric

Learning Outcome: 6. Complete civil engineering design problems using realistic constraints while integrating professional standards and ethical responsibilities.

Assessment Semester: FALL 20__ SPRING 20__

Sr. No.	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
6a	**Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis**	Satisfactory solution obtained; alternatives were not considered; Analysis and conclusions contain several significant errors	Reasonable solution obtained; alternatives should have been developed and analyzed; Satisfactory analysis and conclusions	Best solution determined based on stated criteria and constraints; Appropriate analysis performed; correct conclusions made	70%
6b	**Alternative Designs**	Only one design presented or Serious deficiencies in Exploring and identifying alternative designs.	Alternative approaches identified to some degree	Final design achieved after review of reasonable alternatives.	70%
6c	**Demonstrates knowledge of professional code of ethics and acknowledges sources**	Some knowledge of ethics; does not always acknowledge information source or assistance of others	Sufficient knowledge of ethics; generally acknowledges information source or assistance of others	Comprehensive knowledge of ethics; Always acknowledges and documents information source or assistance of others	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

Learning Outcome Rubric

Learning Outcome: 7. Use any modern engineering tools necessary for engineering practice

Assessment Semester: FALL 20__ SPRING 20__

Sr. No.	Performance Criteria	Unacceptable (0-60%)	Acceptable (60%-84%)	Exceptional (85%-100%)	Level of Attainment as % Student
7a	**Able to write a computer program to solve engineering problem**	No significant or Some ability	Sufficient ability	Agile ability	70%
7b	**Able to use modern equipment to solve engineering problem through laboratory Experiment or field work**	No significant or Some ability	Sufficient ability	Agile ability	70%
7c	**Able to use computer software for engineering analysis, design, or Experimental work**	No significant or Some ability	Sufficient ability	Agile ability	70%
	OVERALL PERFORMANCE	**Unacceptable**	**Acceptable**	**Exceptional**	**AVERAGE**
	AVERAGE SCORE REQUIRED	**(0-60%)**	**(60%-84%)**	**(85%-100%)**	

E.12 Sample Course Assessment Data Sheet and Action Plan Form - Spring 2018

EGC 207L and CE 470

Course Outcome Assessment Result
EGC 207L Strength of Materials Lab
Spring 2018
Instructor: Dr. Anil Acharya

Student Name	2a Able to formulate and design an experiment to obtain data in support of an engineering problem	2b Knowledge of equipment, sensors, and data acquisition methods	7b Able to use modern equipment to solve engineering problem through laboratory experiment or field work	Student Average	Student Performance
Student 1	75	85	77	78.89	Acceptable
Student 2	68	80	72	73.06	Acceptable
Student 3	70	80	78	76.11	Acceptable
Student 4	0	65	0	21.67	Unacceptable
Student 5	73	80	82	78.06	Acceptable
Student 6	68	73	72	70.56	Acceptable
Student 7	83	83	82	82.50	Acceptable
Student 8	88	93	86	88.94	Exceptional
Student 9	89	90	90	89.50	Exceptional
Student 10	93	96	91	93.06	Exceptional
Student 11	70	75	70	71.67	Acceptable
Student 12	83	77	85	81.39	Acceptable
Student 13	75	68	68	70.56	Acceptable
Student 14	75	68	80	74.44	Acceptable
Student 15	80	67	65	70.56	Acceptable
Student 16	80	68	80	76.11	Acceptable
Student 17	80	68	77	75.00	Acceptable
Student 18	80	70	80	76.67	Acceptable
Student 19	93	92	92	91.94	Exceptional
Class Average	**74.66**	**77.82**	**75.00**	75.82	Acceptable
No. of Students	19				
No. of Students >= 60%	18				
% of Students >= 60%	95%				

Performance Scale:	< 60%	Unacceptable
	60% - 85%	Acceptable
	> 85%	Exceptional

CE Course Action Plans

Course: EGC 207L Strength of Materials Lab Instructor: Anil Acharya **Spring 2018**

