ABET
Self-Study Report

for the

Bachelor of Science of
Environmental Engineering Program

at

The University of Oklahoma

Norman, OK

July1, 2011

CONFIDENTIAL

Contents

List of Acronyms

AP - Advanced Placement
ASCE – American Society of Civil Engineers
CAB – Capstone Advisory Board
CEC - Carson Engineering Center
CSA - Center for Student Advancement
CEES - Civil Engineering and Environmental Science
CoE - College of Engineering
DN – Degree Navigator
EnvE – Environmental Engineering
EPF – Engineering Practice Facility
FE - Fundamentals of Engineering
IDP - Instructional Development Program
MPGE - Mewbourne School of Petroleum and Geological Engineering
OU – University of Oklahoma
PEOs - Program Educational Objectives
REU - Research Experience for Undergraduates
SRF - Salary Release Funds
SRI - Sponsored Research Incentive
TA - Teaching Assistant
TSRC - Technology and Software Review Committee
UC - University College
VC – Visiting Council
WSSC - Williams Student Services Center

BACKGROUND INFORMATION

A. Contact Information

Primary Pre-visit Contact Person Information for the Program:
Name: Dr. Robert C. Knox
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E-Mail Address: rknox@ou.edu

B. Program History

In 1902, the University of Oklahoma (OU) began providing introductory courses in Civil Engineering (CE). The School of Mines and the School of Applied Science were merged in 1909 and organized as the College of Engineering (CoE). Sanitary engineering courses began in civil engineering in 1907. Through time, the departmental scope and emphasis expanded, and in 1967 it officially became the School of Civil Engineering and Environmental Science (CEES).

As societal needs changed, the role of the civil engineer expanded to include environmental issues such as the quality and management of our air, soil and water resources. In 1986, CEES developed and undergraduate program in Environmental Engineering (EnvE). The EnvE program was first accredited in 1997. The last General Review was conducted in 2005.

Since the last General Review, the EnvE program has:

1) Developed and implemented a content-based assessment plan for quantitatively assessing Criterion 3 "a to k" Student Outcomes in each CEES course,

2) Revamped the content and course title for CEES 2313 – Water Quality Fundamentals; and
3) Increased the credit hours in the Introduction to CEES class from 1 to 2 (CEES 1112).

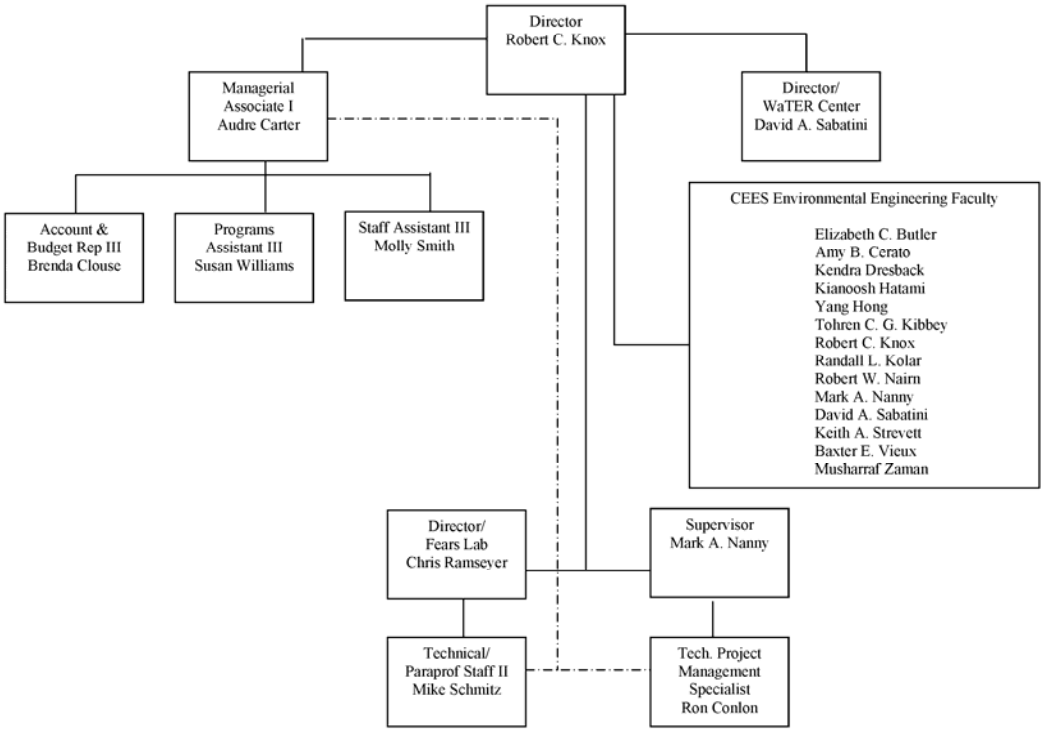
C. Options

CEES offers an Accelerated Dual Degree (BS-MS EnvE) option for qualified students.

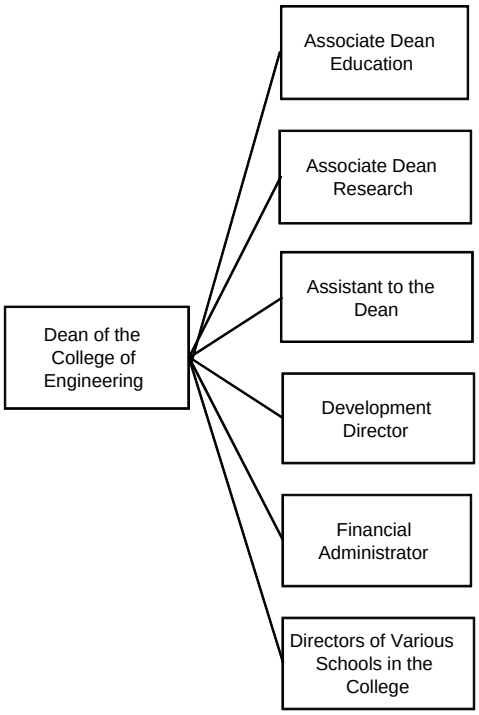
D. Organizational Structure

The organizational structure for the EnvE program is shown below.

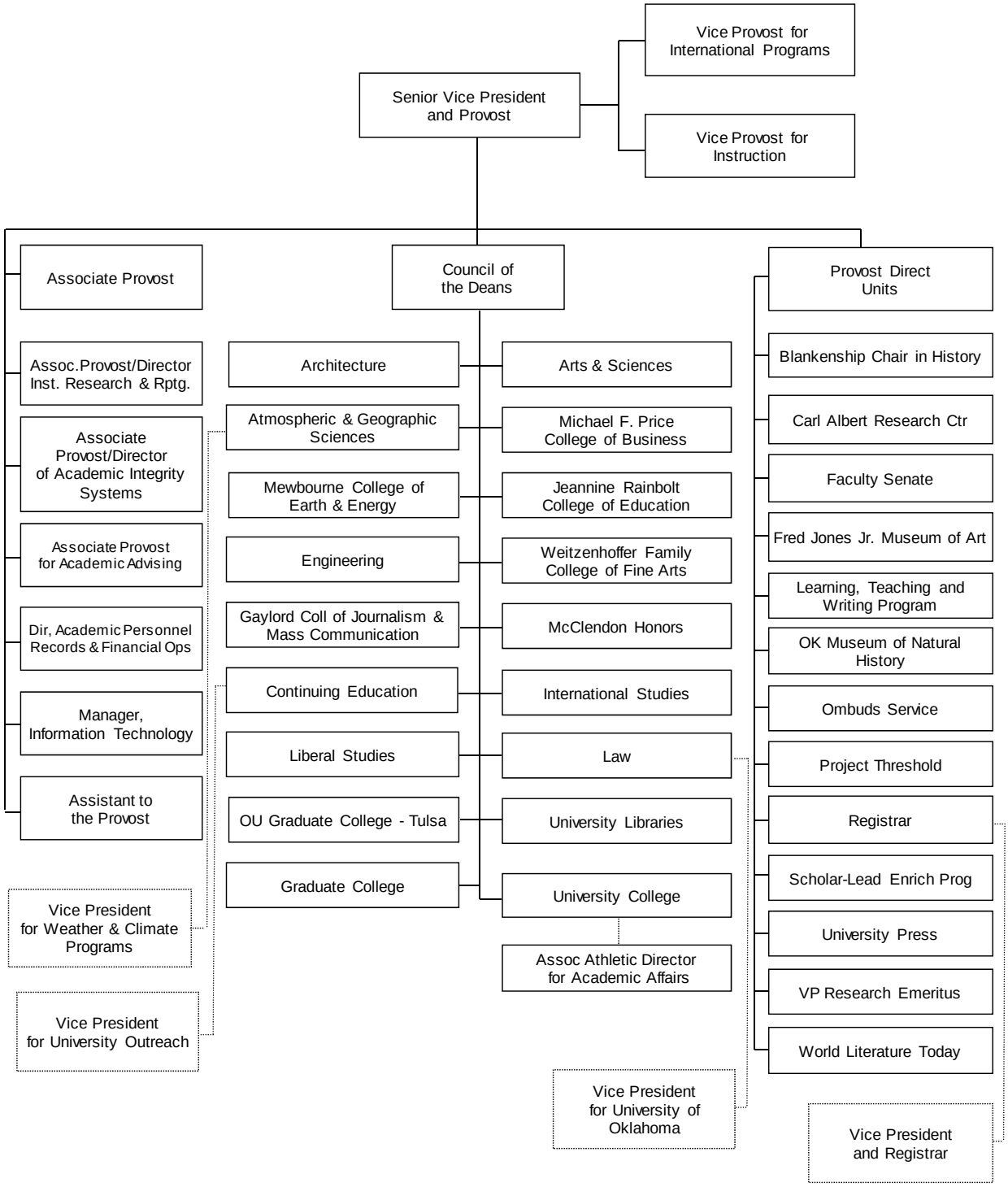
CEES Environmental Engineering
Organizational Chart



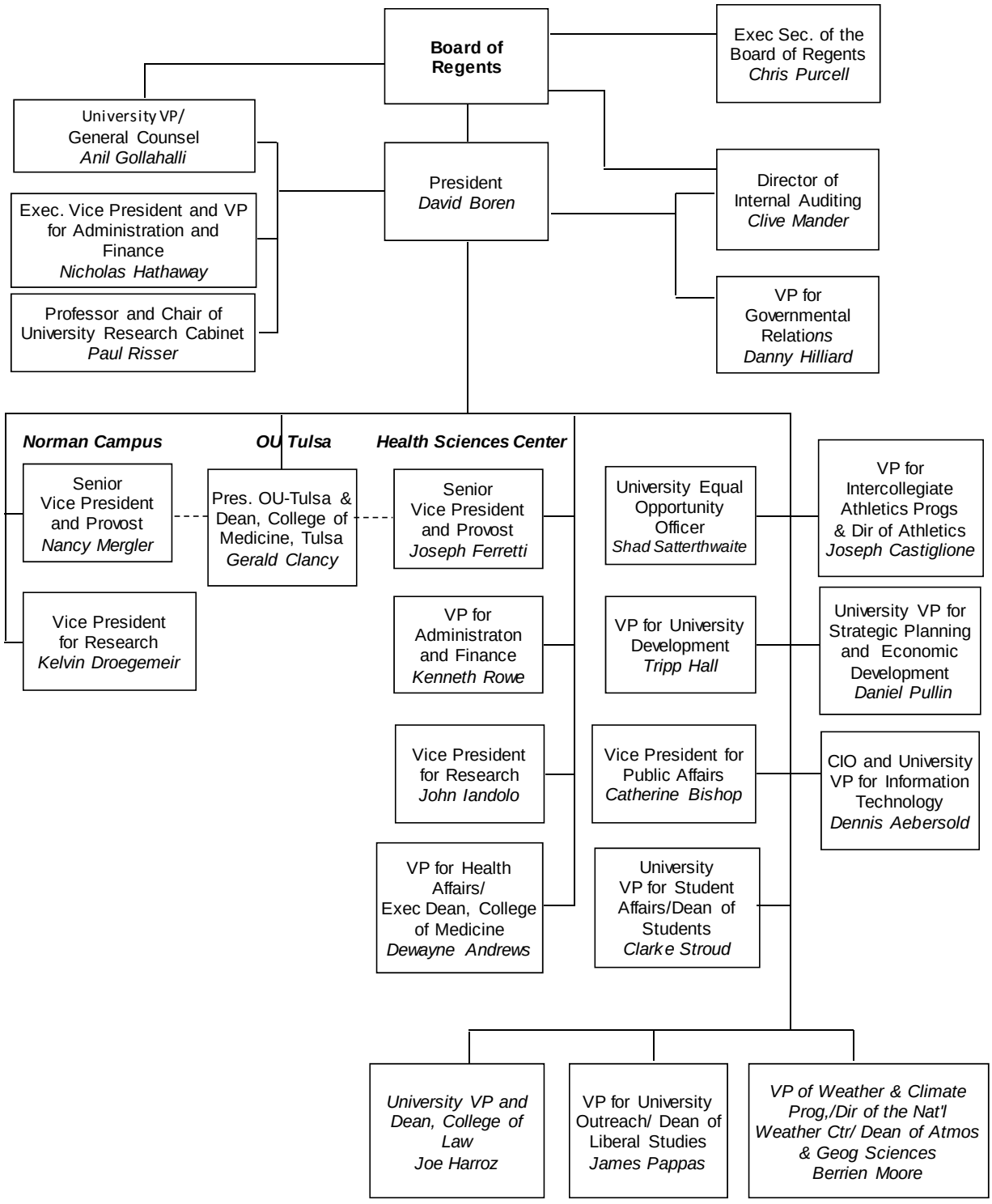
CEES and its Director fit into the following administrative structure of the CoE.



The Dean of the CoE fits within the Council of Deans, which reports to the Senior Vice President and Provost, as shown below.



Finally, the organizational structure of the senior officers of the University is shown below.



E. Program Delivery Modes

The EnvE classes are delivered by the traditional on-campus lecture/laboratory modes.

The capstone class CEES 4923 – Environmental Engineering Capstone usually involves extensive field work away from the main campus.

F. Program Locations

EnvE students can participate in study abroad programs. They must get their study abroad courses pre-approved for academic credit.

EnvE students can also to get academic credit (one Professional Elective) for completing a professional internship under the supervision of a licensed professional engineer.

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

NA.

H. Joint Accreditation

N/A

CRITERION 1. STUDENTS

A. Student Admissions

The University of Oklahoma (OU) College of Engineering (CoE) has historically utilized the same admissions policies for incoming freshmen as that of the institution. The admission of entering engineering freshmen is no more restrictive than those for admission to the university itself. Once admitted, all incoming freshmen at OU, regardless of major, are advised in University College (UC) until they have completed at least 24 credit hours (including Advanced Placement (AP) credit), one full-time semester in residence, and meet the minimum GPA requirements of the college of their declared major. Consistent with the institution, the College of Engineering requires a minimum 2.0 combined retention GPA for acceptance into all but the accelerated (BS/MS), degree programs. Provided students meet this minimum, their records are automatically transferred to the CoE, Williams Student Services Center (WSSC*). However, an engineering student in UC who has completed more than 24 hours and achieved the minimum GPA, yet has unsuccessful attempts in required courses for the curriculum may be denied automatic transfer. This determination is made by the CoE, WSSC director of advising in consultation with the engineering program director.

*The WSSC provides curriculum advising and guidance, degree certification, degree audits, graduation checks, pre-requisite checking, academic performance monitoring as well as recruiting and outreach, tutoring, mentoring, student organization and leadership development, multicultural and diversity programs, and college-level scholarship processing.

1) Freshmen

The admission of entering engineering freshmen is as follows:
Resident freshmen-

- 3.0 high school GPA and top 25% of graduating class

-or-

- 24 ACT/1090 SAT and a 3.0 high school GPA or top 50% of graduating class

Non-resident freshmen-

- 3.5 high school GPA and top 25% of graduating class

-or-

- 26 ACT/SAT 1170 and a 3.0 high school GPA or top 50% of graduating class

(For more information, see: University of Oklahoma, Office of Admissions home page: Undergraduate Admissions/ Freshmen: http://www.ou.edu/content/admissions/home/requirements/undergraduate/freshman_admission.html)

B. Evaluating Student Performance

The evaluation of engineering student performance is assessed and monitored at the university level regarding entry-level assessment, probation and suspension. The director of advising in CoE, WSSC oversees the pre-requisite checking process, and college-level academic performance review. CoE faculty assess student performance in engineering courses by issuing a letter grade. Each of these processes is summarized below:

Entry-Level Assessment – OU's Assessment and Learning Center provides testing in concert with the state-mandated assessment of higher education. This mandate requires that all incoming freshmen (and some new transfer students), be assessed in the areas of reading comprehension, English and mathematics to ensure appropriate placement into courses. Academic advising professionals assess a student's preparedness by virtue of:

- ACT/SAT scores

-and/or-

- Completed coursework and GPA's

Based upon these assessments, students may be required to:

- Complete developmental classes prior to beginning program specific courses

-or-

- Undergo subsequent assessments to monitor improvement

(For more information, see OU General Catalog/University College/Entry-Level Assessment: http://catalog.ou.edu/current/index.html)

Pre-Requisites - The university's web based enrollment system within the university's student information system (oZone), includes a pre-requisite check feature which prevents students from enrolling into courses for which they lack the necessary preparation. In the CoE, students are required to earn a minimum grade of "C" in all pre-requisite coursework.

The oZone system permits students to pre-enroll into a course for an upcoming semester if they are currently enrolled in the pre-requisite course. For this reason, a report is generated at the close of any semester or term listing students enrolled in any upcoming courses for which they failed the pre-requisite. The CoE, WSSC director of advising oversees the following process:

1. Obtains a list from the OU Office of Enrollment Services of all CoE students who are enrolled in a course for which they do not possess the minimum qualifications.
2. Sends by email to the chair person of each CoE school a list of the students who will be dropped from an enrolled engineering course.
3. Emails students notification (with read receipt) of the course drop and directs students to meet with a WSSC academic advising professional to revise their class schedules for the upcoming semester.

Any exceptions to students remaining enrolled in a course without the necessary pre-requisites must come from the instructor of the course and chair of the engineering program in which the student is enrolled. Such exceptions are noted in the student's Degree Navigator (DN) record.

Grading - OU utilizes a 4.0 or A=4, B=3, C=2, D=1, F=0 system. The CoE requires:

1. A minimum grade of C is required for any course applied toward degree completion.
2. Pass/No Pass (P/NP) coursework will not apply toward degree completion.
3. Satisfactory (S) graded credits that result from Advanced Placement (AP), Departmental, College Level Examination (CLEP), and International Baccalaureate (IB), toward program requirements and degree completion.

The institution makes available to students and faculty, the Desire 2 Learn (D2L) system for entering and tracking grades and progress. Ultimately, faculty submit grades via the institution's oZone system both at the end of the sixth week of classes (Early Progress Report which is not mandated by the institution, but strongly encouraged as an additional retention mechanism), and

no later than the Call for Grades which is typically two days following the end of Finals Week. These grade files download directly to the Office of Academic Records. Students are notified electronically when their final grades are available to be viewed.
(For more information, see OU General Catalog/Office of Academic Records: http://catalog.ou.edu/current/index.html)

College-Level Contract and Stop Out The CoE WSSC director of advising monitors the overall progress of engineering students. CoE students must:

1. Maintain at least a minimum 2.0 retention GPA in their Combined (all coursework, OU and transfer), OU, and Major coursework.
2. Earn a minimum grade of C for any course required for degree completion.

If, at the close of any semester, any of these GPAs fall below the 2.0 minimum, or the student has two failed attempts in a required course for the curriculum, the student is placed on Academic Performance Contract. If the student's semester GPA is below a 2.0 in the subsequent term, or if after three attempts a student fails to earn a minimum grade of C in a required course, he/she is stopped or dismissed from the college. Exceptions to this rule can be made by the chairperson or director of the student's program, or the associate dean. (Note: Regarding the three attempts rule, if the student's first attempt is a W, it does not count against the student.) The college-level stop out process generally precedes and prevents a university-level suspension.

When a CoE student is placed on contract, the CoE, WSSC the Director of Advising:

1. Notifies students by email of their status. (Note: A read receipt is attached to the message to ensure students have received the information. If no read receipt is returned, the student is contacted by phone.)
2. Makes notation of status in student's DN record.
3. Requests a College Academic Hold be placed on the student's record to prevent enrollment into any future semesters, terms or sessions

The College Academic Hold will be removed if and when the student meets with an academic advising professional in WSSC to sign an Academic Performance Contract, or the student's performance improves. In brief, Academic Contracts require students to meet frequently with an academic advising professional throughout the semester to monitor progress. The academic advising professional may require that the student undergo further assessment, and attend career counseling and/or tutoring.

If the student's academic performance does not improve after one semester, the CoE, WSSC director of advising carries out the following process:

1. Notifies student by email of stop out status. A read receipt is attached to the message to ensure student has received the message. If no read receipt is returned, the student is contacted by phone.
2. Makes notation of stop out status in student's DN record.

3. Requests a College Academic Stop, and a Center for Student Advancement Stop be placed on the student's record, which prevents further enrollment in engineering courses.
4. Student is canceled from all enrolled courses.
5. Student referred to the university's Center for Student Advancement (CSA)

Academic advising professionals in the CSA office guide students toward alternate programs and career options outside of the CoE, or the institution as a whole, whichever is most appropriate.

A student who has been stopped out from the CoE may petition for readmission after demonstrated improvement, which includes completing and at least two full semesters with a 3.0 GPA outside of college. Readmission requires approval of the chairperson or director of the student's intended engineering program. A student stopped from CoE is unlikely to be re-admitted.
(For more information see: OU General Catalog/College of Engineering/ Scholastic/Transfer and Special Regulations/Academic Performance: http://catalog.ou.edu/current/index.html)

University-Level Academic Probation/Suspension - At the close of each semester, the OU Office of Academic Records reviews all student records and produces a Retention Roster. The director of Academic Records administers the following process:

1. If a student is not making satisfactory progress (i.e., combined retention GPA falls below 2.0) he/she will be placed on Academic Probation by the university, and notified by the director of Academic Records.
2. If a student fails to earn a semester GPA of 2.0 or higher while on Academic Probation, he/she will be suspended by the university, notified by the director of Academic Records and canceled from all future enrollments.
3. An Academic Stop is placed upon the student's record.

Note: A suspended student may apply for readmission to the university after a specified amount of time which would also require the approval of the CoE. In such instances, a Referral from the OU Office of Admissions is sent to the CoE, WSSC director of advising. The CoE, WSSC director of advising administers the decision in consultation with the chairperson or director of the engineering program to which the student seeks readmission. Significant improvement in academic performance and courses relevant to engineering are generally the basis for readmission into a CoE program following a period of suspension.
(For more information see: OU General Catalog, Office of Academic Records, Academic Probation and Suspension: http://catalog.ou.edu/current/index.html)

C. Transfer Students and Transfer Credits

Transfer students who meet the following criteria (1-4 below) minimums are instructed by the Office of Admissions to contact the CoE, WSSC for guidance on advisement and enrollment into courses If engineering applicants do not meet the minimum GPA requirements listed below, these students can appeal their denied admission, and an Admission Referral will be sent to the CoE, WSSC director of advising. This decision to admit or deny is issued by the CoE, WSSC director of advising in consultation with the engineering program director.

1) Transfer Students

The OU Office of Admissions administers the admission of entering transfer students as follows:

Resident transfer-

a) 2.5 combined GPA for students with less than 60 hours

-or-

b) 2.0 for students with 60 or more hours earned

The admission of non-resident transfer students is more restrictive for CoE programs, and is administered on the college's behalf by the Office of Admissions and is as follows:

Non-resident transfer-

a) 3.0 combined retention GPA regardless of the number of hours earned.

Note: Students who do not meet the minimum requirements for admission as a transfer student can petition the CoE. In such cases, a referral from the OU Office of Admissions is sent to the CoE, WSSC director of advising. The CoE, WSSC director of advising administers the decision in consultation with the chairperson or director of the engineering program to which the student seeks admission. Academic performance in courses relevant to an engineering curriculum is generally the basis for acceptance into a CoE program for a student otherwise inadmissible.

(For more information, see: University of Oklahoma, Office of Admissions home page, Undergraduate Admissions, Transfer: http://www.ou.edu/content/admissions/home/requirements/undergraduate/transfer_admission.html)

2) Transfer Credits

The Office of Admissions conducts all initial assessment of transfer coursework. Transfer students who wish to apply unequated transfer courses towards degree completion must meet with a WSSC academic advising professional for review. The advisor will instruct student regarding the process for final evaluation.

- Major specific coursework must be reviewed and approved by the CoE faculty in the specific engineering program in order to apply toward degree requirements. (e.g. mathematics courses are evaluated by the Department of Mathematics.)
- A CoE chairperson or director may elect to approve a course for any student with a specific course, from a specific institution. In these cases, a memo is sent to the director of OU Admissions, and the course is listed on the institution's Transfer Equivalency Tables. http://checksheets.ou.edu/tetables.htm

Note: No upper-division engineering courses appear on the Transfer Equivalency Tables, which is in keeping with the CoE regulation that at least 24 hours of junior and senior courses in the major be completed in residence at OU and in the CoE.

3) Cross-Campus Admits

Students pursuing a major in another college on campus who wish to switch to an engineering program must meet with an academic advising professional in WSSC to change majors. The advising professional assesses the student's GPA and completed courses. If the student lacks necessary preparation to begin coursework in the major, the advising professional may

recommend the student remain in their current major until they are adequately prepared for an engineering curriculum.

In accordance with State Regents' requirements, students are assigned to the degree pattern that was current at the time they entered the Oklahoma State System of Higher Education. http://checksheets.ou.edu/

4) State Mandated Articulation Agreements that Impact Engineering Programs

Beginning in 1996, the State Regents launched a program to facilitate the transfer of students within Oklahoma's state system of higher education. The result is the current Oklahoma State Regents for Higher Education Course Equivalency Matrix which can be accessed electronically at: http://www.okhighered.org/transfer-students/course-transfer.shtml. The Regents have also established a policy that guarantees that the freshmen and sophomore level general education requirements are deemed satisfied for students who complete a two-year Associates of Arts or Associates of Science degree from an Oklahoma public college, and who transfer to a four-year university.

For these reasons, general education coursework readily transfers from Oklahoma colleges into OU, and more specifically, the CoE programs. Additionally, if the student has completed the Associates of Arts or Associates of Science, and he/she earned a D in one of the general education courses used to complete that degree, the CoE will accept the course toward degree completion unless it is a direct pre-requisite for an engineering course.

D. Advising and Career Guidance

To facilitate the advising and the degree certification process, the university purchased Degree Navigator (DN) from Decision Academic. DN is a web-based, 24/7 relational database system which enables students direct access regarding their progress towards degree completion.

The university's student information system is currently a SunGard Higher Education Banner, relational, unified digital database. The students, faculty and staff portal into the Banner system via oZone. (See: http://www.sungardhe.com/)

In addition to DN and oZone, official curriculum sheets are produced each year by the OU Academic Bulletins Office. Curriculum sheets and the associated degree patterns apply to one academic year, beginning with the summer term. In accordance with State Regents' requirements, students are assigned to the degree pattern that was current at the time they entered the Oklahoma State System of Higher Education. Within the CoE, degree programs remain current for six years after which they are deemed expired, and any student in such a program is moved to a current program year by an advisor in WSSC. Students may elect to move to a more recent program year, and CoE department or program chairs may elect to extend an engineering program beyond six years, (not to exceed ten) if a student situation warrants such action, i.e. deployment, health issues, etc.

1) Advising Process

a) Freshmen

All incoming freshmen, including engineering majors, are advised during the university's summer enrollment and orientation program. This program is coordinated by University College (UC) and the OU Scholars Program. Freshmen must continue to be advised by a UC academic advising professional each semester until:

- completion of 24 credits (including AP, CLEP, Departmental and/or IB credit)
- at least one semester completed at OU
- possess the minimum 2.0 GPA

b) CoE Undergraduate Students

All engineering students with more than 24 hours earned, must be advised each semester by CoE faculty in their respective major. New engineering students are instructed to meet with an academic advising professional in WSSC for college intake session prior to advisement by a CoE faculty advisor in their respective program. Engineering students who are on Academic Contract, have questions about degree completion, require signatures on administrative forms or actions, or who require or seek additional guidance are directed to meet with WSSC academic advising professionals. With the use of DN as a tool, the majority of CoE students now attend Lean Cell advising sessions. In these sessions, CoE program specific faculty advisors, department staff and WSSC advising professionals are present at a predetermined advising venue. The process is as follows:

1. CoE students are required to be advised by faculty in their respective program each fall and spring semester. To ensure students are advised, an Advising Hold is placed on all engineering undergraduate students' enrollment accounts prior to advanced enrollment for the subsequent semester or term.
2. At least one month prior to advanced enrollment, CoE Schools and Departments inform students in their programs by email, CoE E-Newsletter, and flyers about faculty advising schedules or Lean Cell Advising sessions.
3. Whether during office hours, or during Lean Cell Advising sessions, engineering student~~s~~ meet with a CoE faculty member for one-on-one advisement, during which time they are mentored and monitored regarding their progress towards degree completion. This is accomplished by review of the student's DN record. Once the faculty advisor has conducted this review, he/she advises the student into an appropriate set of courses for the upcoming semester. Faculty advisors are required to enter notes regarding the student's advisement into the student's DN record. Notes entered in DN by faculty or staff cannot be altered.
4. Faculty or the student inform a WSSC advisor or designated staff to lift the student's advising stop. This is typically done in person during a Lean Cell Advising session, or via email. Prior to lifting the advising stop, WSSC advisors or designated staff verify the advising notes have been entered.
5. Students are then able to enroll into classes using the oZone on-line enrollment system from anywhere they have internet access

Note: Though not every program in CoE utilizes the Lean Cell Advising model, these sessions have proven to be a very efficient and effective method for timely advisement. Most students report a reduction in confusion and the need to visit several different offices prior to completing their advisement and ultimate enrollment. It also allows the office hours of faculty advisors and

WSSC academic advising professionals to be reserved for those students who desire or require more guidance and time in course planning and advising.

All EnvE students are assigned an individual CEES faculty advisor after they are admitted to the CoE. Faculty advisors provide guidance on enrollment and career paths within the EnvE program (i.e., Professional Electives in environmental, geotechnical, or structural engineering). CEES uses a Lean Cell Advising" process for enrollment advising. The week prior to the pre-enrollment period in the fall and spring semesters, CEES schedules periods on three different days for the student to be advised. Students can select the day their individual advisor is in attendance or they can opt to be advised by any of the EnvE faculty. The Director of CEES attends all Lean Cell Advising sessions.

The Director of CEES does enrolment advising for all transfer students.

2) Career Guidance

The CoE faculty provide informal career advising to students during regular office hours or semester advising sessions. Additionally, the CoE hosts an annual Career Fair for students. All CoE students are encouraged, if not required to attend. Engineering students are also introduced to the resources available to them via the OU Career Services during the engineering orientation courses (ENGR 1410, *Freshman Engineering Experience* or ENGR 3510, *Engineering Orientation Experience for Transfer Students),* taken during their first semester at OU. These orientation courses also introduce the students to undergraduate research experience (REU) programs and graduate school. For the last two years, the college has hosted a Graduate School Fair for the undergraduate students. Additionally, CoE students may seek career guidance from faculty in their respective areas, as well as through their WSSC advisor.

The OU Career Services offers specialized services to students and alumni, such as:

- Job search and interviewing skills
- Resume and cover letter writing
- Major specific career advice
- Internship and job postings
- Information regarding Career Fairs, and on-campus interviews

(For more information, see the OU Career Services website: http://www.ou.edu/career/)

E. Work in Lieu of Courses

In addition to accepting AP, CLEP, and IB credits, the CoE permits students who have mastered course content via work or military experience the option of credit per a Departmental (Advanced Standing) Exam in lower division courses. Such students must:

- Obtain an Advanced Standing form from the Office of Admissions and receive approval from the department responsible for awarding such credits prior to sitting for an exam.
- Once approved, the student submits the signed form to the Office of Admissions along with the exam fee which is $25 per credit hour for the course in which he/she intends to receive credit.
- The department arranges for a proctor, and determines the place and time of the exam.

- The department reports a grade of S for exam scores of 70% (C) or higher, U for scores of 69% (D) or less. Note: Only S grades for Departmental exams are posted to the student's record.

EnvE students can also get academic credit (one Professional Elective) for completing a professional internship under the supervision of a licensed professional engineer. Each student pursuing an internship credit is monitored by an EnvE faculty member. Reports from the supervisor of the student's work experience are submitted several times during the internship. Upon returning to campus, the student enrolls in CEES 4423 – Internship under the section of the faculty advisor. The student then prepares a written report regarding their internship experience and submits it to the faculty advisor. If the report is satisfactory, an oral presentation is scheduled in front of three jurors (two of whom must be EnvE faculty). Upon successful completion of the oral presentation, the student is allowed to substitute CEES 4423 for one the Professional Electives in the curriculum. EnvE students can only substitute one internship for academic credit.

F. Graduation Requirements

The CoE, WSSC academic advising professionals monitor closely the progression and completion of degree requirements for all engineering students. Additionally, CoE students are encouraged to request a degree check at any time during their academic career. The process is as follows:

1. Students complete and submit a request for a graduation/ degree check to WSSC at least one semester prior to the term they expect to graduate. Students are typically notified in person by a WSSC academic advisor to request a degree check when the student attends a Lean Cell Advising session. A notice to apply for graduation (which includes a degree check), for the upcoming semester is also included in the weekly CoE E-Newsletter which is sent to all CoE students.
2. At the time of the degree check request, the student is also given the Senior Exit Survey and the official Application for Graduation.
3. The WSSC academic advising professional responsible for graduation certification for the respective area conducts the graduation/degree check using the degree audit system Degree Navigator (DN), and a copy of the corresponding official OU checksheet. The WSSC academic advising professional then conveys by e-mail the results of the degree check.
4. After grades are posted for the student's final term and the student has successfully completed all final courses and graduation requirements, the WSSC academic advising professional certifies the student's degree.
5. The CoE, WSSC director of advising conducts a final check of all degrees certified, and submits a final list to the Office of Academic Records by the established deadline which is typically four weeks after the end of the fall and spring semesters, and summer term.

The student's graduation file will contain the following documents:

- Student's final Graduation Description (Report) with Exceptions from DN. The name of the degree (Bachelor of Science in Civl Engineering), the name of the person who certified degree completion and the date are included in this report.

- Curriculum Sheet listing degree requirements for the student's program year.
- Copy of the student's advising Notes and documentation of any approved substitutions or exceptions to the student's degree requirements.
- Transfer courses applied toward the degree, but not listed on the Transfer Equivalency Tables are included in the notes and documentation in the student record and file.

G. Transcripts of Recent Graduates

The University of Oklahoma Official Transcript is arranged as follows:

The top block of the University of Oklahoma official transcript lists the following:
Course Level: (Undergraduate, Graduate or Law)
Awarded: BS in (Electrical Engineering for example)
Major/Concentration ( )
Minor.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

The mission statement for OU reads as follows:

> *The mission of the University of Oklahoma is to provide the best possible educational experience for our students through excellence in teaching, research and creative activity, and service to the state and society*.

The following vision statement for the CoE was extracted from the College Strategic Plan:

To produce graduates and knowledge sought first in tomorrow's technology-driven world.

The following departmental Mission Statement is found in the CEES Undergraduate Student Handbook, which is provided to each student majoring in Environmental Engineering.

> *The mission of the School of Civil Engineering and Environmental Science is to provide a high-quality educational experience for undergraduate and graduate students in the areas of architectural, environmental, geotechnical, structural, and transportation engineering and environmental science. The educational experience is accomplished through innovative classroom instruction aided by computer and multimedia-based instruction, laboratory experiences and student mentoring. The products of this experience are engineers and scientists capable of critical thinking, devoted to a lifetime of learning, and highly sought after by employers.*

B. Program Educational Objectives

Program Educational Objective 1: The Environmental Engineering Bachelor of Science alumni will have embarked on successful careers in areas associated with the development, implementation, and management of environmental engineering systems.

Program Educational Objective 2: The Environmental Engineering Bachelor of Science alumni will advance in their careers and continue their professional development through continuing education and lifelong learning.

The Program Educational Objectives (PEOs) are listed on the departmental web site (www.cees.edu) and in the CEES Undergraduate Student Handbook which is provided to each student majoring in Environmental Engineering.

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

By providing the best possible educational experience for our students, we are training qualified engineers who can embark on successful careers and are devoted to continuing education and lifelong learning.

D. Program Constituencies

The PEOs were developed to meet the needs of the constituencies of CEES. The primary constituents of CEES programs are the students, both during their academic careers and later as alumni. Other constituencies of the CEES program include the CEES faculty and the industries and governmental agencies that employ our graduates. The PEO's are focused on providing well trained engineers for employers and to empower these engineers to advance during their careers.

E. Process for Revision of the Program Educational Objectives

The original PEOs were born out of the CEES Departmental Assessment Plan beginning in 1998. In the spring of 1998, CEES established an ABET 2000 Committee, with the Assessment Plan Director serving as chair of the Committee. The Committee Chair attended an on-campus ABET 2000 workshop during the fall semester and a subsequent ABET 2000 Evaluator Workshop in January, 1999.

During the fall of 1998, the CEES ABET 2000 Committee met twice to develop and refine "draft" program educational objective statements and supporting materials (e.g., mission statement, desired outcomes, assessment methods, etc.). These materials were distributed to the CEES faculty for review and discussion. Revised statements were developed based on individual faculty (written) feedback and group discussions.

The revised statements were presented to the CEES alumni advisory board (a.k.a., CEES Visiting Council - VC) prior to their fall 1998 meeting. Written comments were solicited from VC members and the Program Educational Objectives were allocated time for discussion during the campus meeting. The ABET 2000 Committee Chair and the Acting Director solicited feedback from the Visiting Council during the fall meeting. The Program Educational Objectives and supporting materials were again revised based on input from the Visiting Council.

Final draft Program Educational Objectives were distributed to the CEES faculty late in the fall semester. Copies of the final draft statements and supporting materials were mailed to the CEES Visiting Council members prior to their spring 1999 campus visit. The ABET 2000 materials were again allocated time for discussion during the spring 1999 VC campus meeting.

At the end of each Spring semester, CEES faculty participate in a faculty retreat where student exit interviews, course evaluations and input from the assessment committees are discussed and reviewed. As a result of these discussions, updates and strategic actions are suggested.

During the spring 2004 faculty retreat, CEES faculty reviewed the PEOs and concluded that the statements were more focused on "outcomes" than "objectives". The faculty decided to revise the PEOs. The guiding principles for revising the PEOs were: 1) they had to be applicable to "graduates" of the program, and 2) they had to be "measurable", i.e., the objective could be quantitatively assessed.

The revised Program Educational Objectives and Outcomes were presented to the VC prior to their fall 2004 meeting. Written comments were solicited from VC members and the Program Educational Objectives and Outcomes were allocated time for discussion during the campus meeting. he Program Educational Objectives, Outcomes and supporting materials were again revised based on input from the VC.

The PEOs are reviewed every 6 years, at least one year in advance of preparation of the Self Study document, as part of the overall assessment process (Figure 2-1). The PEOs were last reviewed at the spring 2010 retreat. CEES faculty feel that the current PEOs are still relevant; hence, they have not changed since the last general review. CEES faculty have focused their efforts on improving the response rates for the PEO assessment instruments.

CEES Assessment Activities and Feedback

School of Civil Engineering & Environmental Science
College of Engineering

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

Student Outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the knowledge, skills, and behaviors that students acquire as they progress through the EnvE program. The student outcomes for the EnvE program are listed below. These outcomes are identical with the ABET EAC Criterion 3 outcomes. The Student Outcomes are:

(a) an ability to apply knowledge of mathematics, science, and engineering

(b) an ability to design and conduct experiments, as well as to analyze and interpret data

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

(d) an ability to function on multidisciplinary teams

(e) an ability to identify, formulate, and solve engineering problems

(f) an understanding of professional and ethical responsibility

(g) an ability to communicate effectively

(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

(i) a recognition of the need for, and an ability to engage in life-long learning

(j) a knowledge of contemporary issues

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

B. Relationship of Student Outcomes to Program Educational Objectives

All of the student outcomes support both of the PEOs objectives to some extent; however, the association is stronger in some cases than others, particularly since the PEOs focus on our graduates' accomplishments during the first three to five years after graduation. Table 3-1 indicates the particularly strong associations between each student outcome and the PEO(s). As noted in Section 2.E, the relationships between PEOs and Student Outcomes were established through a series of meetings of the CEES faculty and were presented to the CEES alumni advisory board.

Table 3-1. Relationship Between Student Outcomes and Program Educational Objectives

Student Outcome	PEO 1: EnvE alumni will have embarked on successful careers in areas associated with the development, implementation, and management of environmental engineering systems.	PEO 2: EnvE alumni will advance in their careers and continue their professional development through continuing education and lifelong learning.
(a) an ability to apply knowledge of mathematics, science and engineering	X	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	X	
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	X	
(d) an ability to function on multidisciplinary teams	X	X
(e) an ability to identify, formulate, and solve engineering problems	X	
(f) an understanding of professional and ethical responsibility		X
(g) an ability to communicate effectively	X	X
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context		X
(i) a recognition of the need for, and an ability to engage in life-long learning		X
(j) a knowledge of contemporary issues		X

(k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	X	

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Program Educational Objectives

1. Process for Assessing PEOs

The primary processes for assessing the PEOs are the: 1) Student Exit Interviews, 2) Pass Rates on the Fundamentals of Engineering (FE) examination, and 3) the biennial Alumni survey.

Student Exit Interviews - The primary purpose of the Student Exit Interviews is to ascertain whether a student has a job at the time of graduation (PEO #1) or if they are going to pursue a graduate degree (PEO #2). The Student Exit Interviews are also the last opportunity to collect contact information for the subsequent Alumni (and Employer) surveys.

FE Examination – Students in EnvE are required to attempt the FE examination. Record of attempting the FE examination is a departmental requirement for graduation. In exchange for a "good faith" effort on the FE examination, the CEES department pays the first examination fee for each student. The pass rate of EnvE students on the FE examination is monitored and compared to national averages. Passing the FE examination is one of the primary steps in the process of becoming a licensed Professional Engineer (PE) which actually addresses PEO #2.

Alumni Surveys - The primary purpose of the Alumni surveys is to assess career advancement and/or continuing education (PEO #2) for graduates of the EnvE program.

The expected levels of attainment for the PEOs are as follows:

PEO#1 - Sixty percent of the graduates of the EnvE actively pursuing employment will find a job within five years after graduation.

PEO#2 - Seventy percent of the students completing the EnvE program will advance in their careers through professional accomplishments (e.g., professional registration, promotions) and/or continuing education (e.g., professional development hours, graduate degree) within five years after graduation.

2. Frequency of Process and Documentation of Results

Student Exit Interviews – Graduating seniors are interviewed in the semester (fall or spring) in which they are scheduled to graduate. The answers on the Student Exit Interview Questionnaire and the Oral Exit Interview Recording Form are catalogued and summary statistics are presented in the annual EnvE Outcomes Assessment Report.

FE Examination – CEES receives reports on student performance after the fall (October) and spring (April) examinations. The pass rate of EnvE students on the FE examination is compiled and reported in the annual EnvE Outcomes Assessment Report. Student performance is compared to national averages and analyzed for trends over time. The information is distributed to the CEES faculty for review and discussion during the annual faculty retreat. The results of the FE examination are also reported to the CEES Visiting Council each fall.

Alumni Surveys – The surveys are conducted every other year and are sent to recent (< five years out) graduates and the employers of the graduates. The answers to these questionnaires are collected and summarized in the annual EnvE Outcomes Assessment Report.

3. Summaries of Results

Student Exit Interviews - The numbers of students from the EnvE program finding employment after graduation (PEO#1) since the last General Review are noted in Table 4-1. The percentage of students receiving job offers is below the 60% target value. The size of the sample population of graduating seniors is too small to discern any meaningful trends. It is also important to note that almost all of the EnvE seniors who do not take jobs upon graduation go straight to graduate school (Table 4-2).

FE Examination - Table 4-3 shows the performance of EnvE students on the FE examination since the last General Review. The table shows that EnvE students are well below the national average in terms of the percent of examinees passing the entire examination.

Alumni Survey - The results of the questions on the 2010 Alumni survey focusing on career advancement and/or continuing education are shown below [Note: the results were not available at the time of the 2009-10 EnvE Outcomes Assessment Report was prepared]. The response rate was very low (15%) and the size of the sample population of EnvE alumni is too small to discern any meaningful trends.

3. What professional registrations or licenses do you hold? Please select all that apply.

	Response Total	Response Percent
Engineer-in-Training (EIT)	1	33%
Professional Engineer (PE)	0	0%
MD	0	0%
None	2	67%
Other, please specify	0	0%

10. Within the last five years have you obtained any of the following? Please select all that apply.

	Response Total	Response Percent
Promotion	1	33%
Graduate Degree	1	33%
Professional Degree (such as MBA)	0	0%
P.E. or similar registration	0	0%
None of the above	1	33%
Other, please specify	0	0%

Total Survey Sent –20
Total Respondents -3

Table 4-1 Numbers of EnvE Students Receiving Job Offers

Semester	Number of Seniors Interviewed	Number of Seniors Receiving Job Offers	Percent Receiving Job Offers
Spring 06	4	1	25%
Spring 07	4	3	75%
Fall 07	2	1	50%
Spring 08	2	1	50%
Fall 08	1	1	100%
Spring 09	3	1	33%
Spring 10	4	1	25%
TOTALS	20	9	45%

Table 4-2 Career Choices of EnvE Graduates

Semester	Number of Interviews	Number of Seniors Receiving Job Offers	Number of Seniors Awaiting Notification	Number of Seniors Opting for Graduate School
Spring 06	4	1		2
Spring 07	4	3		1
Fall 07	2	1	1	
Spring 08	2	1		1
Fall 08	1	1		
Spring 08	3	1	2	
Spring 10	4	1	2	2

Table 4-3 Pass Rates of EnvE Students on the FE Examination

Exam Date	Oct-06	Apr - 07	Oct –07	Apr-08	Oct –08	Apr-09	Oct - 09	Apr-10	Totals for Four Years	09/10 National Averages
Number of EE Examinees	3	3	1	1	1	3	2	2	16	159
Number of EE's Passing Exam	2	0	0	0	1	2	1	1	7	135
Percent of EE's Passing Exam	67	0	0	0	100	67	50	50	44	85

B. Student Outcomes

1. Process for Assessing Student Outcomes

The primary methods for assessing Student Outcomes are: 1) Student Exit Interviews, 2) performance on the FE examination, and 3) the Content-Based Assessment plan.

Outcomes Assessment Methods

Student Exit Interviews - Each student completing the baccalaureate program in EnvE must schedule and attend an exit interview with a member of the CEES Visiting Council during the semester in which s/he plans to graduate. Students fill out a questionnaire prior to attending the oral exit interview. As depicted in Table 4-4, one portion of the Student Questionnaire is devoted to student opinions relative to the Student Outcomes. Student responses during the oral exit interview are recorded on a separate form.

FE Examination – Students in EnvE are required to attempt the FE examination. Record of attempting the FE examination is a departmental requirement for graduation. In exchange for a "good faith" effort on the FE examination, the CEES department pays the first examination fee for each student. The performance of EnvE students for select topics on the FE examination is monitored and compared to national averages.

Content-Based Assessment of Criterion 3 "a to k" Student Outcomes. Starting in 2007, CEES began implementing a content-based process specifically addressing the Criterion 3 "a to k" Student Outcomes in each required CEES course in the EnvE curriculum. A mapping of the outcomes assessed in each course is shown in Table 4-5. The quantitative methods used to assess Student Outcomes listed in Table 4-5 are summarized below.

1. **Monitor scores on target homework** – CEES faculty have identified basic concepts which the students should learn in each course. Performance on homework questions specifically targeting these basic concepts is evaluated. Statistics are compiled for each target question. A satisfactory grade for each question is 70% (or C grade) or higher. The criterion for assessing whether the concepts have been adequately conveyed to the students would be 70% or higher of all students obtaining a satisfactory grade on all of the target questions.

2. **Monitor scores on target exam questions** – CEES faculty have identified basic concepts which the students should learn in each course. Performance on exam questions specifically targeting these basic concepts is evaluated. Statistics are compiled for each target question. A satisfactory grade for each question is 70% (or C grade) or higher. The criterion for assessing whether the basic concepts have been adequately conveyed to the students would be 70% or higher of all students obtaining a passing grade on all of the target questions.

Table 4-4 Student Exit Interview Questionnaire Regarding Student Outcomes

Please assess your ability and/or knowledge gained in the following areas	Excellent	Very Good	Adequate	Needs Improvement	Needs Considerable Improvement
(a) an ability to apply knowledge of mathematics, science and engineering	5	4	3	2	1
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	5	4	3	2	1
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	5	4	3	2	1
(d) an ability to function on multidisciplinary teams	5	4	3	2	1
(e) an ability to identify, formulate, and solve engineering problems	5	4	3	2	1
(f) an understanding of professional and ethical responsibility	5	4	3	2	1
(g) an ability to communicate effectively	5	4	3	2	1
(h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	5	4	3	2	1
(i) a recognition of the need for, and an ability to engage in life-long learning	5	4	3	2	1
(j) a knowledge of contemporary issues	5	4	3	2	1
(k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice	5	4	3	2	1

Table 4-5: Quantitative Methods Utilized to Assess ABET a to k Criteria

EnvE Classes	ABET Criterion 3 "a to k" Criteria										
	a	b	c	d	e	f	g	h	i	j	k
CEES 1000						12		12	12	12	
CEES 1112	1		3						10		11
CEES 1213											1,2,3
CEES 2113	2				2						
CEES 2153	2				2						
CEES 2223	2		1		2						
CEES 2313	2	2	2							2	
CEES 2323	2				2,3			3		3	
CEES 3213	3		3	6	3		3		10		11
CEES 3243	2		3		4		3				
CEES 3334	1,2	4			1,2		4				
CEES 4114	2	2									11
CEES 4234	2	3,4		6			3			3	
CEES 4263	2	2									
CEES 4813				6		7					
CEES 4923	3	3	3	6	3	3	3,8	3,9	3,9	3	3
Methods Used	1,2,3	2,3,4	1,2,3	6	1,2,3,4	3,7,12	3,4,8	3,9, 12	3,9, 10, 12	2,3,12	1,2,3,11

3. **Monitor scores on interim deliverables and/or final project reports** – Many courses contain semester design projects. Performance on the interim deliverables. and/or final project reports will be evaluated. A satisfactory grade for each deliverable is 70% (or C grade) or higher for each student or design team. The criterion for assessing whether the concepts have been adequately conveyed to the students would be 70% or higher of all students or design teams obtaining a passing grade on all of the deliverables.

4. **Monitor scores on laboratory and/or project reports** - – Many courses are accompanied by laboratory sessions which include experiments, data analysis, and report writing. The laboratory reports will be evaluated relative to the ability to design/conduct experiments, data analysis/interpretation, and communications. A satisfactory grade for each report would be a composite grade of 70% (or C grade) or higher. The criterion for assessing whether the ability to design/conduct experiments, data analysis/interpretation, and communications have been adequately conveyed to the students would be 70% or higher of students obtaining a satisfactory grade on all of the laboratory reports.

5. **Monitor online laboratory quizzes** - – Some courses are accompanied by online laboratory quizzes. The laboratory quizzes will be evaluated relative to the ability to design/conduct experiments and data analysis/interpretation. A satisfactory grade for each quiz would be a composite grade of 70% (or C grade) or higher for each student. The criterion for assessing whether the abilities to design/conduct experiments and to analyze/interpret data have been adequately conveyed to the students would be 70% of students obtaining a satisfactory grade on the quizzes.

6. **Monitor peer evaluation scores** – Many classes incorporate semester design projects involving multi-disciplinary teams. Individual student performance is evaluated through peer evaluations administered at least three times during the course of the semester. The peer evaluation scores are compiled and statistics are calculated. The performance of individuals is compared within a given team and team performances are compared between each other. Students with low peer evaluation scores are informed immediately in order to allow for improvement. At the end of the semester the overall peer evaluation scores are computed and used to determine course grades. The ability to function on a multi-disciplinary team will be reflected by a student scoring less than two standard deviations away from the team average overall score. The criterion for assessing whether the ability to function on multi-disciplinary teams has been adequately conveyed to the students would be 70% or higher of all students scoring less than two standard deviations away from their team average scores.

7. **Monitor ethical case study scores** – Ethics and professional responsibility concepts have been incorporated into select courses. Performance on homework questions specifically targeting these concepts is evaluated. Statistics are compiled for each target question. A satisfactory grade for each question is 70% (or C grade) or higher. The criterion for assessing whether the concepts of ethics and professional

responsibility have been adequately conveyed to the students would be 70% or higher of students obtaining a satisfactory grade on all of the target questions.

8. **Monitor design project presentation scores** - Select courses involve semester design projects which culminate in an oral presentation. Oral presentation scoring forms are completed by the audience and the results are compiled. A satisfactory grade for each presentation is 70% (or C grade) for a student or design team. The criterion for assessing whether the concept of oral presentation has been adequately conveyed to the students would be 70% or higher of students or design teams obtaining a satisfactory grade on all of the evaluation forms.

9. **External evaluation of design project reports and presentations** – Select courses involve semester design projects which culminate in a project report and oral presentations. The reports and oral presentations are evaluated by a review board of practicing professionals. The review boards assess the project reports for technical quality, feasibility, compliance with current standards, and technical writing. The oral presentations are also evaluated by the review board. A satisfactory grade for each project report or presentation is 70% (or C grade) or higher from an individual reviewer. The criterion for assessing whether a given report is technically accurate and meets current standards would be an average score of 70% (or C grade) or higher for all of the reviews. The criterion for assessing whether the concepts have been adequately conveyed to the students would be 70% or higher of students obtaining a satisfactory grade on all project reports and presentations.

10. **Monitor RAT scores for self-guided learning** – Some classes utilize Readiness Assessment Tests (RATS) which in themselves promote self-study and learning how to learn. One of the RATs is a written essay regarding self-guided learning. The instructor evaluates each RAT submittal and provides a score. A satisfactory score for an individual RAT is 70% (or C grade) or higher. The criterion for assessing whether the concept of self-guided learning has been adequately conveyed to the students would be 70% or higher of the students obtaining a satisfactory score on the RAT.

11. **Monitor performance on software applications** - Several classes expose students to educational (e.g., Excel, West Point Bridge, ANSYS) and industry standard (e.g., MINEQL+, Water Cad) software. A satisfactory score for an individual submission is 70% (or C grade) or higher. The criterion for assessing whether the students have developed proficiency with either software program would be 70% or higher of the students successfully completing the homework assignments.

12. **Monitor attendance at Professional Development Seminar** – The CEES seminar class covers a variety of professional development issues (ethics, registration, management, globalization, life-long learning, etc). The majority of the classes involve guest speakers currently practicing engineering. Students are required to take at least four semesters of the seminar class to ensure student exposure to all topics more than once. Class attendance is recorded during the semester. The ABET criteria are assessed by tabulating attendance versus topic statistics. Each criterion is satisfied

by documenting that 90% of the students are exposed to the criterion through class attendance.

2. Frequency of Process and Documentation of Results

Student Exit Interviews – Graduating seniors are interviewed in the semester (fall or spring) in which they are scheduled to graduate. The answers on the Student Exit Interview Questionnaire and the Oral Exit Interview Recording Form are catalogued and summary statistics are presented in the annual EnvE Outcomes Assessment Report. These results are also shared with the CEES faculty during the annual faculty retreat and any improvements/modifications needed for the curricula are discussed.

FE Examination - The performance of EnvE students for select topics on the FE examination is compiled and reported in the annual EnvE Outcomes Assessment Report. Student performance is compared to national averages and analyzed for trends over time. The information is distributed to the CEES faculty for review and discussion during the annual faculty retreat. The results of the FE examination are also reported to the CEES Visiting Council each fall.

Content-Based Assessment - Assessment information is collected at least every other year a course is taught. Some instructors compile the information each time they teach a course. The information is compiled and reported in the annual EnvE Outcomes Assessment Report. The information is distributed to the CEES faculty for review and discussion during the annual faculty retreat. Strategies to address problem areas are devised during the spring retreat and implemented in the subsequent academic year.

3. Summaries of Results

Student Exit Interviews - The information derived from the student exit interviews is used to assess almost all facets of the CEES educational enterprise. The information is distributed to the CEES faculty for review and discussion during the annual faculty retreat. Strategies to address problem areas are devised during the spring retreat and implemented in the subsequent fall semester.

Results from the questionnaires for the last four year are presented in Table 4-6. The results indicate the following:

- CEES faculty are apparently very good in conveying fundamental concepts to the students as evidenced by the responses to questions “a” and “e”. The average responses over the last four years for these two questions are above 80%.

- CEES faculty have effectively incorporated material related to ethics and professionalism (“f”) in courses throughout the undergraduate curriculum.

Table 4-6 Student Responses to ABET Criteria

Academic Year	AY 06-07	AY 07-08	AY 08-09	AY 09-10	TOTAL
Number of students interviewed	4	4	4	4	16
Has Curriculum Provided You With:	% Respondents Who Rated "Very Good" or "Excellent				4-Year Weighted Average
a. knowledge of math, science, and engineering?	100%	75%	75%	100%	88%
b. ability to conduct experiments and interpret data?	100%	75%	75%	100%	88%
c. ability to design systems to meet desired needs?	75%	50%	75%	75%	69%
d. ability to function on multi-disciplinary teams?	50%	75%	75%	100%	75%
e. ability to formulate and solve engineering problems?	100%	100%	100%	50%	88%
f. an understanding professional/ethical responsibilities?	100%	75%	100%	100%	94%
g. ability to communicate (written and oral)?	100%	75%	100%	100%	94%
h. broad educational background?	50%	100%	75%	75%	75%
i. recognition of the need for life-long learning?	100%	100%	75%	100%	94%
j. knowledge of contemporary engineering issues?	100%	100%	75%	100%	94%
k. ability to use techniques, skills and modern engineering tools?	75%	75%	100%	100%	88%
Overall Average	86%	82%	84%	91%	86%

Table 4-7 Performance of Environmental Engineering Students on the FE Examination

Exam Date	Oct-06	Apr - 07	Oct –07	Apr-08	Oct –08	Apr-09	Oct - 09	Apr-10		
Subject Area	Percent of Questions Answered Correctly by OU Environmental Engineering Examinees								Average for Four Years	09/10 National Averages
Engineering Economics	70	52	70	30	60	58	45	40	53	68
Statics	59	50	67	33	46	56	31	56	50	49
Mechanics of Materials	62	44	51	38	25	44	12	44	40	40
Fluid Mechanics	62	59	50	50	88	82	75	50	65	63

Table 4-8: Results of Quantitative Assessment of ABET a to k Criteria

EnvE Classes	ABET Criterion 3 "a to k" Criteria										
	a	b	c	d	e	f	g	h	i	j	k
CEES 1000						Y		Y	Y		
CEES 1112	Y		Y						Y		Y
CEES 1213											Y
CEES 2113	Y			Y	Y						
CEES 2153	Y				Y						
CEES 2223	**n**		Y		Y						
CEES 2313	**n**	Y	**n**							Y	
CEES 2323	Y				Y			Y		Y	
CEES 3213	Y		Y	Y	Y		Y		Y		Y
CEES 3243	Y		Y		Y		Y				
CEES 3334	Y	Y			Y		Y				
CEES 4114	Y	Y									Y
CEES 4234	Y	Y		Y			Y			Y	
CEES 4263	Y	Y									
CEES 4813				Y		Y	Y	Y			
CEES 4923	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Y = > 70% of EE students satisfied the criterion	11	6	5	5	8	3	6	6	4	4	5
n = < 70% of EE students satisfied the criterion	2	0	1	0	0	0	0	0	0	0	0

FE Examination -. Table 4-7 shows the performance of EnvE students for select topics on the FE examination since the last General Review. The table shows EnvE students are near the national average for all of the topics with the exception of Engineering Economics.