Last semester offered: Spring 2017

Learning Outcomes	Performance Criterion	Actions Suggested end of last semester offered (Sp'17)	Actions Adopted for improvement in current semester (Sp'18)	**Results: Identify/Assess Improvement/ Deficiency**	**Actions Suggested end of current semester (Sp'18)**
2a	Able to formulate and design an experiment to obtain data in support of an engineering problem	Providing specific assignments to assess this outcome, discuss practical problems of design, and present some of the educational videos.	As Suggested	Score (75%) Acceptable	Continue assigning a student designed experiment in addition to lab design examples.
2b	Knowledge of equipment, sensors, and data acquisition method	Give written & verbal quizzes	No quizzes given. Additional student design experiment and references were provided.	Score (78%) Acceptable	Continue adding more equipment's in the lab and design additional experiments. Provide additional references related to the experiments.
7b	Able to use modern equipment to solve engineering problem through laboratory experiment or field work.	Give specific assignments on use of the equipment for solving a given problem in class	Experiments that utilizes modern equipment's were conducted in the lab. Student designed experiment was also assigned.	Score (75%) Acceptable	Continue adding more equipment's and design relevant laboratory experiments. Continue providing student designed experiment so that they can explore additional information /equipment to solve the engineering problem.

Course Outcome Assessment Result
CE 470 Civil Engineering Design
Spring 2018
Instructor: Dr. Nesar U. Ahmed, P.E.

3a	3b	3c	4a	4b	4c	5a	5b	5c
Individual – Contributes to team project, work	Individual – Takes Responsibility and Value other Team members	Acknowledgement of sources	Awareness of energy conservation, safety and environmental impact	Awareness of business and engineering economics and global impact	Understands contemporary technical issues in the field related case studies	Able to conduct literature search using library and Internet for assignments	Demonstrated professional membership and attendance at professional membership, seminars, meetings, and field trips	Understand the importance of professional licensing (FE & PE)
80	85	80	80	80	80	85	80	80
70	75	75	70	70	70	75	75	70
70	70	70	75	70	70	75	75	70
73.33	**76.67**	**75.00**	**75.00**	**73.33**	**73.33**	**78.33**	**76.67**	**73.33**
3								
3								
100%								
<60%	Unacceptable							
60%-85%	Acceptable							
>85%	Exceptional							

6a	6b	6c	7c	Student Average	Student Performance
Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical	Alternative Designs	Demonstrates knowledge of profes-sional code of ethics and acknowledges sources	Able to use computer software for engineering analysis, design, or Experimental work		
80	75	80	80	80.38	Acceptable
75	75	75	70	72.69	Acceptable
70	75	70	70	71.54	Acceptable
75.00	**75.00**	**75.00**	**73.33**	74.87	Acceptable

CE Course Action Plan

Course: CE 470 Civil Engineering Design Project **Instructor: Dr. Nesar Ahmed** **Spring 2018**

Last semester offered: Fall 2017

	Performance Criterion	**Actions Suggested end of last semester offered (Fall 17)**	**Actions Adopted for improvement in current semester (Sp'18)**	**Results: Identify/Assess Improvement/ Deficiency**	**Actions Suggested end of current semester (Sp'18)**
3 a.	Individual - Contribution to team project, work	Continue documenting individual contributions; enforce group discussions in class	Team Leader selected, and team leader motivated others to work together as a team.	Score = 73% (Acceptable).	Continue selecting Team Leader.
3 b.	Individual - Takes responsibility	Continue documenting individual responsibilities; assign group leader if necessary; strictly enforce class participation	Team Leader selected, and team leader distribute the individual assignments.	Score = 77% (Acceptable).	Continue selecting Team Leader, and he or she will distribute individual assignment.
3 c	Acknowledgement of resources	Ask them to strictly follow ASCE reference format	As suggested	Score = 75% (Acceptable).	Need to acknowledge all resources they used in the design project and in standard format.

4 b	Awareness of business and engineering economics	Discuss LCCA in class	As suggested Cost analysis of the design project	Score = 73% (Acceptable).	Alternate cost analysis needs to be incorporated and also recovery life needs to be added.
5 a	Able to conduct literature search using library and Internet for assignments	Show them how to use relevant database using keywords, e.g. ASCE and transportation database	Students acknowledge of the resources in their report and presentation.	Score = 78% (Acceptable).	More Internet search/Library search research suggested
5 b	Demonstrated professional membership and attendance at professional seminars, meetings, and field trips	Continue encouraging them to be an active member of ASCE and attend local chapter meetings; bring a speaker from outside to discuss on PE license	As suggested	Score = 77% (Acceptable).	More Student participation in the ASCE student Chapter, and regional competitions, attend ASCE local chapters monthly meetings, are encourages.
5 c	Understand the importance of professional licensing (FE & PE)	Continue encourage them to attend FE review sessions and take FE exam	As suggested	Score = 73% (Acceptable).	Student were encourage to attend FE review sessions.
6 a	Ability to select design solution based on project needs, technical and economic criteria and considering relevant constraints and perform necessary technical analysis	Need to show appropriate analysis, selection of appropriate criteria, and design constrains based on project assignment	As suggested	Score = 75% (Acceptable).	Need appropriate analysis, selection of appropriate criteria, and design constraint based on the project assignment.