Content Based Assessment - The results of the Content-Based Assessment for academic year 2010-2011 are summarized in Table 4-8. It is important to note that there are only three instances in which EnvE students did not meet the numeric criterion for a particular assessment method. Strategies for addressing the non-attainment situations are included in the content-based assessment information collected from each class. The content-based assessment information for each class listed in Table 4-8 will be available for review during the visit unless requested otherwise.

C. Continuous Improvement

Program Educational Objectives

As noted in Section 2.E, the PEOs were revised in 2004 to focus more on "graduates" of the EnvE program. The PEOs have not changed since the last general review. However, the target of the assessment methods is now "graduates of the program within a few years of graduation. " The Alumni survey was revised in 2010 and sent to EnvE alumni who were within 5 years of graduation.

Alumni Survey - The Alumni survey for assessing the PEOs was updated in 2010. The content of the Alumni survey is now more focused on assessment of PEO #2. The alumni are now specifically asked the following:

3. What professional registrations or licenses do you hold? Please select all that apply.*
   - Engineer-in-Training (EIT)
   - Professional Engineer (PE)
   - MD
   - None
   - Other (CPS, QEP, etc.) please specify

10. Within the last five years have you obtained any of the following? Please select all that apply.*
   - Promotion
   - Graduate Degree
   - Professional Degree (such as MBA)
   - P.E. or similar registration

The Alumni and Employer Survey forms have been changed to be more "user friendly" in an attempt to increase participation. The surveys are now administered online through a web site that provides the raw data plus data analysis. CEES switched the questionnaires to electronic format on SelectSurvey. NET, which is a web-based survey creation tool that can be used to quickly and easily distribute surveys via e-mail or a web site. It is a user-friendly application that allows the user to create surveys using over 20 different item/question types including choice, matrix and open ended questions. The results are tracked in real-time by using built-in reporting tools that include

statistical summaries of question responses. The University of Oklahoma IT Services makes SelectSurvey.NET available to OU faculty and staff.

Student Outcomes

Student Exit Interviews – The most important information is derived from the "comments" noted on both the Student Exit Interview Questionnaire and the Oral Exit Interview Recording Form. The student comments focus mainly on curriculum content and faculty performance. As a result of the feedback derived from these two forms, CEES has made the following changes in the EnvE program since the last General Review:

1. Revamped the content and course title for CEES 2313 – Water Quality Fundamentals.

2. Increased the Credit hours in the Introduction to CEES class from 1 to 2 to cover more computer software and design applications in the freshman class.

FE Examination – Starting in 2008, Engineering Economics was included in the fall Professional Practice course (CEES 4813) which should improve performance on that topic.

Content Based Assessment – The implementation of the Content Based Outcomes Assessment Process in 2007 was, in itself, a dramatic improvement for the overall evaluation process relative to Student Outcomes. The decision to implement a content based process required the CEES faculty to complete several tasks relative to improving the EnvE program including:

i. Reviewing and familiarizing themselves with the Criterion 3 "a to k" Student Outcomes. The accreditation process was discussed at the Spring 2010 retreat and during several faculty meetings during the 2010-11 academic year. All of the faculty teaching in the EnvE program (not just the Director and ABET Coordinators) are now at least familiar with the ABET accreditation process and the Criterion 3 Student Outcomes.

ii. Indentify which of the Student Outcomes are addressed in their course(s). This task resulted in significant improvements for most of the EnvE program courses. The task required faculty to assess or re-assess the learning outcomes for their courses, an effort that was not previously required. This task will now be repeated each time a course is offered.

iii. Develop methods for quantitatively assessing each of the Student Outcomes in their course(s). This task required that faculty teaching in the EnvE program develop grading rubrics and metrics for quantitatively assessing student outcomes. This has reduced the "subjectivity" of both the grading and assessment processes.

iv. Revise the content and format of their course(s), as needed, to address the Student Outcomes. This task required the faculty to evaluate or re-evaluate the content in their courses, an effort that was not previously required. This task will now be repeated each time a course is offered.

v. Implement the quantitative assessment methods. This task represented a dramatic change for most faculty teaching in the EnvE program. The task requires that faculty evaluate their performance relative to the Student Outcomes, rather than just compiling scores and submitting grades at the end of a semester. This task will now be repeated each time a course is offered.

Future Changes - After reviewing the assessment results, faculty in the program have identified several improvements that need to be implemented.

Educational Program Objectives

i. CEES needs to identify measures for better tracking EnvE students after they graduate, especially job placement and graduate education. The Director of CEES will take this issue forward to the CoE administration, including Directors of other programs, for discussion and brainstorming in the Fall 2011 semester.

ii. In Fall 2011, CEES will establish LinkedIn and Facebook sites and will start posting Alumni survey announcements, requesting participation by graduates from specifically defined years. CEES will continue to monitor response rates to the Alumni survey.

Student Outcomes

i. Several of the EnvE course content-based assessments identify course-specific changes that are needed to better address the selected Student Outcomes.

ii. In Fall 2011, CEES will develop a schedule for assessing specific courses and specific outcomes on a rotating basis.

iii. CEES needs to develop and implement course content that more fully addresses Student Outcome "h" regarding the broad education necessary to understand the impact of engineering solutions in a global environment. This issue will be discussed in faculty meetings starting with the Fall 2011 semester.

D. Additional Information

The following materials will be available for review during the campus visit unless requested otherwise:

Architectural Engineering Outcomes Assessment Report
Student Exit Interview Questionnaire
Oral Exit Interview Recording Form
Alumni Survey Questionnaire
Student Employer Questionnaire
Technology and Software Review Committee Report
Content-based assessment results for each CEES class listed in Table 4-8.

CRITERION 5. CURRICULUM

A. Program Curriculum

The undergraduate EE curriculum is shown in Table 5-1. The 125-hour curriculum is divided into eight semesters over a four-year period. The curriculum includes 35 hours of Math and Basic Sciences and 65 hours of Engineering Topics, both of which exceed the minimal levels noted by ABET.

The undergraduate EnvE curriculum gives the student the required broad-based training, with some flexibility (Professional/Science Electives) to allow for some degree of specialization. It is important to note that all EnvE students are required to attempt the FE exam prior to graduation. Successful completion of an ABET accredited degree plan and passing the FE are two keys steps in the process of becoming a licensed Professional Engineer. The EnvE degree requirements prepare graduates for careers in engineering. The requirement of the FE and emphasis on professional registration help instill the need for lifelong learning.

Figure 5- 1 shows the prerequisite structure support and the structure of the program's required courses.

The undergraduate Environmental Engineering curriculum requires coursework from four broad areas of environmental engineering: Environmental Science (water quality and mass balance and fate processes - 6 credits), Environmental Chemistry (organic chemistry -3 credits, physical chemistry - 3 credits, and aquatic chemistry -4 credits) Environmental Microbiology (4-credits), Environmental processes (water resources - 3 credits, water and wastewater treatment - 3 credits, and hazardous and solid waste - 3 credits), plus 6 credits of professional electives (all in environmental engineering except in unusual circumstances).

The General Education requirements at OU, along with the faculty advising system, guarantee that each student will have breadth and depth in their education. Two courses are required in the social sciences. Humanities are divided into three areas: "understanding artistic forms" (3 credits, one course); "western civilization and culture" (6 credits, two courses); and "non-western culture" (3 credits, one course). Courses to be accepted for general education credit are vetted by the Provost's Advisory Committee on General Education Oversight (PACGEO). Faculty advisors emphasize the depth requirement which is also discussed in the CEES Undergraduate Student Handbook.

Course syllabi are included in Appendix A. Other course materials such as textbooks and samples of student work will be available for review during the visit.

Table 5-1 Curriculum

Environmental Engineering

Course (Department, Number, Title) List all courses in the program by term starting with first term of first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective or a Selected Elective by an R, an E or an SE.	*Curricular Area (Credit Hours)*				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average 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, Fall Semester							
ENGL 1113 English Composition I	R		( )		3.0	*F10,Sp11*	*19*
CHEM 1315 General Chemistry I	R	5.0	( )			*F10, Sp11*	*258*
HIST 1483 U.S. 1492-1865 **or** HIST 1493 U.S. 1865-Present	R		( )	3.0		*F10,Sp11*	*66*
MATH 1823 Calculus I	R	3.0	( )			*F10, Sp11*	*89*
ENGR 1410 Freshman Orientation	R		( )			*F09, F10*	*11*
CEES 1112 Introduction to CEES	R		2.0 (✓)			*F09, F10*	*69*
Freshman, Spring Semester							
ENGL 1213 English Composition II	R		( )		3.0	*F10, Sp11*	*19*
CHEM 1415 General Chemistry. II	R	5.0	( )			*F10, Sp11*	*270*
MATH 2423 Calculus II	R	3.0	( )			*F10, Sp11*	*83*
PHYS 2514 General Physics I	R	4.0	( )			*F10, Sp11*	*192*
Sophomore, Fall Semester							
MATH 2433 Calculus III	R	3.0	( )			*F10, Sp11*	*35*
PHYS 2524 General Physics II	R	4.0	( )			*F10, Sp11*	*199*
CEES 2313 Water Quality Fundamentals.	R	2.0	1.0 ( )			*F09, F10*	*53*
CEES 1213 Computer Applications.	R		3.0 ( )			*F09, F10*	*42*
CEES 2113 Statics and Dynamics	R		3.0 ( )			*F09, F10*	*26*

CEES 1000 CEES Seminar	R		( )			*F10, Sp11*	*114*
Sophomore, Spring Semester							
MATH 2443 Calculus IV	R	3.0	( )			*F10, Sp 11*	*34*
MATH 3113 Intro. to Ordinary Differential Equations	R	3.0	( )			*F10, Sp11*	*40*
ENGR 2002 Professional Development	R		2.0 ( )			*F10, Sp11*	*58*
CEES 1000 CEES Seminar	R		( )			*F10, Sp11*	*114*
CEES 2153 Mechanics of Materials	R		3.0 (✓)			*Sp10, Sp11*	*36*
CEES 2223 Fluid Mechanics	R		3.0 (✓)			*Sp10, Sp11*	*48*
CEES 2323 Env. Transport and Fate Processes	R		3.0 ( )			*Sp10, Sp11*	*13*
Junior, Fall Semester							
CEES 1000 CEES Seminar	R		( )			*F09,F10*	*114*
CHEM 3053 Organic Chemistry.	R	3.0	( )			*F10, Sp11*	*233*
CHEM 3423 Physical Chemistry. I.	R	3.0	( )			*F10, SP11*	*83*
CEES 3364 Soil Mechanics	R		4.0 (✓)			*F09, F10*	*52*
CEES 3213 Water Resources Engineering.	R		3.0 (✓)			*F09, F10*	*42*
ENGL 3153 Technical Writing	R		( )		3.0	*F10, Sp11*	*17*
Junior, Spring Semester							
Professional Science Elective	SE	3.0	( )			*F10, Sp 11*	*NA*
Core III: Social Science	SE		( )	3.0			*NA*
CEES 1000 CEES Seminar	R		( )			*F10, Sp11*	*114*
CEES 3334 Measurements - Civil	R		4.0 (✓)			*Sp10, Sp11*	*47*
CEES 3243 Water & Wastewater Trmt. Design	R		3.0 (✓)			*Sp10, Sp11*	*35*
Senior, Fall Semester							
CEES 1000 CEES Seminar.	R		( )			*F10, Sp11*	*114*
CEES 4114 Aquatic Chemistry.	R	4.0	( )			*F09,F10*	*8*
CEES 4234 Applied Environmental Microbiology.	R		4.0 (✓)			*F09, F10*	*4*
CEES 4263 Hazardous and Solid Waste	R		3.0 (✓)			*F09, F10*	*14*
CEES 4813 CEES Professional Practice.	R		3.0 ( )			*F09, F10*	*6*
HSCI 2333 Hist. Persp. Tech. or Core IV	SE		( )	3.0			*NA*
Senior, Spring Semester							

CEES 4923 Environmental Capstone	R		3.0 (✓)			*Sp10, Sp.11*	*8*
CEES 1000 CEES Seminar	R		( )			*F10, Sp 11*	*114*
Prof. Elective	SE		3.0 ( )				*NA*
ANTH 4623 or Core IV	SE		( )	3.0			*NA*
Core IV: Art Forms	SE		( )	3.0			*NA*
PSC 1113 Political Science	R		( )	3.0		*F10, Sp11*	*92*
TOTALS-ABET BASIC-LEVEL REQUIREMENTS		48	50	18	9		
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE	125						
PERCENT OF TOTAL		38.4%	40%	14.4%	7.2%		
Minimum Semester Credit Hours		32 Hours	48 Hours				
Minimum Percentage		25%	37.5 %				

NA – enrollment figures are Not Available for professional elective and general education courses

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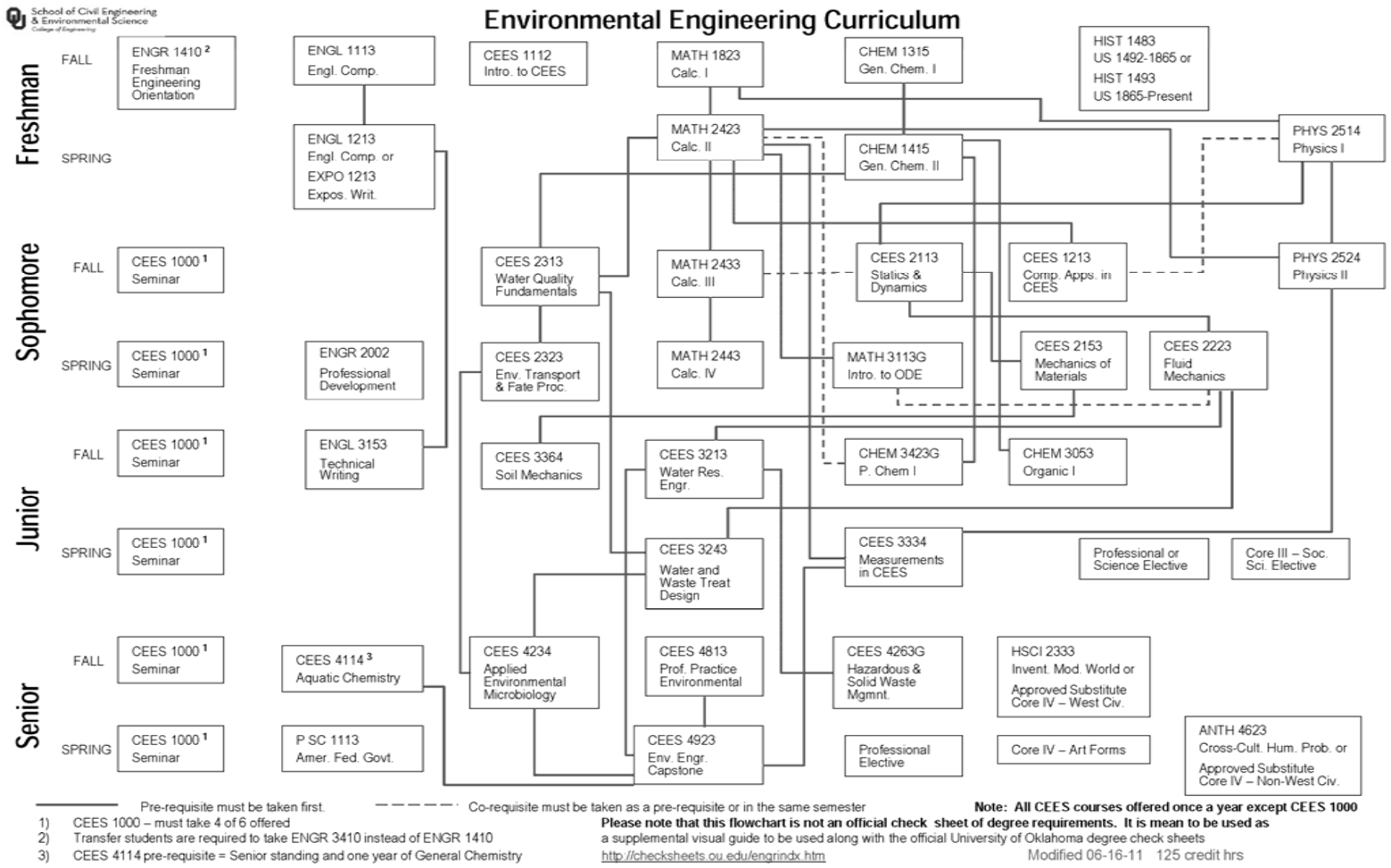

Figure 5-1 Prerequisite Structure

CRITERION 6. FACULTY

A. Faculty Qualifications

The qualifications of the CEES faculty are detailed in Table 6-1 and their resumes are included in Appendix B. Since the last accreditation visit, CEES has hired two new Assistant Professors in structural engineering. One senior structural engineering Professor resigned in December 2010. CEES also hired an Associate Professor in radar hydrology since the last review.

CEES has a total of 19 full time faculty members; eleven have a focus area in either environmental engineering (Drs. Butler, Dresback, Kibbey, Knox, Kolar, Sabatini, Strevett and Vieux) or environmental science (Drs. Hong, Nairn, Nanny); five have focus areas in geotechnical and transportation engineering (Drs. Cerato, Hatami, Miller, Muraleetharan, Zaman); and three have focus areas in structural engineering (Drs. Kang, Pei, and Ramseyer). One geotechnical faculty member (Dr. Hatami) has a strong background in structural mechanics and teaches structural engineering courses. Dr. Nanny has a joint appointment in the Mewbourne of College of Earth and Energy. Seven of the junior faculty members have received the prestigious Faculty Early Career Development (CAREER) Award from the National Science Foundation. In addition, Dr. Cerato was selected as the first ever recipient from the University of Oklahoma for the Presidential Early Career Award in Science and Engineering (PECASE).

The EnvE program includes several courses that are common to both the EnvE and civil engineering programs that are taught by faculty from environmental engineering (CEES 3213, 3243) and geotechnical engineering (CEES 3364). The science related courses in the EnvE program (CEES 4114, 4234) are taught by environmental science faculty. The EnvE capstone (CEES 4923) course is co-taught by an environmental engineering faculty member (Dr. Knox) and an environmental science faculty member (Dr. Nairn).

Currently, eleven faculty members are Registered Professional Engineers, and one faculty member is a Registered Geotechnical Engineer in California (the highest level of registration for a Geotechnical Engineer in the US). CEES requires that faculty teaching design-oriented courses pursue registration as a Professional Engineer.

CEES faculty are excellent teachers as evidenced by their various teaching awards: National – ASCE Arthur Casagrande Professional Development Award, Outstanding Educator of the Year by the Association of Environmental Engineering and Science Professors, Fred Merryfield Design Award, and NSPE Engineering Education Excellence Award; Regional -- 2010 DaVinci Fellows Award, 2010 Oklahoma Medical of Excellence for Teaching at a Research University; University -- David Ross Boyd Professorships, Regents' Award for Superior Teaching, UOSA Outstanding Engineering Faculty Awards, Presidential Professorships, and Alumni Teaching Awards.

Teaching both graduate and undergraduate students through research is an important objective of our faculty. Our success toward this goal can be observed through our external research expenditures, number of graduate degrees conferred, publication record, and journal citations.

Table 6-1. Faculty Qualifications

Environmental Engineering

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment [2] T, TT, NTT	FT or PT	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L [3]		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Butler, Elizabeth	Ph.D., Env. Engr, 1998	P	T	FT	6	13	12		H	H	L
Cerato, Amy	Ph.D., Civ. Engr., 2005	ASC	T	FT	0	7	7	PE	H	H	L
Dresback, Kendra	Ph.D., Civ. Engr. 2005	AST	NTT	FT	7	0	7		H	H	L
Fitzmorris, Clifford	MS, Elec. Engr	AST	NTT	PT	19	10	4		H	H	L
Hatami, Kianoosh	Ph.D., Civ. Engr., 1997	ASC	T	FT	4	14	7	PE	H	H	L
Hong, Yang	Ph.D., Hydrology	ASC	TT	FT	3	5	4		H	H	L
Kang, Thomas	Ph.D., Civ. Engr.	AST	TT	FT	0	7	4	PE	H	H	L
Kibbey, Tohren	Ph.D., Env. Engr., 1997	P	T	FT	0	12	12		L	H	L
Knox, Robert	Ph.D., Civ. Engr., 1983	P	T	FT	9	28	25	PE	L	L	M

Kolar, Randall	Ph.D., Civ. Engr., 1992	P	T	FT	4	22	16	PE	H	M	L
Miller, Gerald	Ph.D., Civ. Engr., 1994	P	T	FT	2	17	17	PE	H	M	H
Muraleetharan, Kanthasamy	Ph.D., Civ. Engr.	P	T	FT	6	17	17	PE, GE	H	H	L
Nairn, Robert	Ph.D., Env. Sci.	ASC	T	FT	3	19	15		H	H	M
Nanny, Mark	Ph.D., Env. Chem.	P	T	FT	0	25	15		H	H	L
Pei, Jinsong	Ph.D., Civ. Engr. & Engr. Mech., 2001	ASC	T	FT	7.5	9	9		H	H	L
Ramseyer, Chris	Ph.D., Civ. Engr.	AST	TT	FT	4.5	11	5.5	PE	H	H	L
Sabatini, David	Ph.D., Civ. Engr., 1989	P	T	FT	3	23	22	PE	H	H	L
Strevett, Keith	Ph.D., Civ. Engr., 1995	P	T	FT	0	16	16	EIT	M	M	L
Vieux, Baxter	Ph.D., Civ. Engr., 1988	P	T	FT	10	22	20	PE	H	H	H
Zaman, Musharraf	Ph.D. Civ. Engr., 1982	P	T	FT	0	28	28	PE	H	H	L

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
2. Code: TT = Tenure Track T = Tenured NTT = Non Tenure Track
3. CEES faculty provided individual evaluations of their levels of activity. The level of activity, high (H), medium (M) or low (L) reflects an average over 2009-2011.

During FY10, our total research expenditures exceeded $4.35 million ($229K per FTE). The University has recognized our research efforts by bestowing faculty awards such as the Regents' Award for Superior Research, Presidential Professorships and numerous Junior Summer Faculty Research Awards. Faculty have also won national and professional awards for research excellence. In 2011, Dr. Sabatini won the Water Environment Federation, Award of Merit with Distinction for work in developing countries. Also in 2011, Dr. Nairn received the Richard I. and Lela M. Barnhisel Reclamation Researcher of the Year Award from the American Society of Mining and Reclamation CEES faculty have also developed international collaborations in research and education. We currently have formal exchange agreements with Chulalongkorn University in Thailand, Thomas Frias University in Bolivia, and Blaise-Pascal in France. CEES faculty have also developed collaborative relationships with researchers at universities in Germany (University of Tuebingen), Cambodia, Ethiopia and the Peoples Republic of China. CEES faculty are also very active in professional service at the national and international levels. Our faculty regularly serve on NRC and NSF review panels and as editors and reviewers for numerous refereed journals.

CEES faculty have been recognized by the University of Oklahoma for their outstanding performance. Dr. Knox is the Director of CEES and occupies the Ted A. Kritikos Chair and is also a Presidential Professor. Dr. Sabatini occupies the Sun Oil endowed Chair and is a David Ross Boyd Professor. Dr. Zaman occupies the Aaron Alexander endowed Professorship and is a David Ross Boyd Professor. Dr. Muraleetharan occupies the Kimmell-Bernard Chair in Engineering and is also a David Ross Boyd Professor. Dr. Vieux occupies the Joseph A. Brandt Professorship. Dr. Kolar is the Lloyd Austin Presidential Professor.

B. Faculty Workload

Workload

CEES defines a fully-obligated faculty member (1 FTE) as being involved in an appropriate level of research and service, plus three courses per year. Faculty members in CEES are expected to teach at least one course per semester. The following typical distribution of activities would be assumed by 1 FTE:

Semester 1		Semester 2	
Course 1	0.25 FTE	Course 1	0.25 FTE
Course 2	0.25 FTE	Contract & Grant	0.25 FTE
Prof. & Univ. Serv.	0.05 FTE	Prof. & Univ. Serv.	0.05 FTE
Research & Scholarly Act.	0.45 FTE	Research & Scholarly Act.	0.45 FTE
TOTAL	1.00 FTE	TOTAL	1.00 FTE

The primary measures of research and scholarly activity are articles in archival journal publications or the equivalent (e.g., refereed conference proceedings, book chapters, or other refereed forums) and research expenditures. In addition, proposals must be written and submitted. For service, faculty must participate in the academic life of the university 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).

If an appropriate level of output from service, research and scholarly activity is deemed inadequate to comprise 0.50 FTE, additional teaching responsibilities can be assigned. A faculty member without research and scholarly activity can be required to teach up to four courses per semester as a 1.0 FTE obligation. Owing to the productivity of the faculty, CEES has not had to assign more than three courses to any faculty member since the last General Review.

Table 6-2 summarizes recent faculty workloads in CEES. Curriculum vitae for the CEES faculty can be found in Appendix B.

C. Faculty Size

The size of the CEES faculty is sufficient relative to the undergraduate enrollment. The total undergraduate student/faculty ratio has recently increased to 13:1; the ratio for the EnvE program is 4.6:1. Current undergraduate engineering enrollment is 265 with 29 in the environmental engineering program. The departmental goal was to reach an undergraduate enrollment of 200 by year 2015.

CEES faculty participate in numerous multidisciplinary research institutes across campus including the Water Technologies for Emerging Regions (WaTER), the Atmospheric Research Center (ARC), Center for Restoration of Ecosystems and Watersheds, Center for Analysis and Prediction of Storms, Institute for Applied Surfactant Research, Institute for Energy and the Environment, Oklahoma Transportation Center, and the Poromechanics Institute. CEES faculty also hold co-appointments or are adjunct faculty in the Mewbourne College of Earth and Energy, Chemical Biological and Materials Engineering, Chemistry and Biochemistry, Botany and Microbiology, and Zoology.

CEES faculty interact regularly with practicing professionals. The most notable example is the practitioner-directed multidisciplinary capstone courses. The instructors for these courses solicit real world projects from local practitioners. In addition, each capstone course has a Capstone Advisory Board made up of local practitioners well-versed in the subject area. Several CEES faculty regularly provide consulting services to local engineering firms. Also, three CEES faculty own private engineering firms. These firms occasionally hire graduates from CEES.

Environmental engineering students are also allowed to interact with practicing professionals through the efforts of the Engineers Without Borders (EWB) student chapter which is administered through the OU WaTER Center. EWB is a college wide organization that currently has projects in Guatemala and Bolivia. EWB tends to attract environmental engineers more than other disciplines. All EWB require faculty supervision plus oversight by a licensed professional engineer.

The WaTER Center uses innovative teaching and technological advances to address drinking water and sanitation problems in developing countries as well as in remote areas of the United States. The WaTER Center sponsors the biennial OU International Water Prize to recognize individuals for outstanding contributions in providing water/sanitation to remote villages. The

Table 6-2. Faculty Workload Summary

Environmental Engineering

Faculty Member (name)	PT or FT	Classes Taught (Course No./Credit Hrs.) Term and Year	Program Activity Distribution			% of Time Devoted to the Program
			Teaching	Research or Scholarship	Other	
Butler, Elizabeth	FT	CEES 2313 – F10 CEES 4114/5114 – F10 ENGR 4510(3) – Sp11	50	45	5	60
Cerato, Amy	FT	CEES 3364 – F10 CEES 4333- Sp11 CEES 5433 – Sp11	50	45	5	5
Dresback, Kendra	FT		10	80	10	75
Fitzmorris, Clifford	PT	CEES 4113 – F10	95	0	5	0
Hatami, Kianoosh	FT	CEES 2113 – F10 CEES2153 – Sp11	50	45	5	15
Hong, Yang	FT	CEES 5020 (3) – F10 CEES 3334 – Sp11 CEES 5020(3) – Sp11	50	45	5	65
Kang, Thomas	FT	CEES 5020(3) – F10	50	45	5	0

		CEES 4903/4993 – Sp11 CEES 5783 – Sp11				
Kibbey, Tohren	FT	CEES 1213 – F10 CEES/GEOL 5853 – F10 CEES 5673 – Sp11	50	45	5	50
Knox, Robert	FT	CEES 4803/4813 – F10 CEES 4913/4923 – Sp11 CEES 5021 – Sp11	30	15	55	30
Kolar, Randall	FT	CEES 3213 – F10 CEES 1000 - F10 CEES 1000 – Sp11 CEES 4123 – Sp11 CEES 2223 – Sp 11	45	45	10	30
Miller, Gerald	FT	CEES 3884 – F10 CEES 5343 – F10 CEES 4903/4993	50	45	5	0
Muraleetharan, Kanthasamy	FT	CEES 5413 – Sp11	25	50	25	0
Nairn, Robert	FT	CEES 4324/5324 – F10 CEES 4263 – F10 CEES 4913/4923 – Sp11 CEES 5653 – Sp11	50	40	10	75
Nanny, Mark	FT	ENGR 4113/5113 – F10 CEES 2323 – Sp 11	30	50	20	50

Pei, Jinsong	FT	CEES 2113 – F10 CEES 5653 – F10 CEES 5683 – Sp11	50	45	5	0
Ramseyer, Chris	FT	CEES 3414 – F10 CEES 3403 – Sp11 CEES 3774 – Sp11	50	45	5	0
Sabatini, David	FT	CEES 1112 – F10 CEES 4243 – Sp11 CEES 5673 – Sp11	40	45	15	50
Strevett, Keith	FT	CEES 4234/5234 – F10 CEES 2223 – Sp11 CEES 3243 – Sp11	50	45	5	60
Vieux, Baxter	FT	CEES 5883 – F10 CEES 5843 – Sp11	50	45	5	30
Zaman, Musharraf	FT		50	45	5	25

winner of the $25,000 award gives the plenary lecture at the biennial OU International WaTER Conference.

D. Professional Development

CEES aggressively encourages faculty professional Development. CEES encourages all faculty members to seek professional registration. A high percentage of CEES faculty members are registered Professional Engineers and have significant professional experience, which allows them to bring professional issues to the attention of the students through various forums. CEES faculty are also active in professional and technical societies. In addition, CEES faculty are encouraged to apply for sabbatical leaves every six years in order to maintain their research programs. Table 6-2 lists and assesses each member of the faculty based on their years of experience, professional registration and level of activities (e.g., professional, research and consulting).

E. Authority and Responsibility of Faculty

The CEES administrative structure is based upon the OU paradigm of a faculty administrative committee working in concert with the Director. The CEES Committee A consists of three faculty; one from each of the three thematic areas (i.e., environmental, geotechnical and structural). The Director serves as an Ex Officio member and functions as Chair of Committee A. Committee A members are nominated by the colleagues in their respective thematic areas and submitted to the entire CEES faculty for approval. Committee A members serve a two-year term.

As noted previously, governance of the EnvE program is based on feedback from the assessment processes. All of the information is shared with the CEES faculty through regular faculty meetings and the annual spring retreat. Most of the proposed substantive actions are derived from discussions at the annual retreat and are then directed to the appropriate committee. All substantive actions affecting the curriculum or faculty governance are voted on by the CEES faculty.

The general standing committee structure of CEES is functional. The charge to a committee is either obvious or suggested by the Director. For example, the Graduate Studies Committee is the control group for all graduate admissions and policies; the committee has representatives from each thematic area, plus a chair who serves for an extended period. Other CEES committees are: Undergraduate Curriculum; Undergraduate Scholarships; Program Outcomes Assessment; Technology and Software Review Committee; Laboratory Safety and Oversight committees for both the Fears Engineering Laboratory and the Broce Asphalt Laboratory. CEES faculty also serve as ASCE Student Chapter Advisor; Chi Epsilon Advisor; and Environmental Science Student Association Advisor. CEES faculty are also requested to serve on the following College of Engineering committees: Liaison to Student Advising; Academic Appeals and Misconduct; Library; and Dean's Senior Faculty Advisory. CEES faculty also serve as Faculty Advisor to the student chapter of Engineers Without Borders, which is a college-wide organization.

CEES annual faculty evaluations are an important part of our assessment plan. CEES uses a peer evaluation process, which is designed to maximize faculty productivity by ensuring transparency

of the evaluation process. Each January, faculty are required to prepare a 1-page mini-vitae and 2-pages of supplemental information documenting their accomplishments during the previous calendar year in teaching, research and creative activity, and service, along with a statement of their goals for the coming year. In support of preparation of these documents, the Director of CEES compiles and distributes data on:

1. Research expenditures
2. Research proposals submitted
3. Research proposals funded
4. Publication citations from the ISI Web of Science database
5. Composited course evaluation (i.e., teaching) scores
6. Student comments (anonymous) from the course evaluations

The composited course evaluation scores are derived from the evaluation form distributed in each course near the end of the semester (Attachment 10). CEES uses weighted responses for questions 3, 4 and 8 to develop Individual to Department (I/D) and Individual to College (I/C) ratios.

The Director of CEES shares all of the mini-vitae and supplemental information documents with each CEES faculty member. Each faculty member is requested to evaluate all other faculty members and the Director. These peer evaluations are composited and provided to Committee A (a three-member advisory committee to the Director). The Director and Committee A consider the peer evaluation scores and supporting documents in developing draft final evaluations scores. The draft evaluation scores are provided individually to each faculty member. Each faculty member is allowed an opportunity to meet with the Director and Committee A to discuss the evaluations scores. The Director and Committee A then forward the mini-vitae and the final annual evaluation scores to the Dean of the CoE. The Director also prepares an annual Unit Evaluation and submits that to the Dean of the CoE.

The College of Engineering Course Evaluation Form will be available for review during the campus visit unless requested otherwise.

CRITERION 7. FACILITIES

A. Offices, Classrooms and Laboratories

CEES is primarily housed in the Carson Engineering Center (CEC), although some faculty with co-appointments have offices in the Sarkey's Energy Center and the National Weather Center. Classroom instruction is primarily conducted in one of four buildings: Carson Engineering Center, Devon Energy Hall, Felgar Hall and Sarkey's Energy Center; however, classes with large sections (e.g., Mechanics of Materials) are often scheduled in larger classrooms across the campus.

The university provides classroom facilities for all lecture classes. The CoE has upgraded several classrooms with capabilities to support high levels of computer-interactive courses. Classroom facilities provided by the university are sufficient to support CEES lecture classes. New wireless classrooms can support the use of laptops in nearly all classrooms on the main campus.

Most CoE classes take place in CoE facilities. All of the general purpose CoE labs and several departmental labs also serve as computer classrooms. All CoE classrooms have wireless networking capability and most also have power and data connections available at each desk. College of Engineering classrooms are outfitted with multimedia technology including data projectors, document cameras, VCR/DVD units, and connections for laptop display. Two CoE classrooms have high definition video conferencing capabilities, in addition to multimedia technology.

The CoE provides 32 team rooms that are outfitted with multimedia technology and available for student use. Nine of the rooms have a large plasma display with laptop audio and video connections. The three remaining rooms have data projectors plus dual plasma displays and laptop audio and video connections.

Students are also exposed to advanced instrumentation via various teaching laboratory experiences. The various facilities and equipment that students utilize during the undergraduate EnvE curriculum are discussed below.

1. Kerr Environmental Teaching Laboratory (CEC 328): This laboratory is used for CEES 3234-Water and Waste Treatment, CEES 4114/5114-Aquatic Chemistry, CEES 4324/5324-Environmental Biology and Ecology, and CEES 4923-Environmental Engineering and Science Capstone Experience. The laboratory has the equipment, glassware, chemicals, and supplies needed for routine analysis of water and wastewater, including alkalinity, hardness, dissolved oxygen, BOD_5, and nutrients (nitrate, nitrite, phosphate, ammonia, etc.) The laboratory also contains the equipment needed for routine microbiological measurements such as plate counts and biological growth studies. Soil analyses such as moisture content and bulk density are also performed in this laboratory. Field monitoring kits for pH, dissolved oxygen, conductivity, alkalinity, and hardness are stored, tested, and maintained in this laboratory.

2. CEES Study Laboratory (CEC S-20): This computer laboratory is used for the senior level CEES 4803-Professional Practice and CEES 4903- Civil Engineering Capstone courses. The laboratory has sixteen dedicated desktop computers, two printers, and laptop-friendly tables with power ports a printer, a black and white plotter and a color laser plotter. Half of the desktop computers are loaded with Autocad, in addition to traditional office software. This laboratory also helps expose students to industry standard and to the principles of engineering design, including team work, project management, design drawings and engineering practice.

3. Soils Laboratories (CEC S-11): The soils laboratory is used for instruction in CEES 3364 - Soil Mechanics and CEES 5404 - Soil Stabilization. The laboratory includes equipment to measure consistency, permeability, gradation and compaction. Strength testing equipment consists of unconfined compression, motorized direct shear and one cylindrical triaxial device, and the lab contains three consolidometers for determining compressibility. The laboratory also houses a model to simulate seepage through earth dams. CEC S-11 is used for instruction in CEES 5423 - Environmental Geotechnology and CEES 5404 - Soil Stabilization. This room contains equipment for determining soil-water characteristic curves and permeability of unsaturated soils. It also houses an HP Vector Impedance meter for measuring electrical properties of soil. The use of soil laboratories helps prepare students for careers in environmental engineering that may involve laboratory measurements of soil properties.

4. Engineering Practice Facility – The CoE recently completed construction of the world-class, one-of-a-kind ExxonMobil Lawrence G. Rawl Engineering Practice Facility (EPF), where current engineering students benefit from a real-world interdisciplinary experience. The two-story, 41,000-square-foot EPF includes 10,000 square feet that students can use to design and build engineering projects and senior capstone projects. There are five practice bays located on the first floor of the EPF. Four of these bays are high-bay works spaces open to the second floor; the fifth bay is one story, closed space separated from the rest of the facility by glass walls. The open bays have a hoist feature above them allowing for movement or display of large, heavy projects. The closed bay provides a work space for those projects that generate more dust and dirt, such as the concrete canoe. Each of the bays has large, bi-fold hangar doors opening to a green space facing Jenkins. Projects can be rolled out and displayed on nice days. Students are able to take advantage of good weather and have a larger open space to work in.

Students are also exposed to advanced instrumentation via several research laboratories. The various facilities and equipment that students utilize during the undergraduate EnvE curriculum are discussed below.

1. Environmental Modeling and Geographic Information Systems Laboratory (CEC 303): This laboratory is used for CEES 5020, Geographical Information Systems, CEES 5853, Groundwater and Seepage and CEES 5873, Water Quality Management. The laboratory has capabilities to handle GIS data structures for surface water, groundwater, landfill siting, and natural resource applications. Finite element modeling capabilities for environmental applications are also available.

2. Center for Restoration of Ecosystems and Watersheds Laboratory Facility (CEC S-9): This facility is used for CEES 4323, Applied Environmental Microbiology, CEES 5624, Biological and Industrial Waste Treatment, ES4324/ES5324 Biological Aspects of Environmental Science and ES2323 Environmental Science II. This facility focuses on inorganic and organic analyses of natural waters, soils and sediments. The facility also includes equipment for standard microbiological characterization and evaluation of microkinetics.

B. Computing Resources

OU Information Technology operates seven computer labs for the benefit of all OU students. Additionally, the CoE provides three general purpose labs that are open to all CoE and College of Earth and Energy students. In total, engineering students have access to approximately 300 general purpose lab machines in addition to their departmental computer labs. All of these labs have workstation class Windows-based machines with access to general campus software, all engineering software, and program specific software. These computers are connected to high speed, networked copier-printers. The CoE also provides a high-end CAD lab with 9 machines available for graphic 3D rendering and processing. All of these labs are available to students 24 hours a day, 365 days a year.

In addition to the physical labs, the CoE makes a virtual lab environment available to students. This virtual lab has approximately 60% of the CoE-specific software installed and is available to students from on or off-campus 24 hours a day.

OU Information Technology and the CoE license the software that is used throughout the curriculum. This includes Ansys, AutoCAD, Bentley, Fluent, Gams, LabVIEW, Mastercam, MathCAD, MATLAB, Patran, ProII, SigmaPlot, Solidworks, Tecplot, and Visual Studio. This software is licensed for all lab computers. Additionally, some software is licensed for installation on faculty or student computers. Software installation and support is provided through the IT Service Center, which is available in various locations from 8am to 8pm, Monday through Friday. Official requests for new software purchases and installation can be made by faculty through the online software request form.

Faculty members are provided with the PC or Mac-based computer model of their choice and have access to centralized networked printers within their departments and personal network storage space.

The CoE has a mandatory laptop policy for students and provides recommended specifications for appropriate hardware. Many courses make use of the wireless network and software that is installed on student computers or through the virtual lab for in-class instruction.

CoE students are provided with additional computing resources as well. The CoE subscribes to the MSDNAA program which allows students to access most Microsoft software for installation and testing on their personal machines. The CoE provides personal network storage for each student which is available on or off-campus. Students also have access to free technical support

for personal computer equipment, including general troubleshooting, installation of software, and hardware replacement.

The Technology and Software Review Committee (TSRC) Annual Report– The TSRC committee consists of three CEES faculty members. The TSRC is tasked with reviewing software and other tools used in all CEES courses to ensure that they meet state of the art/practice standards. In order to review the tools used in a course, the TSRC may follow a number of different approaches. These approaches include visiting in-class demonstrations, interviewing faculty members and students, and requesting a demonstration from a faculty member teaching a particular course. The TSRC prepares an annual report documenting its findings. These findings are documented in the annual Outcomes Assessment Report and reviewed with the faculty during annual evaluations and at the annual spring faculty retreat.

C. Guidance

All computing software used in CEES courses is introduced to the student through classroom lectures, followed by guided laboratory sessions in which the instructor or an experienced Teaching Assistant (TA) is in attendance. Several courses have laboratory sessions that involve use of tools and analytic instruments. These laboratory sessions start with a lecture on the proper use of the equipment, with an emphasis on safety. The lectures are conducted by the course instructor or an experienced TA. All instructional and research personnel dealing hazardous substances must undergo annual hazardous waste and safety training.

D. Maintenance and Upgrading of Facilities

Teaching and research laboratories, and the accompanying equipment, are vital components of an effective program for attracting and retaining students. Research and teaching laboratories are not funded through State budgets, and equipment must be acquired, replaced and maintained using either Salary Release Funds (SRF) or Sponsored Research Incentive (SRI) funds.

The chemical technician for CEES is Ron Conlon. Mr. Conlon maintains and services equipment for environmental and geotechnical laboratories in the CEC.

The other departmental technician (Mike Schmitz) is assigned to the Fears Structural Engineering and Broce Materials laboratories. Mr. Schmitz maintains all testing equipment at these facilities and assists in construction of various teaching and/or research devices. Mr. Schmitz also provides mechanical maintenance and repair services for CEES on an as-needed basis.

The costs of maintenance and servicing are covered by a number of sources. Routine course fees are used to purchase equipment and supplies required to teach courses. Research grant funds are used to cover routine maintenance and servicing requirements and to purchase maintenance agreements for equipment that is vulnerable to large maintenance and servicing costs. As needed, faculty use SRF and SRI funds to maintain and service equipment required for research activities.

E. Library Services

The University of Oklahoma Libraries serves the research needs of the CoE through the Engineering Library. The branch library, located in Felgar Hall in the heart of OU's engineering complex, provides convenient access to library materials and space for both collaborative and private study. The collection houses over 80,000 circulating volumes and a large selection of reference, periodical, and reserve materials. The branch library has seating for more than 50 students and offers seven computer workstations.

In addition to the traditional print collections, the University Libraries has made full text electronic access to scholarly monograph and journal content a top priority in its collection development endeavors. The University Libraries website features an Engineering subject page that provides e-access to a wide array of scholarly content from key science and technology publishers, including Elsevier, Springer, IEEE, ASCE, ICE, Wiley, CRC, and ASTM. University Libraries has aggressively pursued digital collections, including standards, proceedings, journals, and e-books, from these and many other engineering and applied sciences publishers and e-book aggregators. Content discovery is supported by more than a dozen science and engineering databases, including Engineering Information Village, IEEE Xplore, and Web of Science. Content access, print and electronic, is supported by the University Libraries' online catalog. While the Engineering Librarian promotes the use of the University Libraries' free interlibrary loan service to access materials outside of the collection, the librarian is responsive to new purchase requests and actively encourages purchase recommendations and collection input from the teaching faculty.

The Engineering Library is staffed by a tenure-track librarian, a full-time library technician, and six part-time student library assistants. The Engineering Librarian provides both in-class research instruction and individual research consultation. All Engineering Library staff are available for on-site reference assistance during operating hours, currently 69 hours per week during the fall and spring semesters and 53 hours per week through the summer session.

F. Overall Comments on Facilities

The university manages the classroom facilities. The Provost has an advisory committee for classrooms (PACCR). The committee reviews all aspects of the classroom facilities on campus, prioritizes renovations and sets standards for the rooms. The School in which a particular program resides manages the laboratory facilities.

All CEES laboratories follow the OU safety guidelines found at:

http://www.ouhsc.edu/ehso/Normanlabman/NormanLaboratorySafetyManual.htm

Each building has an emergency response plan covering all schools and programs housed in the facility. These plans establish a foundation for emergency response within and recognize that emergency planning and emergency response is a continual process that will adapt to the nature of the emergency at hand. They also serve as a framework to respond effectively and safely to an emergency. Each plan includes assessing an emergency situation, coordinating a response effort and, most importantly, that individuals are informed, safely evacuated or sheltered and accounted

for with reasonable accuracy. The plans establish seamless migration with the University of Oklahoma Emergency Response Plan. The University's Emergency Response Plan is located at: www.ou.edu/admin_and_finance.html.

The EPF is the home for all undergraduate students in the CoE and Mewbourne School of Petroleum and Geological Engineering (MPGE) students in the College of Earth and Energy. The facility has three major thrust areas: Hands-on multidisciplinary projects, student leadership, and engineering outreach. The 1st annual EPF Leadership Teams Workshop was held last September to introduce student leaders in the CoE to staff and resources in the EPF, as well as review proper emergency and safety procedures when using the facility, practice bays and machine shop. Students had an opportunity for team-building to build a more cohesive unit between student organizations and competitions using this facility, as well as learning about the unique experiential learning that occurs, ways students in the building contribute to K-12 outreach and recruitment, as well as tools to help each organization be successful throughout the year. To ensure safety in the facility, there is a comprehensive safety manual covering safety procedures and operations in the building. The manual details the procedure for briefing, training, and monitoring the users of the facility. Upon arrival in the facility, new users are introduced to the manual and thoroughly briefed on the contents. They are given specific direction on important safety procedures like the use of personal safety equipment (impact resistant eyewear, hearing protection, etc.) as well as the location of other safety equipment like eyewash stations, fire extinguishers, etc. A description of emergency procedures like fire evacuation inclement weather procedures is given as well. After receiving the safety briefing the users are given one-on-one training for each individual machine in the machine shop, dyno-testing room, bench labs, and bays. The students are not allowed to operate equipment until they have demonstrated to a staff member that they are competent and aware of all safety aspects involving that particular machine. At that time they are allowed to begin working on their own with the constant supervision of properly trained and designated student safety officers and student employees. In addition, throughout the course of each semester, there are workshops given on techniques and practices on each machine type or manufacturing process, such as welding and composite part manufacturing.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The CEES administrative structure is based upon the OU paradigm of a faculty administrative committee working in concert with the Director. The CEES Committee A consists of three faculty; one from each of the three thematic areas (i.e., environmental, geotechnical and structural). The Director serves as an Ex Officio member and functions as Chair of Committee A. Committee A members are nominated by the colleagues in their respective thematic areas and submitted to the entire CEES faculty for approval. Committee A members serve a two-year term.

B. Program Budget and Financial Support

Budget Process

CEES is allocated an annual State maintenance and operations (M&O) budget and funds to cover a limited number of teaching assistantships (TA's). Both the M&O budget and the graduate TA fund are grossly underfunded and continue to be augmented by SRI funds. Using research-generated funding to meet day-to-day expenses provides a strong disincentive for obtaining external research funds. Note that only 35% of annual M&O funding comes from State appropriations; the majority of expenditures must be raised by the unit.

SRI funds are derived from indirect costs on research grants. The Vice President for Research Administration establishes the indirect cost funds that are available for return to the colleges. Typically, about twenty percent of the available funds are returned to the colleges, prorated based on the level of indirect costs generated. The CoE Dean's office keeps 1.67% of the SRI funds and returns the remainder to the generating School. CEES SRI funds are divided between the PI (65%) and CEES (35%). CEES uses captured SRI funds for TAs and additional M&O expenditures.

The Provost also provides funds each year to support Assessment Activities. CEES uses the assessment funds to cover the cost for each student's initial attempt at passing the FE examination.

Externally funded contract research typically contains some funds to pay faculty time during the academic year. All faculty positions are funded at 100% by the State (for each FTE). Therefore, a faculty member having external funding may appoint him/herself to a project or grant for pay. The funds from the project release an equal amount of funds from the State appropriation for that particular faculty position. These are called salary release funds (SRF). All of the released State funds are retained by the School generating the external research funds. CEES currently returns all SRF funds to the PI.

In FY11, CEES had an annual State budget allotment of approximately 14 TAs (where 1 TA is a work commitment of 20 hours per week for 1 semester). Typically, an equal number of State-

supported TAs are assigned in the fall and spring semesters. Preference for TAs is given to: courses with laboratory components; new faculty, faculty with extraordinary and compelling requirements; and/or lower division classes with enrollments over 30, upper division classes with over 20 students, and graduate classes with more than 10 students. For classes, other than those described above, faculty are expected to fund their own TA requirements using returned SRF/SRI funds.

As noted above, the State-funded M&O and graduate TA budgets are grossly underfunded and have to be augmented by SRI funds. Using research-generated funding to meet day-to-day expenses is not a healthy situation.

Faculty salaries continue to be low when contrasted with comparator institutions. The discrepancy in salary levels is particularly evident for newly promoted Professors. This is of particular concern because this group includes six of the seven NSF CAREER awardees. Other universities could try to lure away these talented individuals unless the University can provide them with competitive salaries.

C. Staffing

CEES has four administrative staff personnel including the Assistant to the Director (Ms. Audre Carter), Graduate Programs Assistant (Ms. Susan Williams), Accounting Specialist (Ms. Brenda Clouse), and Staff Assistant (Ms. Molly Smith). The staff is adequate for running the day to day operations of the CEES graduate and undergraduate programs. To date, CEES has used part time staff to handle administrative overloads such as the WaTER Conference. However, additional full time staff personnel will be needed as CEES pursues new initiatives such as the WaTER Center.

The chemical technician for CEES is Ron Conlon. The other departmental technician (Mike Schmitz) is assigned to the Fears Structural Engineering and Broce Materials laboratories.

CEES allows staff personnel to attend mandatory training (e.g., sexual harassment, hazardous materials) and career advancement workshops available during regular business hours. Attending these types of events is considered part of the regular workload.

CEES has been fortunate to retain the administrative and technical staff over the past six years. The poor economic conditions of the state of Oklahoma have not allowed for raises for the past three years. Limited discretionary funds were used to give meager annual bonuses to the staff this past year.

D. Faculty Hiring and Retention

CEES uses a rigorous screening process for filling faculty vacancies. When a position becomes available, a Search Committee is formed. The Search Committee is comprised of at least two faculty members from the impacted thematic area (structural, geotechnical or environmental) plus one representative from each of the two remaining areas. The Director also serves on all

Search Committees. The Search Committee is charged with developing a position description for the vacancy. The committee submits the position description for faculty approval, then university approval and then distributes it to the appropriate advertising outlets (e.g., Department Heads Council, ASCE magazine, etc.). The Search Committee conducts the initial screening of the applicant pool then applies for approval from the university's affirmative action office. Once the screened pool is approved, the Search Committee conducts telephone interviews with each approved candidate. The candidates are supplied a list of questions and they return typewritten responses to the Search Committee prior to the telephone interview. After all of the telephone interviews are completed, the Search Committee meets to narrow down the pool to at most 3 candidates to bring to campus for personal interviews with the entire CEES faculty and other university administrators. The entire CEES faculty then meets to decide on which, if any, of the candidates to make an offer.

CEES has been fortunate to retain its talented faculty members over the past six years. In 2005, President Boren was instrumental in securing funds from the OU Foundation to address salary compression for our talented Associate Professors. However, the poor economic conditions of the state of Oklahoma have not allowed for raises for the past three years.

The primary means for retaining talented faculty in lieu of pay increases is award nominations. As noted previously, CEES faculty have been nominated and selected for every conceivable teaching and research award that the university offers. The Director and Committee A make a concerted effort to develop award nominations for deserving CEES faculty every year. In addition, when CEES faculty receive national awards (e.g., PECASE, AEESP Outstanding Faculty), the Director has negotiated pay raises and other professional development resources (e.g., laboratory renovation funds) from the central administration.

E. Support of Faculty Professional Development

Faculty professional development is covered in Section 6.D.

PROGRAM CRITERIA

As noted in Table 5-1 the undergraduate curriculum meets the basic level requirements for mathematics and basic sciences. Probability and statistics concepts are covered in CEES 3334 and used in all of the CEES laboratory courses. The undergraduate Environmental Engineering curriculum requires coursework in the areas of general chemistry (20 credits), earth science (CEES 3364), biological science (CEES 4234), introduction to environmental issues (e.g., air land, water and environmental health – 9 credits, CEES 2313, 2323, 4263), and environmental engineering design (CEES 3213, 3243), plus 3 credits of professional science elective and 3 credits of professional elective (in environmental engineering, environmental science or approved substitutes except in unusual circumstances). It is important to note that CEES science courses are taught by environmental science faculty.

Laboratory sections are required for select courses from each of the four broad areas: Geotechnical (CEES 3364 - Soil Mechanics); Measurements (CEES 3334- Measurements); Environmental Processes (CEES 3243- Water and Wastewater Treatment); and Environmental Sciences (CEES 4114- Aquatic Chemistry and CEES 4234- Applied Environmental Microbiology). A number of the Professional Electives also include laboratory components.

Design concepts, methodology and teamwork are incorporated throughout the EnvE curriculum, beginning with the first year. The curriculum culminates in a two semester major capstone experience (CEES 4813 and CEES 4923).The Professional Practice (CEES 4813) course addresses professional registration (including the proposed Body of Knowledge requirements), management, leadership, ethics, public policy, and communication skills. The Environmental Engineering Capstone (CEES 4923) course addresses a practitioner-guided, real world design problem using multidisciplinary teams comprised of environmental (and sometimes civil) engineers and environmental scientists. Prior to enrolling in CEES 4923, students must have completed the following courses – CEES 3213 Water Resources Engineering, CEES 3334 Measurements, and CEES 4813 Professional Practice course. These prerequisites ensure that students in the capstone course have been exposed to design processes necessary for completing the project.

The content of each course is summarized on the course syllabi in Appendix A.

Appendix A – Course Syllabi

1. **Course Number and Name:**
   CEES 1000, Civil Engineering and Environmental Science Seminar

2. **Credits and Contact Hours:**
   0 Credit Hours, One 60-minute lecture every two weeks

3. **Instructor's or Course Coordinator's Name:**
   Randall Kolar

4. **Text Book, Title, Author, and Year:**
   None
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Seminar provides a common meeting time for students and faculty for department activities, such as invited speakers, project presentations, educational surveys, cross-course project coordination, and policy announcements. Students must enroll every semester that they are matriculated in CEES at OU after the freshman year, but in no case can a student graduate without successfully completing four semesters of seminar. (F, Sp)

   b. **Prerequisites and/or Co-requisites:**
      None

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      Further the students' educational and professional development via external speakers representing various fields of CEES practice, movies followed by discussion, and student/faculty dialogue.

   b. **Student Outcomes:**
      EAC Outcomes: f, h, i, j

7. **Brief List of Topics Covered:**
   a. Example seminar topics from the past two semesters include the following: water resources in developing countries; offshore renewable energy; engineering ethics; earth retaining structures; NGWA Darcy lecture on groundwater/surface water interactions; CEES and ABET; a day in the life of a consulting engineer; Oklahoma's comprehensive water plan; Graduate school opportunities.

1. **Course Number and Name:**
   CEES 1112, Introduction to Civil Engineering and Environmental Science

2. **Credits and Contact Hours:**
   2 Credit Hours, Two 75-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   David A. Sabatini

4. **Text Book, Title, Author, and Year:**
   None
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Prerequisite: Freshman only. Introduction to fundamental concepts (mass/flow balance), problem solving and design, and simple computing software for architectural, civil or environmental engineers and environmental scientists. (F)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Freshmen only. Required.