6 b	Alternative Designs	Continue with alternative design approach	As suggested	Score = 75% (Acceptable).	Continue with alternate design approach.
6 c	Demonstrates knowledge of professional code of ethics	More on professional code of ethics needs to be discussed	Professional code of ethics will be discussed in the design course.	Score = 75% (Acceptable).	More professional code of ethics needs to be discussed

E.13 CE Equipment Request 2017-2018

Summarized List of Lab Equipment Requests for the Civil Engineering Program

Name of Equipment	Model	Vendor	No. of Items	Price	Course	REMARKS
Computers/Printers for LABS:						
Bentley Systems Software Academic	2 years	Bentley		$8,000.00	All courses	Renew licenses
MATLAB Software	1 year	The Mathworks, Inc.	35 Licenses	$1,225.00	EGC 104	Renew Licenses
E1Z74UT#ABA Smart Buy 600PD SFF I5-45703.2G 4GB Computer	HP	Technology Integration Group	1	$710.00		Upgrade computers
Licenses Acrobat Professional 11	Acrobat	Staples	5	$756.00		Renew Licenses
HP Desktop 400 G4Core I5 & Monitors (5 nos.)	HP	Technology Integration Group	5	$4,574.05		
Subtotal				**$15,265**		

Name of Equipment	Model	Vendor	No. of Items	Price	Course	REMARKS
Equipment for Concrete LAB:						
42-1000/02 Buoyancy Balance 8100G Kit		GILSON COMPANY, INC.	1	$2,752	EGC 207. 207L	
34-8105 Cradle Cylinder & Cube Specimens				$107		
35-1475 Concrete Text Hammer			1	$448		
34-2850 Unit Weight Mea., 1/10 CU Ft			1	$103		
34-2852 Unit Weight Mea., 1/3 CU Ft			1	$272		
Subtotal				**$3,682**		

Name of Equipment	Vendor	No. of Items	Price	Course	REMARKS
Equipment for Soil Lab:					
HM-891 2.5" Combination Permeameter	GILSON COMPANY INC	1	$490	CE 308/308L CE 408	Equipment update
SP-2 Universal Splitter, (36) 1/2" Chutes, 0.55		1	$535		
Vacuum Pump, 1/2-Hp, with Gauge, 110V/60Hz		1	$835		
Direct shear test setup HM-380R Direct/Residual Shear test, Dead WeightSet		1 1	$7400 $374		
Unconfined compression test setup Loader Frame, 10K lbf Cap., 110V/60Hz Two Channel Digital Readout Kit, 2/5000 lbf Rolling Cart Karol Warner Pro Loader Frames		1	$3,590 $1,900 $380		
Hydrometer Constant Temp. Bath, 120V/50-60Hz		1	$3,140		
Subtotal			**$18,644**		

Name of Equipment	Vendor	No. of Items	Price	Course	REMARKS
Equipment for Fluid Mechanics and Hydraulics Lab:					
Flocculation Jar Text Apparaturn 6 Spindle	Ajanta	6	$558	EGC 305 EGC 305L CE404	Build up lab
3-0025 Kydrometer Cylinder Salinity Kit	LaMotte Co.	1	$187		
Extech RPM40 Pocket Contact & Laser Photo Tachomet	TEquipment	1	$480		
Milwaukee MW102 PH & Temp. Meter	Southern Educational Systems	1	$169		
Global Water Flow Probe	Grainger	1	$900		New Experiment
H215 Reynolds Transitional Flow	Tecquipment	1	5,600		New Experiment
Aquamate 7000 VIS Spectrophoto	Fisher Scientific	1	$3,801		Replacement for older set in lab
Cannon BS/U-Tube-C Viscometer, 6 to 30 Centistokes	Amazon	1	$235		
Impact of a Jet Apparatus Additional Impact Plates	Southern Educational Systems	1	$2,751 $584		
Subtotal			**10,265**		
TOTAL			**47,856**		

Signature Attesting to Compliance

By signing below, I attest to the following:

That the Civil Engineering program has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual*.

Dr. Chance M. Glenn
Dean's Name

Signature **Date**