6. **Specific Goals for the Course:**
   To gain fundamental skills critical to being a successful civil / environmental engineer / scientist, as listed below:
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. Have a basic understanding of civil engineering, environmental engineering, and environmental science issues.
      ii. Be able to tackle a complex problem by breaking it down into its components and developing solution pathways.
      iii. Be able to use basic methods (e.g., conservation of mass) and basic tools (e.g. Excel) to analyze components of a complex problem.
      iv. Effectively work in teams and communicate results in oral and written form using common tools (e.g., Word, PowerPoint).
      v. Improve skills as a self-guided learner.
   b. **Student Outcomes:**
      EAC Outcomes: a, c, i, k

7. **Brief List of Topics Covered:**
   a. Engineering calculations
   b. Mass and flow balance
   c. Spreadsheets
   d. Hydrological processes
   e. Presentations with PowerPoint
   f. Design of a dam
   g. Engineering economics
   h. Group dynamics

1. **Course Number and Name:**
   CEES 1213 Computing Applications in Civil Engineering and Environmental Science

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures per week

3. **Instructor's Name:**
   Tohren C. G. Kibbey

4. **Text Book, Title, Author, and Year:**
   "AutoCAD 2010 Essentials", Hamad, 2009
   "C++: A Beginner's Guide, 2nd Ed.", Schlidt, 2003

   a. **Other Supplemental Materials:**
      "A Guide to Microsoft Excel 2007 for Scientists and Engineers", Liengme, 2008, Recommended

5. **Specific Course Information:**
   a. **Catalog Description:**
      Introduction to application software and computing tools relevant to civil engineering, environmental engineering and environmental science, including programming, spreadsheets and computer-aided design. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Math 2423, Physics 2514 or concurrent enrollment

6. **Specific Goals for the Course**
   a. The objective of this class is to introduce a diverse set of computational skills that will help students, both in their studies, and as practicing civil or environmental engineers or environmental scientists. The course emphasizes programming, advanced spreadsheet use, and computer aided design.

   b. **Student Outcomes:**
      EAC Outcomes: k

7. **Brief List of Topics Covered:**
   A. **Programming with C++**
      a. Introduction to C++
      b. Basic Elements of C++
      c. The structure of a C++ program
      d. Input and output
      e. Branches
      f. Loops
      g. Arrays
      h. Strings
      i. Functions

j. Objects and Object Oriented Programming

B. Spreadsheets

a. Introduction to Excel
b. Entering and working with formulas
c. Relative vs. absolute references
d. Formatting spreadsheets
e. Good spreadsheet practice
f. Built-in Functions
g. Plotting (Charts)

C. Scientific/Engineering Graphics with AutoCAD

a. Scientific/Engineering Graphics Basics
b. AutoCAD Basics
c. Layers
d. Dimensioning
e. Model Space vs. Paper Space

1. **Course Number and Name:**
   CEES 2113, Statics and Dynamics

2. **Credits and Contact Hours:**
   3 Credit Hours, Three 50-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Jin-Song Pei (Jinsong Pei)

4. **Text Book, Title, Author, and Year:**
   "Vector Mechanics for Engineers: Statics", Beer, Johnston, Mazurek & Eisengurg, 2009
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Vector representations of forces and moments; general three-dimensional theorems of statics and dynamics; centoids and moments of area and inertia. Free-body diagrams, equilibrium of a particle and of rigid bodies, principles of work and energy; principle of impulse-momentum. Motion of particles and rigid bodies in translating and rotating reference frames. Newton's law of motion and Lagrange's equation, including application to lumped-parameter systems. Analyses of trusses, frames and machines. (F, Sp)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Physics 2514 and Mathematics 2433 or concurrent enrollment in Mathematics 2433.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will have a solid grasp of all topics covered in this course that are listed under Item 7.

   b. **Student Outcomes:**
      EAC Outcomes: a, c
      a. an ability to apply knowledge of mathematics, science and engineering
      e. an ability to identify, formulate and solve engineering problems

7. **Brief List of Topics Covered:**
   a. Force resultants and resolution of forces into components
   b. Rectangular components of a force, Unit vectors, Addition of forces
   c. Equilibrium of a particle, Free-body diagrams
   d. Rectangular components of a force in space, Equilibrium of a particle in space
   e. Vector product of two vectors, Moment of a force about a point
   f. Scalar product of two vectors, Mixed product of vectors

g. Moment of a force about a given axis, Moment of a couple
h. Equivalent systems of forces
i. Equilibrium of rigid bodies in two dimensions
j. Equilibrium of rigid bodies in three dimensions
k. Centoids and centers of gravity, distributed loads on beams
l. Analysis of trusses by the method of joints and sections
m. Introduction to analysis of beams

1. **Course Number and Name:**
   CEES 2153, Mechanics of Materials (Regular and Honors Sections)

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures or Three 50-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Kianoosh Hatami

4. **Text Book, Title, Author, and Year:**
   "Mechanics of Materials", Ferdinand P. Beer, E. Russell Johnston, Jr., John T. DeWolf and David F. Mazurek, $5^{th}/6^{th}$ ed., 2008/2011, McGraw-Hill Book Co.

   b. Other Supplemental Materials:
   a. Lecture notes in PowerPoint
   b. Links to selected interesting and informative websites posted on D2L (e.g. textbook website (learning center); http://www.engineeringsights.org/; http://video.pbs.org/video/1701025927/; http://web.mst.edu/~medialab/fipse/preview/Philpot/mohr_stress/a_draw.htm)

5. **Specific Course Information:**
   a. Catalog Description:
   Basic principles of mechanics, including the definition of stress and strain, transformations and principal values for the stress and strain tensors, kinematic relations, review of conservation equations and the development and application of constitutive laws for idealized materials. Elementary elastostatics utilizing Hooke's law; constitutive relations for a linear-elastic continuum, including elastic parameters such as Young's modulus, shear and bulk moduli and Poisson's ratio. Solution of elementary one- and two-dimensional mechanics problems, including thermal stresses and strains, beam flexure, shear and deflections, pressure vessels and buckling of columns. (Sp)

   b. Prerequisites and/or Co-requisites:
   Prerequisite: CEES 2113 or Aerospace and Mechanical Engineering 2113 or Petroleum Engineering 2113.
   Required

6. **Specific Goals for the Course:**
   a. Specific Outcomes of Instruction:
   At the end of the semester the students will understand analysis and design of members subjected to axial, shear, torsion and bending stresses. They will develop an understanding of basic concepts such as stress, strain, material strength and elastic properties, and plane-strain and plane-stress problems. They will be able to determine principal stresses in a beam under combined loading using Mohr's Circle. Additionally, they will be able to solve relatively simple

problems related to the analysis and design of pressure vessels and deflection of beams.

b. Student Outcomes:

EAC Outcomes for this course include: a,d,e,f

7. Brief List of Topics Covered:

a. Review of statics
b. Concepts of stress and strain
c. Hooke's Law and linear elasticity
d. Modulus of elasticity
e. Stress, strain and deflection of axially loaded members
f. Shear stress and strain
g. Shear modulus
h. Torsional stress and strain
i. Pure shear
j. Torsional deformations
k. Power transmission in circular shafts
l. Beams
m. Shear and bending moments diagrams
n. Bending stresses and strains in beams
o. Composite beams
p. Shear stresses in beams
q. Transformation of plane stress
r. Principal stresses and strains
s. Mohr's circle
t. Pressure vessels
u. Deflection of beams
v. Beam deflections by integration
w. Moment-area theorems
x. Statically indeterminate structures

1. **Course Number and Name:**
   CEES 2223, Fluid Mechanics

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Randall Kolar, Keith Strevett (two sections taught)

4. **Text Book, Title, Author, and Year:**
   Kolar section; "Engineering Fluid Mechanics: 9th Edition", Crowe, Elger, Roberson & Williams, 2009
   Strevett section; "Mechanics of Fluids: 3rd Edition", Potter and Wiggert, 2002
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Coverage of the fundamentals of fluid statics and dynamics. Formulation of the equations of fluid flow, i.e., Navier-Stokes equation, Eulers equation, Bernoulli equation, etc. and their application. Examples of ideal fluid flow and viscous fluid flow, such as flow in open and closed conduits. (Sp)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: 2113 or Aerospace and Mechanical Engineering 2113 or Petroleum Engineering 2113, Mathematics 3113 or concurrent enrollment.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students:
      i. will have an understanding of fundamental principles of fluid mechanics - conservation of mass, conservation of momentum, conservation of energy - and apply those principles to various engineering problems, including forces on submerged objects, pressure measurements, buoyancy, flow in conduits, open channel flow, flow measurement, forces due to momentum changes, and hydraulic machinery.
      ii. must demonstrate, via quizzes, homework assignments, and exams, both a conceptual understanding and proficiency with analysis and design tools.
      iii. will have the foundation knowledge needed for upper division courses in water resources and environmental engineering.
   b. **Student Outcomes:**
      EAC Outcomes: a, c, e

7. Brief List of Topics Covered:

a. Introduction, fluid properties, and basic considerations;
b. Fluid statics: manometers, forces on plane and curved surfaces, buoyancy, stability;
c. Fluids in motion: flow classification/visualization, Lagrangian vs. Eulerian description, Euler's equation, Bernoulli equation, linearly accelerating and rotating flows;
d. Control volume analysis: conservation of mass, momentum, and energy;
e. Dimensional analysis and similitude;
f. Flow in conduits: friction losses, minor losses, grade lines, hydraulic machinery;
g. Lift and drag;
h. Miscellaneous topics (as time permits): open channel flow, flow measurement, computational fluid dynamics, compressible flow.

1. **Course Number and Name:**
   CEES 2313, Water Quality Fundamentals

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Elizabeth Butler

4. **Text Book, Title, Author, and Year:**
   "Fundamentals of Environmental Engineering, Mihelcic, 1999
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Introduction to environmental mass balance and fate processes. Studies of mass and energy transfer, introductory environmental chemistry, water quality parameters, mathematics of growth, statistics and data analysis, introduction to environmental laws and regulations. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Chemistry 1415, Mathematics 2423.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will be able to:

      i. For solid phases (e.g., soil, biota (plant and animal tissue)), convert from mg/kg or µg/kg to ppm,m, or ppb,m, and vice versa.
      ii. For gases, convert between mass per volume (e.g., moles/L or $\mu g/m^3$), partial pressure, and ppm,v or ppb,v for different temperatures.
      iii. For dissolved species in water, convert between units of molarity (M), normality (N), mg/L, µg/L, ppm,m, and ppb,m.
      iv. Express concentrations of different species containing the same element (e.g., NH_4^+, NH_3, NO_2^-, NO_3^- in terms of the common constituent (in this example, N). For example, given the concentration of NH_3 in moles/L or mg/L, convert it to mg/L as N.
      v. Set up and solve mass balance problems, including those for both steady and non-steady state systems and conservative and non-conservative substances.
      vi. Set up and solve energy balance problems, including those for both open and closed and steady and non-steady state systems.

vii. Calculate free energy changes for a chemical reaction and the spontaneous direction of a chemical reaction under standard and non-standard conditions.
viii. Calculate equilibrium constants at temperatures other than 25 ^{o}C using the van't Hoff equation.
ix. Use equilibrium constants and a chemical equilibrium approach to determine equilibrium concentrations of unknown species in systems containing acids and bases, and dissolved species and solids.
x. Know the conventions for the activity scales (or units) for different kinds of species i.e., dilute solutes, pure liquids, pure solids, gases.
xi. Determine the gas phase concentrations of volatile organics, given the total mass of organic compound and the volume of an enclosed space.
xii. Determine the gas phase concentration of a volatile substance given its aqueous concentration, or vice versa; do this using dimensionless or non-dimensionless Henry's Law constants, and for atmospheric gases (e.g., O_2, CO_2) or volatile organic contaminants (e.g., benzene, trichloroethylene).
xiii. Given the volumes of air and water, and the total mass of contaminant added to an air/water system, determine the mass or concentration of contaminant in either phase (i.e., air or water).
xiv. Determine reaction order and rate constants from experimental data.
xv. Use rate constants to determine half lives, the amount of a reactant remaining after a certain time, or the amount of time required for a certain fraction of a reactant to be degraded.
xvi. Apply rate laws for zero and first order (including pseudo-first-order) reactions. Calculate pseudo-first-order rate constants from second order rate constants and the appropriate concentration data.
xvii. Discuss basic facts about the Safe Drinking Water Act and the Clean Water Act from the assigned reading and class handouts.
xviii. Calculate total, fixed, and volatile suspended and dissolved solids based on experimental data.
xix. Calculate the biological oxygen demand (BOD), chemical oxygen demand (COD), or total organic carbon (TOC) of a water sample based on experimental data.
xx. Calculate the theoretical oxygen demand (ThOD) of a water sample based on the composition of the water.
xxi. Predict downstream concentrations of dissolved oxygen (DO) given rate constants for DO depletion, reaeration, and stream or river velocity (or information needed to calculate stream or river velocities).
xxii. Given two of the following three: k_L (rate constant for BOD decay), BOD_t (BOD remaining at time t), and L_0 (ultimate BOD), calculate the third.
i. Quantitatively and qualitatively assess the effects of nutrients (N and P) on water quality (eutrophication).

b. Student Outcomes:
EAC Outcomes: a, b, c, i

7. Brief List of Topics Covered:

i) Conventions for expressing concentrations in different environmental media (including solid phase (biomass, soil), aqueous, and gas phase)
ii) Mass balances
iii) Energy balances
iv) Chemical thermodynamics (whether reactions will proceed spontaneously under standard and non-standard conditions)
v) Chemical equilibrium problems
- acid/base equilibria
- precipitation/dissolution equilibria
- air/water equilibria (Henry's Law)
- pure phase/vapor equilibria

vi) Chemical kinetics
vii) Safe Drinking Water Act and Clean Water Act
viii) Total and suspended solids
ix) Oxygen demanding wastes
- how to quantify oxygen demanding wastes (BOD_5, L_0, COD, TOC, ThOD (nitrogenous and carbonaceous)
- BOD kinetics
- DO depletion in streams and rivers (Streeter Phelps equation)

x) Nutrients (N and P) and their impacts on water quality (eutrophication)

1. **Course Number and Name:**
   CEES 2323, Environmental Transport and Fate Process

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Mark Nanny

4. **Text Book, Title, Author, and Year:**
   "Fundamentals of Environmental Engineering", Mihelcic, 1999
   a. **Other Supplemental Materials:**
      - Chapter 2: Physical-Chemical Characteristics of Soils and the Subsurface, I.L. Pepper and M.L. Brusseau, Environmental & Pollution Science, 2nd edition, Ian L. Pepper, Charles P. Gerba, and Mark L. Brusseau, editors, Elsevier, 2007.
      - Chapter 2: Bonds and Molecules – Their Influence on Physical Chemical Properties in the Environment, Des W. Connell, Basic Concepts of Environmental Chemistry, Lewis Publishers, 1997.
      - Chapter 2: An Introduction to Environmental Organic Chemicals, Rene P. Schwarzenbach, Philip M. Geschwend, and Dieter M. Imboden, Environmental Organic Chemistry, 2nd edition, Wiley-Interscience, 2003.
      - Chapter 3.12: Adsorption, Clair N. Sawyer, Perry L. McCarty, and Gene F. Parkin, Chemistry for Environmental Engineering and Science, McGraw Hill, 2003.
      - Chapter 2 sections on: Octanol/Water Partition Coefficient, James E. Girard, Principles of Environmental Chemistry, Jones and Bartlett Publishers, 2005.
      - Chapter 7: Ion Exchange in Soils, R.L. Hausenbuilder, Soil Science: Principles and Practice, 3rd edition, Wm. C. Brown Publishers, 1985.
      - Chapter 5.5: Hydrolysis, Donald G. Crosby, Environmental Toxicology and Chemistry, Oxford University Press, 1998.
      - Chapter 4: Oxidation-Reduction, Stanley E. Manahan, Environmental Chemistry, 7th edition, Lewis Publishers, 2000.
      - Chapter 4.9: Oxidation-Reduction Reactions, Steven S. Zumdahl, Chemistry, D.C. Heath and Company, 1986.
      - Chapter 8: Biological Processes Affecting Contaminant Transport and Fate, R.M. Maier, Environmental & Pollution Science, 2nd edition, Elsevier, 2007.
      - "What is ground water" and "What is an aquifer?" Readings from the United States Geological Survey website. http://pubs.usgs.gov/of/1993/ofr93-643/, http://pubs.usgs.gov/gip/gw/, http://capp.water.usgs.gov/aquiferBasics/uncon.html
      - Chapter sections 5.8 Groundwater, 5.9 Aquifers, 5.10 Hydraulic Gradient, 5.11 Darcy's Law, and 5.12 Contaminant Transport, Gilbert M. Masters, Introduction to Environmental Engineering and Science, Prentice Hall, 1998.

- The Hydrologic Cycle and Interactions of Ground Water and Surface Water, reading from the United States Geological Survey website: http://pubs.usgs.gov/circ/circ1139/htdocs/natural_processes_of_ground.htm
- Chapter 15: Sediment (Soil Erosion) as a Source of Pollution, D.F. Post, Pollution Science, Ian L. Pepper, Charles P. Gerba, and Mark L. Brusseau, editors, Academic Press, 1996.

5. Specific Course Information:

a. Catalog Description:

Physicochemical and biological processes controlling contaminant distribution and fate; hydrological processes controlling contaminant transport; sources, prevention and remediation of environmental pollutants. (Sp)

b. Prerequisites and/or Co-requisites:

Prerequisite: CEES 2313.
Required

6. Specific Goals for the Course:

a. Specific Outcomes of Instruction:

At the end of the semester, the students will be able:

- To identify and describe the properties and processes associated with environmental compartments (e.g., soil, groundwater, surface water, and atmosphere) affecting contaminant fate and transport;
- To quantify major biotic and abiotic fate processes (e.g., sorption, hydrolysis, redox transformations, biodegradation);
- To quantitatively predict the transport of a contaminant through mass transfer processes (dispersion, gravitational settling, and movement through a saturated porous medium (Darcy's Law));
- To use quantitative fate process models and quantitative transport process models to predict the fate and transport of contaminants within and between multiple environmental compartments;
- To map a subsurface contaminant plume and predict its origin using well data and contour plotting.

b. Student Outcomes:

EAC Outcomes: a, e, h, j

7. Brief List of Topics Covered:

A. Soil and sediment properties and processes
- Soil profiles and structure
- Physical and chemical soil and sediment properties

B. Biogeochemical Fate Processes
- Aqueous solubility and solubilization
- Sorption – general principles
- Sorption – organic compounds and natural organic matter
- Sorption – metal ions and minerals, cation exchange capacity

- Hydrolysis
- Abiotic reduction and oxidation reactions
- Biodegradation

C. Mass Transport Processes
- Hydraulic gradients
- Darcy's Law
- Dispersion
- Gravitational settling

D. Hydrological Cycle
- Contour plotting
- Aquifer structure and recharge mechanisms
- Sedimentation

1. **Course Number and Name:**
   CEES 3213, Water Resources Engineering

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 50 minute-lectures and one 110 minute laboratory session per week

3. **Instructor's or Course Coordinator's Name:**
   Randall Kolar

4. **Text Book, Title, Author, and Year:**
   "Water Resources Engineering: 2nd Edition", Chin, 2006
   (Optional) "Computer Applications in Hydraulic Engineering" with CD, Bentley Systems, (2010)
   a. **Other Supplemental Materials:**
      Handouts on Desire to Learn (web)

5. **Specific Course Information:**
   a. **Catalog Description:**
      Municipal water demands, surface water hydrology, ground water hydrology, water distribution systems, pump design, wastewater collection systems, storm water management, water law. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: 2223 or permission of instructor.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. remember the basic facts and concepts underlying each of the core subject areas of water resources engineering, as listed in the catalog description;
      ii. use good engineering design principles, including analyzing and assessing multiple alternatives, to solve common water and sewer infrastructure problems found in both modern cities and rural villages;
      iii. find connections between water resources and other subdisciplines of civil and environmental engineering and be able to able identify the technical and non-technical constraints that may be placed on their design;
      iv. appreciate the value of multiple perspectives in problem solving and gain experience with team dynamics;
      v. be excited about their chosen profession of engineering (in general), and water resources engineering (in particular), and realize that an engineering degree equips them to make a difference in the world;
      vi. be curious about the function of civil infrastructure and be able to identify sources of data and design resources needed to tackle problems that are beyond the scope covered in this class.

b. Student Outcomes:
EAC Outcomes: a, c, d, e, g, i, k

7. Brief List of Topics Covered:

a. Introduction to water resources engineering
b. Municipal water demands
c. Sources of water:
    i. Basic surface water hydrology and the water budget
    ii. Basic ground water hydrology and well hydraulics
d. Design of water distribution systems
e. Pump analysis & design (system curves, pumps in parallel & series)
f. Quantities of waste
g. Open channel hydraulics for sewer systems
h. Design of sanitary sewers
i. Urban hydrology
j. Design of storm sewers
k. Introduction to water law

1. **Course Number and Name:**
   CEES 3243, Water and Wastewater Treatment Design
2. **Credits and Contact Hours:**
   3 Credit Hour, Two 50-minute lectures and one 110-minute laboratory session per week.
3. **Instructor's or Course Coordinator's Name:**
   Keith Strevett
4. **Text Book, Title, Author, and Year:**
   "Unit Operations and Processes in Environmental Engineering, Reynolds and Richards, 1995
   a. **Other Supplemental Materials:**
      None
5. **Specific Course Information:**
   a. **Catalog Description:**
      Design of municipal water and wastewater treatment plants. Emphasis is placed on the characterization of water and wastewater and physical, chemical and biological treatment methods. Sludge processing advanced treatment methods and treatment plant hydraulics are also considered. (Sp)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: CEES 2223 and 2313.
      Required
6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. Evaluate a scenario requiring water or wastewater treatment and draw an appropriate process flow schematic for full-scale treatment of the water or wastewater being evaluated. The contaminants removed and residuals produced by each operation or process must also be identified in all schematics; formulate reactor design equations by implementing mass balance concepts and integrating them with simple chemical and biological kinetic expressions, as appropriate; professionally convey engineering design calculations using a written format; apply established equations and approaches to the design of the water and wastewater operation/process. Laboratory
   b. **Student Outcomes:**
      EAC Outcomes: a, c, e, g
7. **Brief List of Topics Covered:**
   a. Introduction: Materials Balance; Reaction Kinetics
   b. Water Treatment: Water Chemistry; Water Quality, Coagulation, Softening, Mixing, Flocculation, Sedimentation, Filtration and Disinfection.
   c. Wastewater Treatment: Design Overview; Microbiology, Water Quality, Pretreatment, Primary Treatment, Secondary Treatment, Tertiary Treatment and Sludge Treatment.

1. **Course Number and Name:**
   CEES 3334, Measurements In CEES

2. **Credits and Contact Hours:**
   4 Credit Hours, Three 50-minute lectures per week, One 170 minute laboratory per week

3. **Instructor's or Course Coordinator's Name:**
   Yang Hong

4. **Text Book, Title, Author, and Year:**
   Mendenhall, W. and Sincich, T. (2007). *Statistics for Engineering and the Sciences*, 5th Edition, Pearson, Prentice Hall. NJ. ISBN:0-13-187706-2. (ch1-3,5,7,8,10)

   *Barry F. Kavanagh (2008), Surveying: Principles and Applications, 8th Edition,*791pp, Prentice Hall, ISBN-13: 9780132365123; (ch1,5,10, Appendix A)

   Other Supplemental Materials:
   W. J. Youden, 1997: Experimentation and Measurement, National Institute of Standards and Technology (NIST) Standard Reference Materials Program, Statistical Engineering Division, Department of Commerce

5. **Specific Course Information:**
   a. **Catalog Description:**
      Introduction to measurement (laboratory and field) techniques, data analysis and interpretation and applications to architectural, civil or environmental engineering and environmental science problems. Topics include statistics, land surveying, remote sensing, GIS, environmental sampling and analysis and sensors. **Laboratory** (Sp)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Mathematics 2423, Physics 2424 or Physics 2524
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. To provide students with awareness of space and of methodologies to measure distance, elevation, direction, and description of these features.
      ii. Write a professional technical memo in a standard engineering format in order to convey information and give recommendations concerning an engineering problem.
      iii. Understand and be able to apply basic principles of statistics and probability to data sets of varying types.
      iv. Estimate and discuss the accuracy and precision of laboratory or surveying measurements and be knowledgeable concerning sources of error in those measurements.

b. Student Outcomes:
EAC Outcomes: a, b, c, k

7. Brief List of Topics Covered:

a. Weeks 1-5, Test 1
   i. Measurements and statistics
   ii. Standard Error and Error Propagation
   iii. Uncertainty, Precision and Accuracy
   iv. Probability concepts
   v. Confidence Intervals
   vi. Hypothesis, z-test and Student t-test

b. Weeks 6-10, Test 2
   i. Topographic Mapping
   ii. Total Stations
   iii. GPS measurements of horizontal and vertical measurement
   iv. Working with coordinates and GIS

c. Weeks 11-15, Test 3
   i. Environmental Sampling
   ii. Calibration of Sensors
   iii. Field Surveys
   iv. Term project and laboratory

1. **Course Number and Name:**
   CEES 3364, Soil Mechanics

2. **Credits and Contact Hours:**
   4 Credit Hours, Three 50-minute lectures and one 170 minute laboratory session per week.

3. **Instructor's or Course Coordinator's Name:**
   Amy Cerato

4. **Text Book, Title, Author, and Year:**
   "Introduction to Geotechnical Engineering", Holtz-Kovacs, 1981
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      General treatment of the physical and mechanical properties of soils. Theories of effective stress, consolidation, lateral earth pressure, bearing capacity, slope stability and groundwater flow. **Laboratory** (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: CEES 2153.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. To provide students with an understanding of the fundamental behavior of soil with regard to applications in geotechnical engineering.
   b. **Student Outcomes:**
      EAC Outcomes: a, b, c, e, g, k

7. **Brief List of Topics Covered:**
   a. Laboratory tour/slide show on Geotechnics
   b. Soil identification/phase relationships - ASTM D2488
   c. Soil classification - ASTM D2487, D422, D4318
   d. Soil survey exercise
   e. Soil compaction - ASTM D698, D1557
   f. Permeability and seepage
   g. Video seminar (deep dynamic compaction, trenchless technology)
   h. Oedometer test - ASTM D2435
   i. Geotechnical exploration exercise
   j. Direct shear test - ASTM D3080
   k. Unconfined compression test - ASTM D2166
   l. Triaxial compression test - ASTM 4767
   m. Geosynthetics seminar

1. **Course Number and Name:**
   CEES 4114, Aquatic Chemistry

2. **Credits and Contact Hours:**
   4 Credit Hours, Three 50-minute lectures and one 170-minute laboratory session per week. Laboratories include wet chemistry labs and computer labs using MINEQL+ chemical equilibrium software.

3. **Instructor's or Course Coordinator's Name:**
   Elizabeth Butler

4. **Text Book, Title, Author, and Year:**
   "A Problem Solving Approach to Aquatic Chemistry", Jensen, 2003
   a. **Other Supplemental Materials:** None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Environmental kinetics and thermodynamics in aquatic systems; acid/base, precipitation/solubility, metal complexation and oxidation/reduction reactions; environmental colloidal and solid-liquid interface chemistry. No student may earn credit for both 4114 and 5114 or Environmental Science 4114 and 5114. **Laboratory** (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: senior standing and one year of general chemistry.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:

      i. Calculate equilibrium constants from thermodynamic data (ΔG^{o}_{f} values).
      ii. Identify the conventionally-used activity scales for any species involved in a chemical equilibrium reaction.
      iii. Determine whether a reaction will proceed spontaneously in the forward or reverse direction given data about the system composition (i.e., the concentrations or partial pressures of the reactants and products).
      iv. Determine the effects of temperature and ionic strength on equilibrium constants.
      v. Use temperature or ionic strength adjusted equilibrium constants in solving chemical equilibrium problems.
      vi. Understand and apply the relationship $K_a K_b = K_w$.
      vii. Identify the species present at equilibrium in the carbonate system.
      viii. Calculate the total alkalinity of a solution from titration data.
      ix. Knowing the alkalinity and pH of a sample, calculate the concentrations of all carbonate species, for both open and closed systems.

x. Calculate the changes in alkalinity, pH, and/or C_T that would result from mixing two waters with different compositions (say a wastewater discharging into a lake).
xi. Determine the concentration of all metal species in a water given pH, $[M]_T$, and $[L]_T$, (where M=metal and L=ligand) for the case where the ligand is present far in excess of $[M]_T$. When the ligand is CO_3^{2-}, calculate its concentration from alkalinity, C_T, or P_{CO2}.
xii. Calculate the concentrations of dissolved metals in equilibrium with different solid phases at different values of pH, C_T and/or P_{CO2}.
xiii. Identify the oxidation state of an element in different chemical species.
xiv. Write the balanced reaction between the oxidized and reduced forms of a redox couple, e.g., NO_3^- and NH_4^+, or $Fe_2O_3(s)$ and Fe^{+2}.
xv. Combine oxidation/reduction half reactions to form balanced overall reactions.
xvi. Understand and apply the formulas relating K, $\Delta G°$, E°, and pe° (and the formulas relating ΔG, E, and pe).
xvii. Determine the system pe for natural waters where the redox conditions are controlled by a certain redox couple, for example, an aerobic water, or an anaerobic water where sulfate-reducing bacteria are growing.
xviii. Use the system pe to determine the speciation of an element present at trace levels, assuming redox equilibrium.
xix. Understand qualitatively and quantitatively the effects of pH on reaction kinetics involving chemical species that undergo acid/base or hydrolysis reactions (e.g., Fe^{+2}) as a function of pH.
xx. Understand qualitatively and quantitatively the effect of ionic strength on the rates of elementary reactions involving ionic or neutral species.
xxi. Identify acid/base species present at the surfaces of metal oxides and understand the trends in surface complex formation for cations and anions as a function of pH.
xxii. Apply MINEQL+ to efficiently solve chemical equilibrium problems.

b. Student Outcomes:
EAC Outcomes: a, b, e

7. Brief List of Topics Covered:

i. Thermodynamics/chemical equilibria
ii. Aqueous species (acids, bases, salts)
iii. Acid base equilibria/tableau method
iv. Log C-pH diagrams; carbonate system (open and closed)
v. Alkalinity
vi. Buffer capacity
vii. Complexation reactions
viii. Precipitation/dissolution reactions
ix. Oxidation/reduction reactions
x. Chemical kinetics
xi. Surface complexation

1. **Course Number and Name:**
   CEES 4234, Applied Environmental Microbiology

2. **Credits and Contact Hours:**
   4 Credit Hours, Three 50-minute lectures and one 140-minute laboratory session per week

3. **Instructor's or Course Coordinator's Name:**
   Keith Strevett

4. **Text Book, Title, Author, and Year:**
   "Environmental Microbiology 2nd Edition", Maier, Pepper, Gerba, 2010
   "Environmental Microbiology, A Laboratory Manual", Pepper and Gerba, 2004
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Basic environmental microbiology and bioenvironmental engineering. Presentation of the diversity and importance of organisms involved in solid and liquid waste reduction. The course examines basic microbiology, biodegradation mechanisms, bioavailability, biotreatability studies, groundwater remediation (both oxic and anoxic), and bioengineering process technologies. No student may earn credit for both 4234 and 5234. **Laboratory** (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: CEES 2323 and 3243.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. This course will provide introduction to biotic systems important to environmental remediation. The course emphasizes microbial ecology, microbial physiology, and bacterial metabolism.
   b. **Student Outcomes:**
      EAC Outcomes: a, b, d, g, j

7. **Brief List of Topics Covered:**
   a. Introduction to general microbiology
   b. Groundwater Microbiology
   c. Biogeochemistry
   d. Microbial Nutrition
   e. Reaction Kinetics
   f. Biokinetics
   g. Bioenergetics

h. Central Metabolism
i. Petroleum hydrocarbon Metabolism
j. Halogenated hydrocarbon Metabolism
k. Bioremediation

1. **Course Number and Name:**
   CEES G4263, Hazard and Solid Waste Management

2. **Credits and Contact Hours:**
   3 Credit Hours, Two 75-minute lectures per week

3. **Instructor's or Course Coordinator's Name:**
   Robert Nairn

4. **Text Book, Title, Author, and Year:**
   "Hazardous Wastes: Sources, Pathways, Receptors, Watts, 1998
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Sources and types of solid wastes; identification and classification of hazardous wastes; waste handling, transportation, treatment and disposal techniques, federal and state legislation; and environmental and health effects. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Prerequisite: CEES 2323 or 3213 or permission of instructor. Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. To provide students with an understanding of solid and hazardous waste management, including waste minimization techniques, treatment and disposal alternatives, environmental impact and health effects, and regulatory issues.
   b. **Student Outcomes:**
      EAC Outcomes: a, c, e, h, j

7. **Brief List of Topics Covered:**
   a. Introduction to solid and hazardous waste management (2 cl.)
   b. Nomenclature of chemicals, history of industrialization, material use (4 cl.)
   c. Properties and classification of hazardous materials (2 cl.)
   d. Sources of materials to the environment (2 cl.)
   e. Partitioning, sorption and exchange reactions (2 cl.)
   f. Volatilization processes (2 cl.)
   g. Abiotic and biotic transformations (2 cl.)
   h. Contaminant release and transport processes (2 cl.)
   i. Toxicology and risk assessment (3 cl.)
   j. Minimization, remediation, treatment and disposal (3 cl.)
   k. Pathway application design (3 cl.)

1. **Course Number and Name:**
   CEES 4813, Environmental Science and Environmental Engineering Professional Practice

2. **Credits and Contact Hours:**
   3 Credit Hours, One 180 minute lecture per week

3. **Instructor's or Course Coordinator's Name:**
   Robert C. Knox

4. **Text Book, Title, Author, and Year:**
   None
   a. **Other Supplemental Materials:**
      None

5. **Specific Course Information:**
   a. **Catalog Description:**
      Nature of profession, duties and administrative responsibilities. Organization and management of operating divisions with emphasis on role of environmental professional. Functional approach to planning and implementing public works needs with emphasis on role of environmental professional. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: senior standing in environmental science or environmental engineering.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      i. Be trained in non-technical areas needed for professional practice.
      ii. Have developed an understanding of the future of professional practice.
   b. **Student Outcomes:**
      EAC Outcomes: d, f,

7. **Brief List of Topics Covered:**

Week	Topic
(1)	Personality tests, Resume development
(2)	Team assignments, Oral Communications
(3)	Team building, Brainstorming, Charette Assignment
(4-5)	Ethics
(6)	Written Communications
(7)	Engineering and Civic Government
(8)	Leadership
(9)	Embarking on Your Engineering Career
(10)	Starting Your Engineering Business

(11) Economics, Time Value of Money
(12) Professional Registration and the Body of Knowledge
(13-14) Economics, Money and the Engineer

1. **Course Number and Name:**
   CEES 4923 Environmental Engineering Capstone

2. **Credits and Contact Hours:**
   3 Credit Hours, One 75-minute lecture per week. One 75-minute group meeting per week

3. **Instructor's or Course Coordinator's Name:**
   Robert C. Knox

4. **Text Book, Title, Author, and Year: - none**
   a. **Other Supplemental Materials:**
      Variable, depending on project

5. **Specific Course Information:**
   a. **Catalog Description:**
      Solution of major design problems by a team approach of disciplines. Problems to be varied within the area of Environmental Engineering (Water Resources; Water and Wastewater Treatment; Environmental Remediation; Hazardous and Solid Waste Design). The capstone project will be under direct faculty supervision. (Sp) [V]
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: CEES 3213, CEES 3334, CEES 4114, CEES 4324 and CEES 4813. Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      The capstone experience is a course in which students draw upon various aspects of their undergraduate course work for a comprehensive analysis of an open-ended real world problem. The end result is a design report and oral presentation before the Environmental Capstone Advisory Board.

   b. **Student Outcomes:**
      EAC Outcomes: all of a to k

7. **Brief List of Topics Covered:**

1	Project Introduction Site Visit – East Side
2	Site Visit – West Side Presentation Topics
3	Team Building Experiment Topical Presentations
4	Work Plan Assignment Team Working Session
5	DRAFT of Work Plan Peer Evaluations Team Working Session

6	Work Plan Edits/ Discussion Team Working Session
7	Work Plan Edits/ Discussion Team Working Session
8	Revised Work Plan Peer Evaluations Team Working Session
9	Spring Break Spring Break
10	Working Review Session
11	Working Review Session Team Working Session
12	Working Review Session Team Working Session
13	Working Review Session DRAFT Final Report
14	Working Review Session 100% Completion Report
15	Practice Presentations Peer Evaluations Oral Presentation

1. **Course Number and Name:**
   CHEM 1315, General Chemistry

2. **Credits and Contact Hours:**
   5 Credit Hours, 3 hours lecture, 3 hours laboratory, 1.5 hours recitation

3. **Instructor's or Course Coordinator's Name:**
   Michael R. Abraham

4. **Text Book, Title, Author, and Year:**
   Chemistry 2nd Ed. –Burdge, McGraw-Hill, 2011
   a. **Other Supplemental Materials:**
      HTT TX 3200 RF Clicker
      Desire to Learn (D2L) learn.ou.edu
      Web Assign.net
      Inquiries into Chemistry, 3rd Edition, Abraham and Pavelich, Waveland Press, 1999.
      During Class Inventions and Computer Lab Activities Vol. I, 3rd Edition, Abraham, Gelder, & Greenbowe, Hayden-McNeil, 2009.
      Approved Safety Googles

5. **Specific Course Information:**
   a. **Catalog Description:**
      First of a two-semester sequence in general chemistry. Topics covered: basic measurement, gas laws and changes in state, stoichiometry, atomic theory, electron configuration, periodicity, bonding, molecular structure and thermochemistry. **Laboratory** (F, Sp, Su)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Mathematics 1503 or 1643, or math ACT equal to or greater than 23.

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      Chemistry 1315 is the beginning general chemistry course for students in the physical sciences, engineering, health sciences, biological sciences, and related fields. At the end of the semester the students will:
      1. Have a good understanding of the concepts associated with the course.
      2. Be able to collect and interpret laboratory information supporting the development of the concepts associated with the course
      3. Begin to develop the science processes of a laboratory science.
      4. Relate the submicroscopic, macroscopic, and symbolic representations of chemical systems with each other.

   b. **Student Outcomes:**
      EAC outcomes: a, b
      CAC Outcomes: a

7. Brief List of Topics Covered:

1. Basic Concepts, Atoms, Molecules & Ions
2. Stoichiometry
3. Theromochemistry
4. Atomic Structure & Periodicity
5. Molecular Structure and Bonding
6. Properties of Gases
7. Properties of Liquids, Solids, and Solutions
8. Organic Chemistry

1. **Course Number and Name:**
   CHEM 1415, General Chemistry (Continued)

2. **Credits and Contact Hours:**
   5 Credit Hours, 3 hours lecture, 3 hours laboratory, 1.5 hours recitation

3. **Instructor's or Course Coordinator's Name:**
   Michael R Abraham

4. **Text Book, Title, Author, and Year:**
   Chemistry 2nd Ed. –Burdge, McGraw-Hill, 2011
   a. **Other Supplemental Materials:**
      HTT TX 3200 RF Clicker
      Desire to Learn (D2L) learn.ou.edu
      Web Assign.net
      Inquiries into Chemistry, 3rd Edition, Abraham and Pavelich, Waveland Press, 1999.
      During Class Inventions and Computer Lab Activities Vol. II, 3rd Edition, Abraham, Gelder, & Greenbowe, Hayden-McNeil, 2009.
      Approved Safety Googles

5. **Specific Course Information:**
   a. **Catalog Description:**
      Second of a two-semester sequence in general chemistry. Topics covered include: nature of solutions, equilibrium, thermodynamics, acid and base properties, kinetics and electrochemistry. **Laboratory** (F, Sp, Su)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: 1315 with a minimum grade of C or a satisfactory score on the chemistry placement examination.

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      Chemistry 1415 is the beginning general chemistry course for students in the physical sciences, engineering, health sciences, biological sciences, and related fields. At the end of the semester the students will:
      1. Have a good understanding of the concepts associated with the course.
      2. Be able to collect and interpret laboratory information supporting the development of the concepts associated with the course
      3. Continue to develop the science processes of a laboratory science.
      4. Relate the submicroscopic, macroscopic, and symbolic representations of chemical systems with each other.

   b. **Student Outcomes:**
      EAC Outcome: a, b
      CAC Outcome: a

7. Brief List of Topics Covered:

1. Kinetics
2. Equilibrium
3. Acid/Base
4. Aqueous Equilibrium
5. Chemical Thermodynamics
6. Electrochemistry
7. Nuclear Chemistry
8. Coordination Chemistry

1. **Course Number and Name:**
   CHEM 3053, Organic Chemistry I: Biological Emphasis

2. **Credits and Contact Hours:**
   3 credits, 48 contact hours

3. **Instructor's or Course Coordinator's Name:**
   A.K.Fazlur Rahman

4. **Text Book, Title, Author, and Year:**
   Organic Chemistry 1st Edition by, David Klein, Wiley, John & Sons, Incorporated, 2010.
   a. **Other Supplemental Materials:**
      Study Guide for Organic Chemistry, David Klein (recommended)

5. **Specific Course Information:**
   a. **Catalog Description:**
      First course in a two-semester sequence (3053 and 3153). This course will cover the concepts of organic structure, nomenclature, and reactivity with an emphasis on biological applications. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:** CHEM 1415 or CHEM 1425
      Required course

6. **Specific Goals for Course:**
   a. **Specific Outcomes of Instruction:**
      To provide a conceptual approach and an in-depth understanding of Organic Chemistry. This is a continuation of the reinforcement of the skills you have learned how to interconvert functional groups, how to make a bond and break an bond, writing reaction mechanisms using curved arrows.
   b. **Student Outcomes:**
      EAC Outcomes: a, b

7. **Brief List of Topics Covered:** Concepts of organic structure, nomenclature, and reactivity with an emphasis on biological applications.

1. **Course Number and Name:**
   CHEM 3423, Physical Chemistry I

2. **Credits and Contact Hours:**
   3 credits, 48 contact hours

3. **Instructor's or Course Coordinator's Name:**
   Wai Tak Yip

4. **Text Book, Title, Author, and Year:**
   Physical Chemistry, Fourth Edition, by K.J. Laidler, J.H. Meiser, and B.C. Sanctuary, 2003
   b. Other Supplemental Materials:
   None

5. **Specific Course Information:**
   a. Catalog Description:
   States of matter, chemical thermodynamics, equilibria, etc. (F, Sp, Su)

   c. Prerequisite and/or Co-requisites:
   CHEM 1415 or CHEM 1425; MATH 2423 or MATH 2924 or concurrent enrollment.
   Required

6. **Specific Goals for Course:**
   a. Specific Outcomes of Instruction:
   Introduction to the fundamentals of thermodynamics and chemical kinetics.

   c. Student Outcomes:

7. **Brief List of Topics Covered:** States of matter, chemical thermodynamics, equilibria, etc.

1. **Course Number and Name:**
   ENGL 3153, Technical Writing

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture/discussion/peer writing-editing

3. **Instructor's or Course Coordinator's Name:**
   Office of First Year Composition
   Department of English, Gittinger Hall, Room 122

4. **Text Book, Title, Author, and Year:**
Handbook of Technical Writing, 8th ed. G. Alred et al., 2006 [**Recommended**.]
Technical Communication, 9th ed., Markel, Michael, 2009
Other readings and handouts to be distributed through Desire to Learn (D2L).

5. **Specific Course Information:**
   a. **Catalog Description:**
      Focuses on the forms of report writing most frequently encountered in research and industry. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: ENGL 2153 and Engineering or hard science majors only. Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      To introduce the writing process and improve skills needed for effective informational and persuasive written communications in technical and professional applications**.**

   b. **Student Outcomes:**
      EAC and CAC Outcomes: EAC g, CAC f

7. **Brief List of Topics Covered:**

a. Introduction to genres of workplace writing in order to enable audience(s) to accomplish a task, understand a technical subject, solve a problem or make a decision.

b. Pragmatic orientation to resumes, business correspondence, short reports, proposals, progress reports, and completion reports.

c. Rhetorical skills necessary for effective technical communications, identifying and profiling target audiences, writing for specific purposes, and appealing to audience values through traditional rhetorical strategies, document design and presentation.

d. Workshop and writing experiences sequenced to model of writing process: planning, drafting, revising, editing, and proofreading.

1. **Course Number and Name:**
   ENGR 1410, Freshman Engineering Orientation

2. **Credits and Contact Hours:**
   0 Credit Hours, 1 hour lecture, 2 hours laboratory

3. **Instructor's or Course Coordinator's Name:**
   P. Simin Pulat

4. **Text Book, Title, Author, and Year:**
   None
   a. **Other Supplemental Materials:**
      Engineering Grand Challenges

5. **Specific Course Information:**
   a. **Catalog Description:**
      Required orientation course for specified majors. Covers a variety of topics including: majors and minors; career planning; advising; and extra-curricular activities. (F)

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: freshman majoring in Civil Engineering, Architectural Engineering, Environmental Engineering, or Environmental Science.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      ii. Know that engineering is multidisciplinary.
      iii. Be able to name at least five different disciplines in engineering.
      iv. Have met at least five upper-class engineering students who have successfully walked the path of a first-year engineering student.
      v. Know in detail what at least one discipline of engineering does upon graduation.
      vi. Have attended at least two engineering-sponsored events outside of class.
      vii. Have visited the Engineering Courtyard and know the four engineering buildings.
      viii. Know where the Career Services is located and the services provided by them
      ix. Be familiar with and understand the value of study abroad, research, internship and co-op opportunities and the process of applying for one
      x. Be familiar with the advising process and Degree Navigator
      xi. Experience engineering problem solving in a multidisciplinary team environment
      xii. Attend "Engineering Freshman Showcase Day" to observe student project experiences in other sections.

   a. **Student Outcomes:**

EAC Outcomes: d,h

7. Brief List of Topics Covered:

a. Degree Navigator
b. Student Leadership Opportunities
c. Competition Teams
d. Career fair and Internships
e. Study Abroad
f. Research Opportunities
g. Interaction with Deans Leadership Council Mentors
h. Exploring Majors and Minors
i. Small Section Experiences
    i. Hovercraft
    ii. Pumpkin Drop
    iii. Chemical Car
    iv. Engineering Design (varying projects)
    v. Botball - Robots
    vi. Lego Mindstorm - Robots
    vii. Interactive Game Development
    viii. Energy – Oil and Gas Industry
    ix. Interface between Physics and Engineering
    x. Lasers, Transistors, Energy Conversion
    xi. Circuit Design
    xii. Bioengineering
    xiii. Engineering Outreach - Elementary
    xiv. Service Learning

1. **Course Number and Name:**
   ENGR 2002, Professional Development

2. **Credits and Contact Hours:**
   2 Credit Hour, 2 hours lecture

3. **Instructor's or Course Coordinator's Name:**
   Matthew Green

4. **Text Book, Title, Author, and Year:**
   Oakes, W. C., Leone, L. L., and J. Craig, *Engineering Your Future*, 4th edition, Great Lakes Press, Inc., 2004.
   a. **Other Supplemental Materials:**
      Engineering Grand Challenges
      Engineering Code of Ethics and Case Studies
      Stanley, A., *Visioneering*, Mulnomah Publishers
      Kouzes, J. M., B. Posner, *Leadership Challenge*, Jossey-Bass, 2002
      Smith, K. A., *Teamwork and Project Management (B.E.S.T Series)*, McGraw-Hill, 2004
      Collins, J., *Good to Great*, Harper Business, 2001
      Zimmer, T. W. and N. M. Scarborough, *Essentials of Entrepreneurship and Small Business Management*, Pearson-Prentice Hall, 2005
      Dorf, R. C. and T. H. Byers, *Technology Ventures from Ideas to Expertise,* McGraw-Hill, 2005
      Case studies and posted articles from Fast Company and Wired

5. **Specific Course Information:**
   a. **Catalog Description:**
      Develop an understanding of engineering ethics, teamwork, leadership, and professional responsibility through the concepts of contemporary, social, and global issues. (F, Sp).

   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Sophomore standing.
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      At the end of the semester the students will:
      vi. Demonstrate understanding of core professional topics by reviewing, analyzing, and discussing case studies
      vii. Develop an ability to apply business principles to engineering practice
      viii. Develop and demonstrate improved communication capabilities
      ix. Demonstrate ability to form, participate in, and lead cross-functional/multi-disciplinary teams
      x. Develop and demonstrate project management skills
      xi. Develop a framework and process for solving open-ended problems

xii. Begin building a personal network

b. Student Outcomes:
EAC Outcomes: d, f, h, i
CAC Outcomes: d, e

7. Brief List of Topics Covered:

a. Team building
b. Project management
c. Leadership
d. Ethics
e. Engineering design
f. Product development
g. Entrepreneurship/Intrapreneurship

1. **Course Number and Name:**
   MATH 1823 Calculus and Analytic Geometry I

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture, 1 hour discussion

3. **Instructor's or Course Coordinator's Name:**
   Paul Goodey

4. **Text Book, Title, Author, and Year:**
   Stewart James, *Calculus*, 6th edition, Brooks/Cole Publishing Company, 2008.

5. **Specific Course Information:**
   a. **Catalog Description:**
      Topics covered include equations of straight lines; conic sections; functions, limits and continuity; differentiation; maximum-minimum theory and curve sketching. A student may not receive credit for this course and 1743. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: 1523 at OU, or satisfactory score on the placement test, or, for incoming freshmen direct from high school, satisfactory score on the ACT/SAT. Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      By the end of the semester the students will learn the basic concepts of single-variable, differential calculus, as well as its applications to curve sketching and maximum/minimum problems.

   b. **Student Outcomes:**
      EAC and CAC Outcomes: a

7. **Brief List of Topics Covered:**
   a. Functions and their graphs
   b. Limits and Continuity of functions
   c. Tangent lines and the derivative
   d. Differentiation formula, chain rule, implicit differentiation
   e. The derivative as a rate of change, related rate problems, velocity
   f. Newton's method
   g. Curve sketching using the derivative (including concavity, inflection points, asymptotes)
   h. Applied max-min problems

1. **Course Number and Name:**
   MATH 2423 Calculus and Analytic Geometry II

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture, 1 hour discussion

3. **Instructor's or Course Coordinator's Name:**
   Paul Goodey

4. **Text Book, Title, Author, and Year:**
   Stewart James, *Calculus*, 6th edition, Brooks/Cole Publishing Company, 2008.

5. **Specific Course Information:**
   a. **Catalog Description:**
      Integration and its applications; the calculus of transcendental functions; techniques of integration; and the introduction to differential equations. A student may not receive credit for this course and 2123. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Math 1823
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      By the end of the semester the students will learn the basic concepts of single-variable, integral calculus, as well as its applications to area, work centers of mass, etc.

   b. **Student Outcomes:**
      EAC and CAC Outcomes: a

7. **Brief List of Topics Covered:**
   a. Areas and distances
   b. The definite integral
   c. Fundamental theorem of calculus
   d. Indefinite integrals
   e. Substitution
   f. Areas between curves
   g. Volumes
   h. Work
   i. Average value of a function
   j. Inverse, logarithmic, exponential, inverse trig, and hyperbolic functions
   k. l'Hospital's rule
   l. Techniques of integration, numerical and improper integrals

1. **Course Number and Name:**
   MATH 2433 Calculus and Analytic Geometry III

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture

3. **Instructor's or Course Coordinator's Name:**
   Paul Goodey

4. **Text Book, Title, Author, and Year:**
   Stewart James, *Calculus*, 6th edition, Brooks/Cole Publishing Company, 2008.

5. **Specific Course Information:**
   a. **Catalog Description:**
      Polar coordinates, parametric equations, sequences, infinite series, vector analysis. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Math 2423
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      This course serves as a bridge between single variable and multivariable calculus. Single variable calculus is completed via the study of sequences and series. The study of parametric equations, vector techniques and higher dimensional parameterizations form the basis of multivariable calculus.

   b. **Student Outcomes:**
      EAC and CAC Outcomes: a

7. **Brief List of Topics Covered:**
   a. Curves defined by parametric equations
   b. Tangents to and areas enclosed by parametric equations
   c. Polar coordinates, conic sections
   d. Sequences and series
   e. Tests for convergence of series
   f. Power series, Taylor and MacLaurin series
   g. Three dimensional coordinate systems and vectors
   h. Vector dot and cross products
   i. Equations of lines and planes
   j. Quadratic surfaces
   k. Vector functions, arc length, space curves (velocity and acceleration)

1. **Course Number and Name:**
   MATH 2443 Calculus and Analytic Geometry IV

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture

3. **Instructor's or Course Coordinator's Name:**
   Paul Goodey

4. **Text Book, Title, Author, and Year:**
   Stewart James, *Calculus*, 6th edition, Brooks/Cole Publishing Company, 2008.

5. **Specific Course Information:**
   a. **Catalog Description:**
      Vector calculus; functions of several variables; partial derivatives; gradients, extreme values and differentials of multivariate functions; multiple integrals; line and surface integrals. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Math 2433
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      Students will learn basic concepts of multivariable differential and integral calculus, and their applications including the fundamental theorems of Green, Gauss, and Stokes.

   b. **Student Outcomes:**
      EAC and CAC Outcomes: a

7. **Brief List of Topics Covered:**
   a. Functions of several variables, limits, and continuity
   b. Partial derivatives, tangent planes and differentials, the chain rule of partial derivatives
   c. Directional derivatives and gradients
   d. Max/min problems, Lagrange multiplier method
   e. Double and triple integrals, surface area, volumes, and other applications
   f. Double integrals in polar coordinates, triple integrals in cylindrical and spherical coordinates
   g. Vector fields, line integrals, Green's theorem
   h. Divergence and curl of a vector field
   i. Parametric surfaces, surface integrals, and surface area
   j. Stoke's theorem and the divergence theorem
   k. Cylindrical and spherical coordinates

1. **Course Number and Name:**
   MATH 3113 Introduction to Ordinary Differential Equations

2. **Credits and Contact Hours:**
   3 Credit Hour, 3 hours lecture

3. **Instructor's or Course Coordinator's Name:**
   Paul Goddey

4. **Text Book, Title, Author, and Year:**
   Edwards C.H. and D.E. Penney, *Differential Equations and Boundary Value Problems*, 4th edition, Pearson Education/Prentice Hall, 2008.

5. **Specific Course Information:**
   a. **Catalog Description:**
      First order ordinary differential equations, linear differential equations with constant coefficients, two-by-two linear systems, Laplace transformations, phase planes and stability. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Math 2423
      Required

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      Students will be introduced to basic solution methods for ordinary differential equations of the following types: first-order equations, higher-order linear equations with constant coefficients and rudimentary first-order systems. These methods include Laplace transforms.
   b. **Student Outcomes:**
      EAC and CAC Outcomes: a

7. **Brief List of Topics Covered:**
   a. First-order differential equations
   b. Linear equations of higher order
   c. Introduction to systems of differential equations
   d. Linear systems of differential equations
   e. Laplace transform methods

1. **Course Number and Name:**
   PHYS 2514, Introductory Physics for Engineers

2. **Credits and Contact Hours:**
   4 Credit Hours, 3 hour lecture, 1 hour discussion

3. **Instructor's or Course Coordinator's Name:**
   Kieran Mullen

4. **Text Book, Title, Author, and Year:**
   Knight, R., *Physics for Scientists and Engineers*, 2nd edition, complete with Student Access Kit and HITT-voting remote.

   a. **Other Supplemental Materials:**
      www.masteringphysics.com and course site on University Desire to Learn (D2L)

5. **Specific Course Information:**
   a. **Catalog Description:**
      Vectors, kinematics and dynamics of particles, work and energy systems of particles, rotational kinematics and dynamics, oscillations, gravitation, fluid mechanics, waves. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Prerequisite: Mathematics 1823 or Mathematics 1914 with grade of C or better. Not open to students with credit in 1205.

6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      The students will learn about the physical principles governing mechanical systems
   b. **Student Outcomes:**
      EAC Outcome: a
      CAC Outcome: a

7. **Brief List of Topics Covered:**
   1. Concepts in Motion
   2. Kinematics: the Mathematics of Motion
   3. Vectors and Coordinate Systems
   4. Force and Motion
   5. Dynamics I: Motion Along a Line
   6. Dynamics II: Motion in a Plane
   7. Dynamics III: Motion in a Circle
   8. Newton's Third Law
   9. Impulse and Momentum
   10. Energy
   11. Work
   12. Newton's Theory of Gravity
   13. Rotation of a Rigid Body
   14. Oscillations
   15. Fluids and Elasticity

1. **Course Number and Name:**
   PHYS 2524, General Physics II for Engineering and Science Majors
2. **Credits and Contact Hours:**
   4 Credit Hours, 3 hour lecture, 1 hour discussion
3. **Instructor's or Course Coordinator's Name:**
   Lloyd Bumm
4. **Text Book, Title, Author, and Year:**
   Knight, R., *Physics for Scientists and Engineers*, 2nd edition, Prentice Hall complete with Student Access Kit and HITT-voting remote.
   a. **Other Supplemental Materials:**
      www.masteringphysics.com and course site on University Desire to Learn (D2L), learn.ou.edu
5. **Specific Course Information:**
   a. **Catalog Description:** Temperature, heat, thermodynamics, electricity, magnetism, optics. (F, Sp, Su)
   b. **Prerequisites and/or Co-requisites:**
      Phys 2514 and Math 2423. Not open to students with credit in Phys 1215.
6. **Specific Goals for the Course:**
   a. **Specific Outcomes of Instruction:**
      The students will learn about physical principles governing electromagnetic systems and radiation
   b. **Student Outcomes:**
      EAC Outcome: a
      CAC Outcome: a
7. **Brief List of Topics Covered:**
   1. A Macroscopic Description of Matter
   2. Work, Heat, and the First Law of Thermodynamics
   3. The Micro/Macro Connection
   4. Heat Engines and Refrigerators
   5. Electric Charges and Forces
   6. The Electric Field
   7. Gauss's Law
   8. Current and Conductivity
   9. The Electric Potential
   10. Potential and Field
   11. Fundamentals of Circuits
   12. The Magnetic Field
   13. Electromagnetic Induction
   14. Electromagnetic Fields and Waves
   15. AC Circuits

Appendix B – Faculty Vitae

1. Name:
ELIZABETH C. BUTLER

2. Education
B.S. Chemistry, University of Maryland, 1985
M.S. Civil Engineering, University of Maryland, 1991
Ph.D. Environmental Engineering, University of Michigan, 1998

3. Academic experience
University of Oklahoma, Full Professor, 2010-present, Full time
University of Oklahoma, Associate Professor, 2005 – 2010, Full time
University of Oklahoma, Assistant Professor, 1999 – 2005, Full time

4. Non-academic experience
Environmental Scientist, Halliburton NUS Corporation, Gaithersburg, Maryland (now Tetra Tech NUS, Inc.), 1986 - 1991
Junior Staff Scientist, Dynamac Corporation, Rockville, Maryland, 1985 - 1986
Laboratory Technician, U. S. Department of Agriculture, Beltsville Agricultural Research Center, Beltsville, Maryland, 1984-1985

5. Certifications or professional registrations
Not applicable

6. Current membership in professional organization
Association of Environmental Engineering and Science Professors, American Chemical Society, Environmental Chemistry Division

7. Honors and awards
Larry W. Canter Influencing Environmental Interest Award (chosen by department students) (2009, 2010), College of Engineering Alumni Teaching Award (Fall 2008), *Environmental Science & Technology* Excellence in Review Award (2008), George W. Tauxe Outstanding Professor Award (chosen by department students) (2002), National Science Foundation CAREER Award (2001-2006), University of Oklahoma Junior Faculty Research Award (2001)

8. Service activities (last 5 years)
University Level: Member: Research Council (Fall 2009-present), Panelist: English Assessment Program TEACH test (2007, 2008), Speaker: Fundamentals for Faculty Workshop, Office of Research Services (8/18/05), Member: Graduate Council (2004-2007), Member: Graduate Council Graduate Faculty Subcommittee (Spring 2007), Member Graduate Council Subcommittee to evaluate Eddie Carol Smith Scholarship applications (Spring 2007), Member: Graduate Council Research and Travel Grant Subcommittee (Spring 2006), Member: Provost Graduate Teaching Awards Committee (Spring 2006) , Member: Graduate Council Graduate Faculty Subcommittee (Fall 2006)

College Level: Faculty Advisor: Society of Women Engineers (SWE) (2005-2009)
School Level: Chair: CEES Student Performance Review Committee (2005-2008), Chair: CEES Undergraduate Curriculum Committee (2008-present), Member: CEES Undergraduate Curriculum Committee (2000-2008), Member: CEES Scholarship Committee (Fall 2004-present)

Professional Service: Associate Editor, *Chemosphere,* Science for Environmental Technology section (2011-present), Member: Association of Environmental Engineering and Science Professors (AEESP) Doctoral Dissertation Awards Committee (2009-present) (committee chair in 2010), Member: Association of Environmental Engineering and Science Professors (AEESP)/American Chemical Society Joint Session Planning Committee (2001-2007), ad hoc reviewer for numerous journals and funding agencies.

9. Publications in the last 5 years

Dong, Y., Butler, E. C., Philp, R. P., Krumholz, L. R. (in press), Impacts of microbial community composition on isotope fractionation during reductive dechlorination of tetrachloroethylene, *Biodegradation*. DOI 10.1007/s10532-010-9416-2.

Aurandt, J. L., Butler, E. C. (in press), Sustainability education: Approaches for incorporating sustainability into the undergraduate curriculum, *Journal of Professional Issues in Engineering Education and Practice.*

Liang, X., Butler, E. C. (2010), Effects of natural organic matter model compounds on the transformation of carbon tetrachloride by chloride green rust, *Water Res*. 44, 2125-2132.

Shao, H., Butler, E. C. (2009b), The relative importance of abiotic and biotic transformation of carbon tetrachloride in anaerobic soils and sediments, *Soil Sed. Contam*. 18, 455-469.

Shao, H., Butler, E. C. (2009a), The influence of soil minerals on the rates and products of abiotic transformation of carbon tetrachloride in anaerobic soils and sediments, *Environ. Sci. Technol.* 43, 1896-1901.

Liang, X., Philp, R. P., Butler, E. C. (2009), Kinetic and isotope analyses of tetrachloroethylene and trichloroethylene degradation by model Fe(II)-bearing minerals, *Chemosphere* 75, 63-69.

Dong, Y., Liang, X., Krumholz, L. R., Philp, R. P., Butler, E. C. (2009), The relative contributions of abiotic and microbial processes to the transformation of tetrachloroethylene and trichloroethylene in anaerobic microcosms, *Environ. Sci. Technol*. 43, 690-697.

Zhu, X., Nanny, M. A., Butler, E. C. (2008), Photocatalytic oxidation of aqueous ammonia in model gray waters, *Water Research* 42, 2736-2744.

Liang, X., Dong, Y., Kuder, T., Krumholz, L. R., Philp, R. P., Butler, E. C. (2007), Distinguishing abiotic and biotic transformation of tetrachloroethylene and trichloroethylene by stable carbon isotope fractionation, *Environ. Sci. Technol.* 41, 7094-7100.

Shao, H., Butler, E. C. (2007), The influence of iron and sulfur mineral fractions on carbon tetrachloride transformation in model anaerobic soils and sediments, *Chemosphere* 68, 1807-1813.

10. Presentations in the last 5 years (9—not listed due to space constraints)

11. Professional development activities (last 5 years)

Participant: Center for Sustainable Engineering Workshop, Carnegie Mellon University, July 13-14, 2009.

1. **Name:**
   AMY B. CERATO

2. **Education**
   B.S. Civil Engineering, Lafayette College, 1999
   M.S. Geotechnical Engineering, University of Massachusetts, 2001
   M.S. Geosciences, University of Massachusetts, 2004
   Ph.D. Geotechnical Engineering, University of Massachusetts, 2005

3. **Academic experience** –
   University of Oklahoma, Assistant Professor, School of Civil Engineering and Environmental Science, Norman, 2005-2010, Full-time

4. **Non-academic experience**
   Federal Highway Administration, Geotechnical Engineer, 2000 2004
   TerraTech Engineering, Geotechnical Engineer, 2000 - 2001
   Pietrzak and Pfau Engineering and Surveying PLLC, Civil Engineer, 1998

5. **Certifications or professional registrations**
   Licensed Professional Engineer, PE; Oklahoma License #23099

6. **Current membership in professional organizations**
   American Society of Civil Engineers: 1998 – current; Society of Women Engineers: 2001 – current; Chi Epsilon: 2002 – current; Geo-Institute: 2004 – current; American Society of Engineering Education: 2005 – current; USUCGER Member: 2005 – current; American Association of University Women (AAUW): 2007 – current.

7. **Honors and awards**
   2010 ASCE Arthur Casagrande Professional Development Award
   2009 Presidential Early Career Award for Scientists and Engineers (PECASE)
   2009 Rapp Foundation Presidential Professorship
   2009 Alumni Teaching Award (top 10% Fall ‘08 & Spring ‘09 course evaluations in OU CoE)
   2008 National Science Foundation (NSF) CAREER Award
   2008 George W. Tauxe Outstanding Professor Award (awarded by the OU-CEES students)
   2008 Graduate College Special Recognition for Outstanding Efforts in Graduate Recruiting
   2005 Junior Faculty Research Program Award
   2004 American Association for University Women (AAUW) Selected Professions Fellowship
   2004 Society of Women Engineers (SWE) Past Presidents Scholarship
   2004 UMass – Amherst Geotechnical Engineering Fellowship
   2003 Association for Women in Science (AWIS) Predoctoral Certification of Merit
   2002 Trent R. Dames and William W. Moore Fellowship (ASCE)
   2001 National Fraternity Graduate Fellowship

2001 UMass – Amherst Geotechnical Service Award
2001 National Science Foundation Graduate Fellowship - Honorable Mention

8. Service activities

a. **University:** Member: Provost's Advisory Committee on Women's Issues (PACWI); Graduate Enrollment Management (GrEM) Committee; Advisory Committee for the University Vice President of Research (AC/VPR);

b. **Department:** GeoInstitute (GI) Student Chapter Advisor; CEES Graduate Liaison and Graduate Studies Committee; Geotechnical Group WebMaster; Graduate Student Recruitment; Undergraduate recruitment; REU 2010; CE Capstone Advisory Board

c. **Professional:** Conference Session Organizer/Moderator: GeoInstitute GeoCongress including Student GeoCompetition Emcee + Technical Session; Session Organizer: GeoFlorida; Board Member: USUCGER; Member: ASCE GeoInstitute Committee on Engineering Geology and Site Characterization; Proposal and Manuscript Reviewer

9. Publications in the last 3 years (only Journal Papers included)

Buhler, R. and Cerato, A.B. (2010). Design of Dynamically Wind-Loaded Helical Piers for Small Wind Turbines. ASCE Journal of Performance of Constructed Facilities. Vol. 24, No. 4, pp. 417-426.

Chang, C.S., Cerato, A.B. and Lutenegger, A.J. (2010). Modeling the Scale Effect of Granular Media for Strength and Bearing Capacity. International Journal of Pavement Engineering. *Special Issue on* Unified Approach for Characterizing, Modeling and Simulating of Stone-Based Infrastructure Materials. Vol. 11, No. 5, pp. 343-353.

Cerato, A.B., Miller, G.A. and Hajjat, J. (2009). The Influence of Clod-Size and Structure on Wetting-Induced Volume Change of Compacted Soil. ASCE Journal of Geotechnical and Geoenvironmental Engineering. Vol. 135, No. 11, pp. 1620-1628.

Cerato, A.B. and Victor, R. (2009). Effects of Long-Term Dynamic Loading and Fluctuating Water Table on Helical Anchor Performance for Small Wind Tower Foundations. ASCE Journal of Performance of Constructed Facilities. Vol. 23, No. 4, pp. 251-261.

Cerato, A.B. and Victor, R. (2008). Effects of Helical Anchor Geometry on Long-Term Performance for Small Wind Tower Foundations Subject to Dynamic Loads. The Journal of the Deep Foundations Institute (DFI), Vol. 2, pp. 30-41.

Cerato, A.B. and Lutenegger, A.J. (2007). Scale Effects of Shallow Foundation Bearing Capacity on Granular Material. Journal of Geotechnical and Geoenvironmental Engineering, ASCE. Vol. 133, No. 10, pp. 1192-1202.

Presentations in the last 3 years (partial list)

- Diversity in the GeoProfession. *IFCEE09.* Orlando, FL (March 2009)
- Creating Excitement for the GeoProfession through Competition: GeoChallenge. *IFCEE09.* Orlando, FL (March 2009)
-

10. Professional Development Activities (partial list)

- Annual ASCE Geo-Institute's GeoCongress'; Monthly Geotechnical Engineering Seminars

1. **Name:**
   KENDRA M. DRESBACK

2. **Education**
   B.S. Civil Engineering, University of Oklahoma, 1997
   M.S. Civil Engineering, University of Oklahoma, 1999
   PhD Civil Engineering, University of Oklahoma, 2005

3. **Academic experience** –

   University of Oklahoma, Research Assistant Professor, School of Civil Engineering and Environmental Science, 2011 – 2008, Full-time
   University of Oklahoma, Postdoctoral Research Associate, School of Civil Engineering and Environmental Science, 2008 – 2005, Full-time

4. **Non-academic experience**
   Naval Research Laboratory-Stennis Space Center, Visiting Researcher 2001
   Trust Environmental Services, Engineering Intern, 1997

5. **Certifications or professional registrations**
   E.I., Oklahoma (10581)

6. **Current membership in professional organizations**
   Tau Beta Pi National Engineering Honor Society, Chi Epsilon National Civil Engineering Honor Society, Golden Key National Honor Society, Oklahoma Society of Professional Engineers, National Society of Professional Engineers, American Geophysical Union, American Society of Civil Engineers, American Society for Engineering Education

7. **Honors and awards**
   UCOWR Ph.D. Dissertation Awards – Honorable Mention (2005), U.S. Department of Education GAANN Fellow (2002-2005)

8. **Service activities**
   a. **University Level:** Not required for research position
   b. **College Level:** Not required for research position
   c. **School Level:** Not required for research position
   d. **Professional Service:** Advisory Board, NOAA Unstructured Grid Catalog; Reviewer, ASEE Postdoctoral Candidate, International Journal for Numerical Methods in Fluids, Continental Shelf Research, Advances in Water Resources
   e. **Community Service:** Volunteer as an Assistant Coach for basketball teams

9. **Publications in the last 5 years (5 recent)**
   Dresback, K.M., Kolar, R.L., Blain, C.A., Szpilka, C.M., Szpilka, A.M., Luettich, R.A., and Shay, T., "Development and Application of the Coupled HYCOM and ADCIRC System," *Estuarine and Coastal Modeling,* M.L. Spaulding (eds.), ASCE, pp. 259-277, 2010.

Szpilka, C.M., Dresback, K.M., Toohey, I.P., and Kolar, R.L., "Alternative Advection Schemes for the Baroclinic ADCIRC Model: Application to the Lock-Exchange Problem," *Estuarine and Coastal Modeling,* M.L. Spaulding (eds.), ASCE, pp. 239-258, 2010.

Tromble, E.M., Kolar, R.L., Dresback, K.M., Hong, Y., Vieux, B.E., Luettich, R.A., Gourley, J.J, Kelleher, K., and Van Cooten, S., "Aspects of Coupled Hydrologic/Hydrodynamic Modeling for Coastal Flood Inundation," *Estuarine and Coastal Modeling,* M.L. Spaulding (eds.), ASCE, pp. 724-743, 2010.

Kolar, R.L., Kibbey, T.C.G, Szpilka, C.M., Dresback, K.M., Tromble, E.M., Toohey, I.P., Hoggan, J.H., and Atkinson, J.H. "Process-Oriented Tests for Validation of Baroclinic Shallow Water Models: The Lock-Exchange Problem", *Ocean Modelling*, 28(1-3), 137-152, 2009.

Dietrich, J.C., Kolar, R.L. and Dresback, K.M., "Mass Residuals as a Criterion for Mesh Refinement in Continuous Galerkin Shallow Water Models," *ASCE Journal of Hydraulic Engineering*, 134(5), 520-532, 2008.

Presentations in the last 5 years (5 recent)

Dresback, K.M., and Kolar, R.L., "The Use of Supercomputing in Hurricane Storm Surge and Hydrodynamic Modeling," OSCER Supercomputing Symposium, Norman, OK, Oct 6, 2010.

Dresback, K.M., Kolar, R.L., Hong, Y., Szpilka, C.M., Szpilka, A.M., Blain, C.A., Cambazoglu, M.K., Luettich, R.A., Gourley, J.J., Van Cooten, S., Keheller, K.E., "Coupled ADCIRC Model Systems: 1. HYCOM/ADCIRC, 2. HL-RDHM/SWAN/ ADCIRC" IMUM 2010, 9th International Workshop, Cambridge, MA, August 17-20, 2010.

Cambazoglu, M.K., Blain, C.A., Dresback, K.M., Kolar, R.L., "Modeling 3D Density-driven flow in a complex two-strait, three-sea system," IMUM 2010, 9th International Workshop, Cambridge, MA, August 17-20, 2010.

Dresback, K.M., Kolar, R.L. Blain, C.A., Szpilka, C.M, Szpilka, A.M., Luettich, R.A., "Development of the Coupled HYCOM and ADCIRC Models with an Application in the Northern Gulf of Mexico," 14th Army-Navy ADCIRC Model Workshop, USACE ERDC – CHL. Vicksburg, MS, April 20-21, 2010.

10. Professional Development Activities

Gordon Research Conference on Coastal Modeling, Colby- Sawyer College, June 17-22, 2007; "Observing Outstanding Teachers," presented by Instructional Development Program, University of Oklahoma, Sept.- Dec., 2003.

1. **Name:**
   MATTHEW B. GREEN

2. **Education:**
   M.B.A., 1999, Marketing (emphasis), Oklahoma State University, Stillwater, OK
   BS, 1992, Mechanical Engineering, University of Oklahoma, Norman, OK

3. **Academic experience:**
   University of Oklahoma Senior Research Associate, Engineering Instructor, Undergraduate Engineering Recruiter. 2004 – Present
   University of Oklahoma, Senior Development Officer, 2000 – 2002

4. **Non-academic experience:**
   Bluewater Technology, LLC, Director of Business Development, 2010 - Present
   Frontrow Technologies, Inc., 2003 – Present
   Koch Industries, 1993 - 2000

5. **Certifications or professional registrations:** NA

6. **Current membership in professional organizations:** NA

7. **Honors and awards:**
   i2E Technology Business Finance Program Award of $100,000
   Journal Record 2004 Innovator of the Year "On the Brink" Award
   Oklahoma Investment Forum 2004 "Most Promising New Venture" award

8. **Service activities:**
   FCC Youth Mission Trip Sponsor (Boston Islam Society Work Mission), 2011
   Big Brothers Big Sisters of Cleveland County Board Member (2004 – 2011)
   FCC Elder (2010 – 2013)
   FCC Logos Children Program Volunteer (2002 – 2011)
   Norman High School Football Coach (2009 – 2011)
   FCC Deacon (2005 – 2008)
   FCC Youth Mission Trip Sponsor (Habitat for Humanity International - Guatemala), 2008
   FCC Youth Mission Trip Sponsor (Yakama, WA Indian Reservation Work Mission), 2007
   Sooner Theatre Board Member (2004 – 2006)
   FCC Youth Mission Trip Sponsor (South Texas/ Mexico Work Mission), 2006
   FCC Youth Minister Search Committee: Chairperson, 2005
   <u>University Level:</u>
   OU BOOMER BIGS (Big Brothers Big Sisters) Faculty Advisor. 2011

9. **Briefly list the most important publications and presentations from the past five years:** NA

10. **Briefly list the most recent professional development activities:** NA

1. **Name:**
   KIANOOSH HATAMI

2. **Education**
   Ph.D., 1997, Structural Engineering, McMaster University, Hamilton, ON, Canada
   M.Sc., 1991, Hydraulic Structures, Sharif University of Technology, Tehran, Iran
   B.Sc., 1987, Civil Engineering, Iran University of Science & Technology, Tehran, Iran

3. **Academic experience**
   University of Oklahoma, Associate Professor, CEES, 2011-Present, Full-time
   University of Oklahoma, Assistant Professor, CEES, 2004-2011, Full-time
   RMC and Queen's University, Associate Research Director, GeoEngineering Center, 2003-2004, Full-time
   RMC and Queen's University, Research Associate, 2000-2003, Full-time
   RMC and Queen's University, Doctoral Fellow, 1997-1999

4. **Non-academic experience**
   Moshanir-Lahmeyer International, Design Engineer, 1989 – 1991
   Electrical Power Research Centre, Research Engineer, 1988 – 1989

5. **Certifications or professional registrations**
   P.Eng., Ontario (100016655)

6. **Current membership in professional organizations**
   Transportation Research Board of the National Academies (TRB) Geosynthetics (Geo-Institute), American Society of Civil Engineers, American Society for Testing and Materials (ASTM)

7. **Honors and awards**
   College of Engineering and Michael F. Price College of Business Alumni Teaching Award (OU) 2007, 2008, 2009
   Sir Casimir Gzowski Medal for Best Refereed Technical Paper (Canadian Society for Civil Engineering) 2006

8. **Service activities**
   a. **College Level:** FE Exam Review for COE/Tau Beta Pi (Twice a year, Since 2006)
   b. **School Level:** CEES Undergraduate Advising Committee (Since 2006); CEES Scholarships Committee (2010); Structural/Architectural Faculty Search Committees (2006, 2007)

   c. **Professional Service:**
      Technical Reviewer:
   ASCE Journal of Geotechnical and Geoenvironmental Engineering , ASCE Journal of Engineering Mechanics, ASCE Journal of Transportation Engineering, ASCE International Journal of Geomechanics

9. Publications in the last 5 years Partial list)

Refereed Journal Publications:

1. Mikola R.G., Hatami, K. and Doolin, D., **2011**. Elastic–plastic discontinuous deformation analysis using Mohr–Coulomb model, Mining Technology, (In press)
2. Hatami K, Grady BP and Ulmer MC, **2011**. Closure to: "Sensor-Enabled Geosynthetics: use of conducting carbon networks as geosynthetics sensors". *ASCE, Journal of Geotechnical and Geoenvironmental Engineering*, 137(4): 435-436.
3. Khoury, CN, Miller, GA, & Hatami, K, **2011**. Unsaturated soil-geotextile interface behavior, *Geotextiles and Geomembranes*, 29(1): 17-28.
4. Huang, B, Bathurst, RJ, Hatami, K, & Allen, TM, **2010**. Influence of toe restraint on reinforced soil segmental walls, *Canadian Geotechnical Journal*, 47(8): 885–904.

10. Presentations in the last 5 years

1. Hatami K, Miller GA and Esmaili D, **2010**. Measuring Soil Suction in Reinforced Soil Slopes and Embankments for Highway Construction and Repair Applications. *ODOT-OTC Transportation Research Day*, October 14, 2010, ODOT, Oklahoma City, OK.
2. Hatami K, **2010**. ASCE Midwest Regional GeoCompetition at the University of Oklahoma. *OSPE Central /SW Chapter Meeting*, Oklahoma Society of Professional Engineers, May 2010, Oklahoma City, OK.
3. Hatami K, Miller GA and Garcia LM, **2009**. Use of MSE technology in reconstruction and retrofitting highway slopes and embankments. *ODOT-OTC Transportation Research Day*, October 7, 2009, ODOT, Oklahoma City, OK.
4. Hatami K and Wang Z, **2008**. Geogrid properties in ODOT's specifications manual. *ODOT-OTC Transportation Research Day*, October 15, 2008, ODOT, Oklahoma City, OK.

11. Professional Development Activities

4th NEES Centrifuge Workshop, Rensselaer Polytechnic Institute, September 8th – 10th, 2008; Proposal development workshops (NSF, OCAST, etc.), Supercomputing workshops (OU), Instructional development workshops (OU), TRB Webinar, Load and Resistance Factor Design Analysis for Seismic Design of Slopes and Retaining Walls, February 17, 2010. Webinar on unsaturated soils, May 2011.

1. **Name:**
   YANG HONG

2. **Education**
   B.S. Geosciences, Beijing University, 1996
   M.S. Environmental Sciences, Beijing University, 1999
   PhD. Hydrology and Water Resources, College of Engineering, Univ. of Arizona, 2003

3. **Academic experience**
   University of Oklahoma, Associate Professor, School of Civil Engineering and Environmental Science, 2007 – 2011, Full Time
   National Weather Center, Founder, Remote Sensing and Hydrology Group, 2008 – 2011
   University of Oklahoma, Adjunct Associate Professor, School of Meteorology, 2010 – 2011
   University of Oklahoma, Co-Director, WaTER Center (Water Technology for Emerging Regions), 2010 – 2011
   National Weather Center, Faculty Member, Atmospheric Radar Research Center 2008 – 2011
   University of California, Post-doctoral Researcher, Center for Hydrometeorology and Remote Sensing, College of Engineering, 2004 – 2005

4. **Non-academic experience**
   Goddard Earth Science and Technology Center at
   NASA Goddard Space Flight Center, Research Scientist, 2005 – 2007

5. **Certifications or professional registrations:**

6. **Current membership in professional organizations**
   Science Team Member, NASA Precipitation Measuring Mission, 2005~
   Member, American Geophysics Union, 2000~
   Member, American Meteorological Society, 2001~
   Member, International Association of Hydrological Sciences, 2002~
   Member, IEEE, 2006~

7. **Honors and awards**

- **NOAA/OAR Scientific Fellow**, "to provide advice and guidance to NOAA/National Severe Storm Laboratory (NSSL) Director on matters concerning current operations or science initiatives", 2010
- **Oklahoma Space Grant Consortium/NASA EPSCoR RIG Award**, 2009/2010
- **NASA Group Achievement Award**: "*For significant achievements in systematically promoting and accelerating the use of NASA scientific research results for societal benefits*", awarded by NASA Headquarter Administrator on May 8th, 2008
- **Faculty Career Development Award** for Research Fellows, University of California Irvine Academic Senate, 2005
- **Outstanding Public Service Award**, Chinese Consulate General at Los Angeles, 2005
- **The Mayor Award** for Outstanding International Student, City of Tucson, Arizona, 2002

- **Outstanding Academic Honor** for Top 10 Graduate Students of 1999, Peking University, China, 1999
- **Challenge Cup**, Young Scientist Award, Peking University, China, 1998
- **"Baichuan" Award**, School of Earth Sciences, Peking University, China, 1996

8. Service activities

a. University Level: Member, University Strategy Organization ARRC and CAPS
b. College Level: Co-director, WaTER Center
c. School Level: Liaison/Member, University Library; …
d. Professional Service: Editor, International Journal of Remote Sensing; Reviewer or Panelist, NSF, NOAA, NASA, DOT, and European Space Agency; Chair, American Geophysical Union Hydrology Section Precipitation Committee
e. Community Service: Volunteer for Food Bank Drive

9. Publications in the last 5 years

Summary: Dr. Hong has published more than 90 peer-reviewed publications (60+ journal articles, 19+ books or book chapters, and 15+ refereed proceedings) and more than 100 scientific conference abstracts in last five years. Dr. Hong has also released 8 Technology Disclosures to universities, federal governmental agency, and private companies.

Principal developer of the satellite retrieval algorithm: PERSIANN-CCS;
Principal developer of the NASA Global Hazard Alert System;
Principal developer of High-resolution Distributed OU-NASA CREST hydrological model and physical-based OU SLIDE storm-induced landslide model

Hong et al. 2011, "Global Precipitation Estimation and Applications", book chapter for "Environmental Informatics Series (I): Advances in Hydrological Remote Sensing to Monitor Global Changes", in press

Hong, Y., R. Adler, and G. Huffman, 2007: An Experimental Global Prediction System for Rainfall-triggered Landslides using Satellite Remote Sensing and Geospatial Datasets, *IEEE Trans. Geosci. Remote Sens.*, **45(6)**, doi:10.1109/TGRS.2006.888436.

Hong Y., R.F. Adler, A. Negri, and G.J. Huffman, 2007: Flood and landslide applications of near real-time satellite rainfall estimation, *Journal of Natural Hazards*, 43(2), DOI: 10.1007/s11069-006-9106-x.

Hong, Y., R. F. Adler, F. Hossain, S. Curtis, and G. J. Huffman, 2007: A first approach to global runoff simulation using satellite rainfall estimation, *Water Resources Research*, 43(8), W08502, doi: 10.1029/2006WR005739.

10. Professional Development Activities

- Participant and Mentor, **Creating Critical Connection in Math and Science Summer Workshop**, organized by OU College of Engineering, 2009 June 1-14; 2011 June 6-17
- Faculty Workshop on **Active and Cooperative Learning in STEM Classrooms** by The Sooner Engineering Education (SEED) Center, January 2011
- Participant and Mentor, Creating Critical Connection in Math and Science Summer Workshop, organized by OU College of Engineering, 2009 June 1-14; 2011 June 6-17

1. **Name:**
   TOHREN C.G. KIBBEY

2. **Education**
   Ph.D. Environmental Engineering, University of Michigan, 1997
   M.S.E. Environmental Engineering, University of Michigan, 1993
   B.S.E. Mechanical Engineering, summa cum laude, University of Michigan, 1991

3. **Academic experience** –
   University of Oklahoma, Professor, School of Civil Engineering and Environmental Science, 2010-present, Full-time
   University of Oklahoma, Associate Professor, School of Civil Engineering and Environmental Science, 2005-2010, Full-time
   University of Oklahoma, Assistant Professor, School of Civil Engineering and Environmental Science, 1999-2005, Full-time

4. **Non-academic experience**
   None

5. **Certifications or professional registrations**
   None

6. **Current membership in professional organizations**
   - American Geophysical Union (AGU)
   - American Chemical Society (ACS)

7. **Honors and awards**
   - University of Oklahoma Good Teaching Award, 2009
   - Alumni Teaching Award, awarded for CEES 1213 Computing Applications in CEES, Fall 2008
   - Alumni Teaching Award, awarded for CEES 2223 Fluid Mechanics, Spring 2008
   - Alumni Teaching Award, awarded for CEES 2223 Fluid Mechanics, Spring 2007
   - National Science Foundation CAREER Award, "Surfactant Mixtures in Complex Environmental Systems," Awarded 2001
   - Junior Faculty Research Program Award, University of Oklahoma (2003)
   - Junior Faculty Research Program Award, University of Oklahoma (2001)

8. **Service activities**
   a. University: Teach Test Panelist; Graduate College Academic Misconduct Committee; Graduate College Appeals Committee
   b. College: CoE Academic Misconduct Committee; CoE Appeals Committee
   c. School: Committee A Member; Chair, CEES Advising Committee; CoE Liaison to Student Advising
   d. Professional: Editorial Board Member for *Journal of Contaminant Hydrology*, 2009-; Proposal reviewer for eight agencies (NSF, ERDC, ACS PRF, NERC, NC WRRI, USGS/NIWR, WWRI); Paper reviewer for ten journals: *Chemosphere, Environmental Science and Technology, Journal of Contaminant Hydrology, Journal of Environmental Engineering, Journal of Environmental Quality, Journal of Surfactants and Detergents,*

Langmuir, Soil and Sediment Contamination: An International Journal, Water Research, Water Resources Research

9. Publications in the last 5 years

1. Lixia Chen, David A. Sabatini and Tohren C. G. Kibbey. Retention and Release of TiO_2 Nanoparticles in Unsaturated Porous Media During Dynamic Saturation Change, Journal of Contaminant Hydrology, 2010, *118*, 199-207.
2. Tohren C. G. Kibbey, Lixia Chen, David A. Sabatini, Marc A. Mills, and Christopher Nietch. Model Stream Channel Testing of a UV-Transparent Polymer-Based Passive Sampler for Ultra-Low-Cost Water Screening Applications, Chemosphere, 2010, *80*, 908-913.
3. Tohren C. G. Kibbey, Lixia Chen, Natee Singhaputtangkul, and David A. Sabatini. A UV-Transparent Passive Concentrator/Spectrum Deconvolution Method for Simultaneous Detection of Endocrine Disrupting Chemicals (EDCs) and Related Contaminants in Natural Waters, *Chemosphere*, 2009, *76*, 1249-1257.
4. Randal L. Kolar, Tohren C. G. Kibbey, Christine M. Szpilka, Kendra M. Dresback, Evan M. Tromble, Ian P. Toohey, James L. Hoggan, John H. Atkinson. Process-Oriented Tests for Validation of Baroclinic Shallow Water Models: The Lock-Exchange Problem. *Ocean Modeling*, 2009, *28*, 137-152.
5. K.K. Muraleetharan, Chunyang Liu, Changfu Wei, Tohren C. G. Kibbey and Lixia Chen. A Coupled Elastoplastic Model for Capillary Hysteresis and Stress-Strain Behavior of Unsaturated Soils. *International Journal of Plasticity*, 2009, *25*, 473-490.
6. Lixia Chen, David A. Sabatini and Tohren C. G. Kibbey. The Role of the Air-Water Interface in the Retention of TiO_2 Nanoparticles in Porous Media during Primary Drainage, *Environmental Science and Technology*, 2008, 42, 1916-1921.
7. Tohren C.G. Kibbey and Lixia Chen. Phase volume effects in the sub- and super-CMC partitioning of nonionic surfactant mixtures between water and immiscible organic liquids, *Colloids and Surfaces A*, 2008, *326*, 73-82.
8. G. A. Miller, C. N. Khoury, K. K. Muraleetharan, C. Liu, and T. C. G. Kibbey. Effects of soil skeleton deformations on hysteretic soil water characteristic curves: Experiments and simulations, *Water Resources Research*, 2008, *44*, W00C06, doi:10.1029/2007WR006492.
9. Lixia Chen and Tohren C. G. Kibbey. Transport of Nanomaterials in the Unsaturated Zone, in the book *Nanoscience and nanotechnology: Environmental and Health Impacts*, Vicki H. Grassian, Ed., John Wiley & Sons, 2008, 107-132.
10. Lixia Chen, Gerald A. Miller and Tohren C. G. Kibbey. Rapid Pseudo-Static Measurement of Hysteretic Capillary Pressure-Saturation Relationships in Unconsolidated Porous Media. *ASTM Geotechnical Testing Journal*, 2007, 6, 474-483.
11. Tohren C. G. Kibbey, Rajiv Paruchuri, David A. Sabatini, and Lixia Chen. Adsorption of Beta Blockers to Environmental Surfaces, *Environmental Science and Technology*, 2007, *41*, 5349-5356.
12. James L. Hoggan, Keonbeom Bae and Tohren C. G. Kibbey. Non-Steady State Partitioning of Dry Cleaning Surfactants between Tetrachloroethylene (PCE) and Water in Porous Media. *Journal of Contaminant Hydrology*, 2007, *93*, 149-160.

1. **Name:**
   ROBERT CHARLES KNOX, Ted A. Kritikos Chair and Director
2. **Education**
   P.E., 1987, Principles and Practice of Engineering
   EIT, 1984, Engineering in Training
   Ph.D., 1983, Civil Engineering, University of Oklahoma, Norman, OK
   M.S., 1979, Civil Engineering, University of Oklahoma, Norman, OK
   B.S., 1978, Civil Engineering with Distinction, University of Oklahoma, Norman, OK

3. **Academic experience**
   University of Oklahoma, Professor, Ted A. Kritikos Chair and Director, Civil Engineering and Environmental Science, 2006 – present, Full-time
   University of Oklahoma, Professor, John A. Myers Professor and Director , Civil Engineering and Environmental Science, 2000 – 2006, Full-time
   University of Oklahoma, Professor, Samuel Roberts Noble Presidential Professor, Civil Engineering and Environmental Science, 1998 – 2000, Full-time
   University of Oklahoma, Professor, Civil Engineering and Environmental Science, 1997 – 1998, Full-time
   University of Oklahoma, Associate Professor, Civil Engineering and Environmental Science, 1992 - 1997
   University of Oklahoma, Assistant Professor, Civil Engineering and Environmental Science, 1986 - 1992
   McNeese State University, Assistant Professor, Department of Civil Engineering, 1984 – 1986, Full-time
   University of Oklahoma, Environmental Engineer, Environmental and Ground Water Institute, 1983 – 1984, Full-time

4. **Non-academic experience –**
   Surbec Environmental, LLC, Co-founder and Principal, 1999-present, Part time,

5. **Certifications or professional registrations** - Oklahoma (14903), Louisiana (22283)

6. **Current membership in professional organizations** - American Society of Civil Engineers, American Society for Engineering Education, National Society of Professional Engineers, Association of Ground Water Scientists and Engineers, Association of Environmental Engineering Professors, American Geophysical Union, Oklahoma Society of Professional Engineers

7. **Honors and awards** - NSPE Engineering Education Excellence Award, 2000; Samuel Roberts Noble Presidential Professor, 1998; College of Engineering Distinguished Lectureship Award, 1997; Fred Merryfield Design Award, American Society for Engineering Education, 1996; MAPCO Engineering Lectureship Award, OU College of Engineering, 1994;Outstanding Young Engineer of the Year Award, Oklahoma Society of Professional Engineers,1990; OU Associates Distinguished Lectureship, 1988-89; Outstanding Young Man of America, 1987; DOW Outstanding Young Faculty Award, Gulf-Southwest Section ASEE, 1986

8. Service Activities

University: Medal of Excellence nomination package for Provost Mergler to submit; coordinated university Alpha time on water and sanitation.

College: Faculty Advisor for Engineers Without Borders (Regional Workshop, fundraising events, two assessment trips), WaTER Center committee, ABET Assessment Committee, CoE Dean Evaluation Committee, Greg Mortenson Planning Committee

Department: Director

- General – Faculty evaluations, unit evaluation, faculty retreat, revamped CEES Strategic Plan, revised Visiting Council By-laws, conducted two Visiting Council meetings, met with all prospective students in architectural, civil, environmental engineering and environmental science, advised all transfer students
- Academic – Developed all materials for immediate revisit from ABET, revised AE curriculum in order to meet ABET requirements, AE program accredited until 2011, developed Memorandum of Agreement with Water For People for internships.
- Publications – One journal publication, three Program Outcomes Assessment Reports; CEES Communique' – A Newsletter for Alumni and Friends; Unit Evaluation – 2009, ABET Immediate Revisit Report
- Nominations – One national Award (WERF), one state award (Medal of Excellence), three campus awards (one David Ross Boyd, one Presidential Professor, one Outstanding Teaching), one CAREER letter, three Fellowship reference letters, twelve reference letters for Doctoral students, reference letters for three undergraduate scholarship applications.
- Personnel – Three promotion dossiers, five progress toward tenure evaluations; paid for Fitzmorris to attend IES Lighting Workshop

9. Publications and presentations from the past five years

- "Program Outcomes Assessment Report for Civil Engineering, 2009-10", submitted to Vice Provost for Instruction, September 15, 2010
- "Program Outcomes Assessment Report for Environmental Engineering, 2009-10", submitted to Vice Provost for Instruction, September 15, 2010.
- "Program Outcomes Assessment Report for Architectural Engineering, 2009-10", submitted to Vice Provost for Instruction, September 15, 2010.
- "CEES Unit Evaluation – 2010"
- Nairn, R.W., T. Beisel, R.C. Thomas, J.A. LaBar, K.A. Strevett, D. Fuller, W.H. Strosnider, W.J, Andrews, J. Bays and R.C. Knox. 2009. Challenges in design and construction of a large multi-cell passive treatment system for ferruginous lead-zinc mine waters. In: Proceedings of Joint Conference of the American Society of Mining and Reclamation 26th Annual National Meeting and 11th Billings Land Reclamation Symposium, Revitalizing the Environment: Proven Solutions and Innovative Approaches. May 30 - June 5, 2009, Billings, MT., R.I. Barnhisel (Ed.), pp. 871-892.

10. Professional Development Activities: ASCE National Department Heads Meeting

1. **Name:**
   RANDALL L. KOLAR

2. **Education**

B.S.	Civil Engineering, University of Idaho, 1983
B.S.	Mathematics, University of Idaho, 1983
Ph.D.	Civil Engineering, University of Notre Dame, 1992

3. **Academic experience**
   University of Oklahoma, Professor, Austin Presidential Professor, School of Civil Engineering and Environmental Science, 2008 – Present, Full-time
   University of Oklahoma, Professor, School of Civil Engineering and Environmental Science, 2007 – 2008, Full-time
   University of Oklahoma, Associate Professor, School of Civil Engineering and Environmental Science, 2001 – 2007, Full-time
   University of Oklahoma, Assistant Professor, School of Civil Engineering and Environmental Science, 1995 – 2001, Full-time
   University of New Haven, Assistant Professor, Department of Civil and Environmental Engineering, 1993 – 1995, Full-time
   University of New Haven, Adjunct Professor, Department of Civil and Environmental Engineering, 1992 – 1993, Part-time

4. **Non-academic experience**
   JUB Consulting Engineers, Project Engineer, 1983 – 1987

5. **Certifications or professional registrations**
   P.E., Oklahoma (22724) and Idaho (6034)

6. **Current membership in professional organizations**
   American Geophysical Union, American Society of Civil Engineers, American Society for Engineering Education, American Water Resources Association, Society of Industrial and Applied Mathematics, Tau Beta Pi

7. **Honors and awards**
   OU Alumni Teaching Award (2008), CEES Canter Environmental Awareness Award (2007), Oklahoma Higher Education Teaching Award (2007), Regents' Award for Superior Teaching (2006), Teaching Scholar Award, College of Engineering (2006), ICES Fellow, U. of Texas (2004). ASEE Dow Outstanding New Faculty Award (2000), OU's BP/Amoco Good Teaching Award (2000), Oklahoma Regents' Williams Faculty Innovator Award (2000), NSF CAREER Award (1996-2001)

8. **Service activities**
   a. **University Level:** Member - IT Committee, President's Graduation and Retention Task Force, Faculty Senate; TSI (Teaching Scholars) Steering Committee.
   b. **College Level:** Member - IT Committee.

c. School Level: Associate Director, WaTER Center; Chair - IT Committee; Member - Undergraduate Curriculum Committee.

d. Professional Service: Associate Editor - *Computational Geosciences and Advances in Water Resources*; Advisor Board - NRL and GRDA (Grand River Dam Authority); Steering Committee - DHS Center of Excellence.

9. 5 Publications in the last 1 year

K. M. Dresback, R. L. Kolar, C. A. Blain, C. M. Szpilka, R. A. Luettich and T. Shay, "Development and Application of the Coupled HYCOM and ADCIRC System," *Estuarine and Coastal Modeling, Proceedings of the Eleventh International Conference*, M.L. Spaulding (eds.), ASCE, pp. 259-277, 2010.

C. M. Szpilka, K. M. Dresback, I. P. Toohey and R. L. Kolar, "Alternative Advection Schemes for the Baroclinic ADCIRC Model: Application to the Lock-Exchange Problem," *Estuarine and Coastal Modeling, Proceedings of the Eleventh International Conference*, M.L. Spaulding (eds.), ASCE, pp. 239-258, 2010.

E. M. Tromble, R. L. Kolar, K. M. Dresback, et al., "Aspects of Coupled Hydrologic/Hydrodynamic Modeling for Coastal Flood Inundation," *Estuarine and Coastal Modeling, Proceedings of the Eleventh International Conference*, M.L. Spaulding (eds.), ASCE, pp.724-743, 2010.

K.M. Dresback, C. M. Szpilka, A. M. Szpilka and R. L. Kolar, *Extracting Data from HYCOM for Nested Baroclinic Models: HYCOMextract Theory Report and Users Manual*, Texas Water Development Board, 26 pp., 2010.

Flood Insurance Study: Coastal Counties, Texas, Intermediate Submission 1: Scoping and Data Review, Federal Emergency Management Agency, Region 6, 123 pp., 2010.

5 Presentations in the last 1 year

R.L. Kolar, R.C. Dutnell, "Environmental Assessment of Habitable Structures on Grand Lake," Grand Lake Watershed Conference 2010, GRDA Ecosystem Center, Grand Lake, OK, April 29-30, 2010.

K.M. Dresback*, R.L. Kolar, et al., "Coupled ADCIRC Model Systems, Part 1: HYCOM-ADCIRC, Part 2: HLRDHM-ADCIRC-SWAN," AGU 2010, San Francisco, CA, Dec. 13-17, 2010 (Poster).

S. Van Cooten*, K.E. Kelleher, K. Monroe, J.J. Gourley, Y. Hong, R. Kolar, K. Howard, J. Zhang, "The Coastal and Inland Flooding Observation and Warning (CI-FLOW) Project - Tracking the Raindrop from the Sky to the Summit to the Sea," National Flood Workshop, Houston, TX, Oct. 24-26, 2010.

R.L. Kolar, et al., "A Coupled Hydrologic-Hydrodynamic Modeling System for Flood Inundation," 1st National Flood Workshop, Houston, TX, Oct. 24-26, 2010.

J.P. Looper*, B.E. Vieux, K.M. Dresback, R.L. Kolar, "Hydrologic Prediction at the river basin scale using a physics based distributed modelling approach," Hydrology Conf. 2010, San Diego, CA, Oct. 11-13, 2010.

10. Professional Development Activities

Workshop on Instructional Design (Facilitator), Tennessee Tech. University, August 5-6, 2010; ADCIRC Model Workshop, Stennis Space Center, MS, April 18-19, 2010.

1. **Name:**
   ROBERT W. NAIRN
2. **Education**
   BS Environmental Science, Juniata College, 1989
   PhD Environmental Science, The Ohio State University, 1996
3. **Academic experience** –
   University of Oklahoma, Associate Professor, School of Civil Engineering and Environmental Science, 2002-Present, Full-time
   University of Oklahoma, Adjunct Associate Professor, Department of Zoology, 2011 - Present, Full-time
   University of Oklahoma, Assistant Professor, School of Civil Engineering and Environmental Science, University of Oklahoma, 1997-2002, Full-time
4. **Non-academic experience**
   U.S. Department of Interior, Bureau of Mines, Research Biologist, 1989-92
5. **Certifications or professional registrations**
   None
6. **Current membership in professional organizations**
   American Ecological Engineering Society**,** American Society of Mining and Reclamation, Ecological Society of America, International Affiliation of Land Reclamationists, International Association for Ecology, International Mine Water Association, Society of Wetland Scientists
7. **Honors and awards (selected)**
   Reclamation Researcher of the Year Award, American Society of Mining and Reclamation, 2011
   United Way Volunteer of the Year Award (Service to Education/Youth), 2011
   Mike Synar Environmental Excellence Award, Local Environmental Action Demanded, 2007
   College of Engineering Outstanding Faculty Adviser Award, OU, 2004
   Alpha Phi Omega Leadership Award for Outstanding Teaching, OU, 1999
8. **Service activities**
   a. **University Level:** Research Liaison, OU VPRA; Panelist, English Assessment Program; Speaker, Faculty Senate Speakers Service
   b. **College Level:** Technology Area Leader, CoE TASK/IOTA
   c. **School Level:** Advisor, Environmental Science Student Association, Executive Committee A (2004-2007); Program Outcomes Committee; Undergraduate Curriculum Committee, Technology Software and Review Committee; Environmental Teaching Laboratory Oversight Committee
   d. **Professional Service:** Chair, *International Water Technologies for Emerging Regions Conference*; Chromium VI in Drinking Water Technical Advisory Committee, City of Norman, OK; Storm Water Master Plan Task Force, City of Norman, OK; Oklahoma Comprehensive Water Plan, Regional Input Meetings Alternate; Manuscript review - multiple journals; Proposal review - USEPA, CFI, CRDF, INDO-US STF, OARDC, US DOI, US Department of State
   e. **Community Service:** Boy Scouts of America, Merit Badge counselor; Girl Scouts of America volunteer; Jefferson Elementary School Outdoor Classroom Project Co-coordinator

9. Publications in the last 5 years (5 recent selected)

Amezaga, J.M, T.S. Roetting, P.L. Younger; R.W. Nairn, A-J. Noles, R. Oyarzún, and J. Quintanilla. 2011. A Rich Vein? Mining and the Pursuit of Sustainability. *Environmental Science and Technology* 45(1): 21-26

Strosnider, W.H.J., B.K. Winfrey and R.W. Nairn. 2011. Novel Passive Co-Treatment of Acid Mine Drainage and Municipal Wastewater. *Journal of Environmental Quality* 40(1): 206-213

Winfrey, B.K., W.H. Strosnider, and R.W. Nairn. 2010 Highly Effective Reduction of Fecal Indicator Bacteria Counts in an Ecologically-Engineered Acid Mine Drainage and Municipal Wastewater Passive Co-Treatment System. *Ecological Engineering* 36(12): 1620-1626

Porter, C.M. and R.W. Nairn. 2010 Fluidized Bed Ash and Passive Treatment Reduce the Adverse Effects of Acid Mine Drainage on Aquatic Organisms. *Science of the Total Environment* 408 (22): 5445-5451

Nairn, R.W. J.A. LaBar, K.A. Strevett, W.H. Strosnider, D. Morris, C.A. Neely, A. Garrido, B. Santamaria, L. Oxenford, K. Kauk, S. Carter, B. Furneaux. 2010. A Large, Multi-Cell, Ecologically Engineered Passive Treatment System for Ferruginous Lead-Zinc Mine Waters. *Mine Water and Innovative Thinking, Proceedings International Mine Water Association*, Sydney, Nova Scotia, Canada, pp. 255-258.

10. Presentations in the last 5 years (5 recent selected)

Nairn, R.W. October 2010. Environmental sustainability efforts at the University of Oklahoma. Hokkaido University Sustainability Weeks 2010, Hokkaido University, Sapporo, Japan

Strevett, K.A. and R. W. Nairn. October 2010. Evaluation of an Ecologically-Engineered Passive Treatment System for Ferruginous Lead-Zinc Mine Waters, 2010 Governor's Water Conference and Oklahoma Water Research Symposium, Norman, OK

Nairn, R., J. LaBar and K. Strevett. September 2010. Passive Treatment of Iron-Rich Lead-Zinc Mine Waters: Successful Results and Promising Possibilities, 12th National Conference on Tar Creek, Miami, OK

Nairn, R. J. LaBar, K. Strevett, W. Strosnider, L. Oxenford, T. Beisel, R. Thomas, and J. Bays. April 2010. Passively Addressing Ferruginous Lead-Zinc Mine Waters through Hydro-Biogeochemical and Ecological Engineering. Geological Society of America North Central-South Central Joint Meeting, Branson, MO

Nairn, R.W., J.A. LaBar, K.A. Strevett, W.H. Strosnider, D. Morris, A.E. Garrido, C.A. Neely and K. Kauk. 2010. Initial Evaluation of a Large Multi-Cell Passive Treatment System for Net-Alkaline Ferruginous Lead-Zinc Mine Waters. *Proceedings of the 27th National Conference of the American Society of Mining and Reclamation*, Pittsburgh, PA, pp. 635-649.

11. Professional Development Activities

Hazardous Waste Operations and Emergency Response Training, 29CFR 1910.120, Occupational Safety and Health Administration; Hazard Communication/General Safety Training, Laboratory Safety Training, Department of Transportation Shipping Training, OU Environmental Health and Safety Annual Training, Norman, OK; Basic Assessment and Restoration of Degraded Streams, Oklahoma Department of Wildlife Conservation.

1. **Name:**
   MARK A. NANNY

2. **Education**
   B.S. Chemistry, Wayne State University, 1986
   M.S. Chemistry, University of Illinois, 1989
   Ph.D. Environmental Chemistry, University of Illinois, 1994

3. **Academic experience** –
   University of Oklahoma, Director of the Sooner Engineering Education Center, College of Engineering, 2009 - Present.
   University of Oklahoma, Assistant, Associate (7/02), and Full (5/10) Professor, Institute for Energy and the Environment, 1999 – Present
   University of Oklahoma, Assistant, Associate (7/02) and Full (5/10) Professor, School of Civil Engineering and Environmental Science, 1996 – Present
   University of Oklahoma, Adjunct Assistant, Associate (7/02), and Full (5/10) Professor, Department of Botany and Microbiology, 2002 – Present
   University of Oklahoma, Adjunct Assistant, Associate (7/02), and Full (5/10) Professor, Department of Chemistry and Biochemistry, 1998 - Present
   The Pennsylvania State University, 9/94 - 7/96 Postdoctoral Research Scholar, 1994 - 1996

4. **Non-academic experience** None

5. **Certifications or professional registrations** None

6. **Current membership in professional organizations**
   American Chemical Society: Environmental Chemistry Division, Geochemistry Division, Sigma Xi; International Humic Substance Society; Universities Council on Water Resources; American Society for Engineering Education

7. **Honors and awards**
   Boggs Professor of Engineering Education, College of Engineering, 2009; The Regent's Award for Superior Accomplishment in Research and Creative Activities, 2007 from the Board of Regents of the University of Oklahoma.

8. **Service activities**
   a. **University Level:** Board of Advisors - K20 Center for Educational and Community Renewal 2007 – present; Graduate Faculty Academic Misconduct Panel, CoE representative 2002 – present; Co-developer of new graduate education degree: Masters of Education in STEM 2007 – present
   b. **College Level:** Director – Sooner Engineering Education Center (SEED) 2008 – present; College of Engineering Academic Appeals Committee 2001 – present; Engineering Practice Facility Building Operations Committee 2009 – present

c. **School Level:** Faculty Supervisor, CEES Research Equipment Specialist (departmental technician) 1999 – present CEES Scholarship Committee – Chairman 2000 – present
d. **Professional Service:** American Chemical Society, Division of Environmental Chemistry (1) Editor Division website; (2) Alternate Councilor; (3) Chair – Archive Committee 2005 – present (4) International Outreach Committee 2009 Summer Research Program for Middle School Science & Math Teacher; Summer Engineering Academy for High School Teachers and Students; International Engineering Academy
e. **Community Service:** Volunteer for ABLE, Oklahoma Food Coop,

9. Publications in the last 5 years

Salazar-Ballesteros, C.; Nanny, M.A. "Influence of Hydrogen-Bonding Upon the TiO_2 Photooxidation of Isopropanol and Acetone in Aqueous Solution" *J. of Catalysis*, 269 (2), 404-410, 2010.

Siripornprasarn, A.; Luepromchai, E.; Nanny, M.A. "Role of Dissolved Humic Substances and Dissolved Organic Matter on Degradation of Phenanthrene by Crude Ligninolytic Enzymes from *Agroybe* sp. CU 43" *J. Appl. Science*, 9 (*22*). 3975-3982, 2009.

Beasley, K. K.; Gieg, L. M.; Suflita, J. M.; Nanny, M.A. "Polarizability and Spin Density Correlate with the Relative Anaerobic Biodegradability of Alkylaromatic Hydrocarbons" *Environ. Sci. Technol.*, 43(11), 4995-5000, 2009.

McInerney, M.; Mouttaki, H.; Nanny, M.A. "The metabolism of hydroxylated and fluorinated benzoates by *Syntrophus aciditrophicus* and the detection of a fluorodiene metabolite" *Applied Environ. Microbiol.* 75, 998-1004, 2009.

Presentations in the last 5 years

M.A. Eastman, L.C. Brothers, and M.A. Nanny, "Using solid-state deuterium NMR to characterize the association of benzene with humic and fulvic acid" 239th American Chemical Society National Meeting, San Francisco, CA, March 21-25, 2010.

10. Professional Development Activities

Workshop on Active and Cooperative Learning by Richard Felder, *Sooner Engineering Education Center*, University of Oklahoma, January 28, 2010

1. Name:
PAKIZE SIMIN PULAT

2. Education:
PhD, 1984, Operations Research, North Carolina State Univ., Raleigh, NC.
MS, 1977, Operations Research, North Carolina State Univ., Raleigh, NC.
BS, 1975, Industrial Eng., Middle East Technical Univ., Ankara, Turkey.

3. Academic experience:
University of Oklahoma, Suzanne and Howard Kauffman Chair, Associate Dean of Undergraduate Education, 2007-present
University of Oklahoma, John A. Myers Professor, Associate Dean of Undergraduate Education, 2006-2007
University of Oklahoma, Professor of Industrial Engineering, Director, 2001-2006
University of Oklahoma, Professor of Industrial Engineering, 1996-2001 (1997-1998 as Interim Director)
University of Oklahoma, Associate Professor, Industrial Engineering, 1991-1996
University of Oklahoma, Assistant professor, 1985-1991
North Carolina A&T State University, Assistant Professor, 1980-1985
Bennett College, Mathematics, Part-time Instructor, 1979

4. Non-academic experience:
Creative Insights, CEO, 2005-present
Creative Insights, VP and COO, 2002-2005

5. Certifications or professional registrations: NA

6. Current membership in professional organizations:
Fellow, Institute of Industrial Engineers
Senior Member, Institute of Operations Research and Management Science
Member, American Society of Engineering Education

7. Honors and awards:
IIE Fellow, Institute of Industrial Engineers, May 2004.
Outstanding Professor in Industrial Engineering (*voted by students*), University of Oklahoma, 2001.
Engineering Excellence Award, College of Engineering, Univ. of Oklahoma, 1996.
Distinguished Lecturer Award, College of Engineering, University of Oklahoma, 1993-1994.
Certificate of Appreciation, NASA for Research on Tolerancing, 1992.
Faculty Development Award, University of Oklahoma, Spring 1988.
Associates Distinguished Lecturer Award, University of Oklahoma, 1988-1989.
Ralph Teetor Educator Award, Society of Automotive Engineers, 1987.
IIE Greensboro Senior Chapter 163 Service Award, 1985

8. Service activities:

Member, Board of Advisors for the Pre-Engineering Programs at Moore-Norman Career Tech and Francis Tuttle Career Tech, 2007- present.
Chair Elect, Chair, and Past-Chair, Council of Industrial Engineering Academic Department Heads (CIEADH), 2003-2004, 2004-2005, 2005-2006.
CAREER Grant Proposal Review Panel Member, National Science Foundation, November, 2000, 2002.
University Level:
Co-Chair, Study Abroad in the Middle East, 2009- present
Engineering Transfer Equivalency Committee, 2008-present
Provosts Advisory Committee on Written Communication, 2009-present
Provosts Advisory Committee on General Education Courses, 2008-present
Employee Welfare and Benefits Committee, 2007- present
Program Review Committee, 2007
University Accreditation Committee
Panel Member, Academic Promotion and Tenure, PACWI, 2003.
Panel Member, Research Funding, New Faculty Colloquium, 2003

9. Briefly list the most important publications and presentations from the past five years:

Wang, J., Shen, G., Pulat, P.S., "Data Mining for the Development of a Global Port-to-Port Freight Movement Database", *International Journal of Shipping and Transport Logistics*, Special Issue on *Container Security and Supply Chain Visibility*, Vol. 4, 2012,forthcoming.

Aydin, S. G., Shen, G., Pulat, P.S., Kamath, M. Ingalls, R., "Framework for Freight Flow Movement Modeling under an Extreme Events", working paper, University of Oklahoma, 2011.

Yang, K., Pulat, P.S., and Guan, Y., "Embedded Simulation on a Multi Processor Job Scheduling System with Inspection, *Computers and Industrial Engineering*, doi:10.1016/j.cie.2008.09.011.

Chen, K., Lee, M., Pulat, P.S., and Moses, S. A., "The Shifting Bottleneck Procedure for Job-Shops with Parallel Machines", *International Journal of Industrial and Systems Engineering*, 1(1/2), 244-262, 2006.

Kamath, M., Ingalls, R., Shen, G., and Pulat, P.S., "TISCSoft: A Decision Support System for Transportation Infrastructure and Supply Chain System Planning", *Proceedings of the 44th Hawaii International Conference on System Sciences,* January 2011, Kauai, HI.

Aydin, S.G., Shen, G., Pulat, P.S., Kamath, M., "Retro-Analysis of Freight Movement in the U.S. Highway Network under the 2002 I-40 Bridge Collapse in Oklahoma," 89th Transportation Research Board Annual Meeting, Washington, D.C., January 2010.

Aydin, S.G., Shen, G., Pulat, P.S., Kamath, M., and Ingalls, R.G., "Highway Freight Flow Dynamics under an Extreme Event: Hurricane Katrina," 3rd National Urban Freight Conference, Long Beach, CA, October 2009.

10. Briefly list the most recent professional development activities:

Active and Cooperative Learning Workshop by Richard Felder at the University of Oklahoma, January 2011.

1. **Name:**
   DAVID A. SABATINI

2. **Education**

Ph. D.	Civil Engineering	Iowa State University	1989
M. S.	Civil Engineering	Memphis State University	1985
B. S.	Civil Engineering	University of Illinois	1981

3. **Academic experience** –
   University of Oklahoma, Professor, David Ross Boyd Professor, Director, WaTER Center, 1999 – Present, Full time
   Universität Tübingen, Senior Fulbright Scholar, 1997 - 1998
   University of Oklahoma, Associate Professor, 1994 – 1999, Full time
   University of Oklahoma, Assistant Professor, 1989 – 1994, Full time

4. **Non-academic experience**
   Surfactant Associates, Inc, Partner, 2000 - Present
   USEPA Environmental Research Laboratory Summer 1997
   Surbec Environmental, LLC, co-Founder and co-Principal, 1996 – 2008
   Illinois Central Gulf Railroad, 1981 - 1983

5. **Certifications or professional registrations**
   PE: Oklahoma – 17121; Tennessee - 0107663

6. **Current membership in professional organizations**
   American Chemical Society, American Geophysical Union, American Oil Chemists Society, American Society of Civil Engineers, American Society of Engineering Educators, American Water Works Association, Association of Environmental Engineering and Science Professors (AEESP), International Water Association, National Ground Water Association

7. **Honors and awards (select)**
   Oklahoma Medal for Excellence in Teaching at a Research University – Oklahoma Foundation for Excellence (2010); DaVinci Fellow Award – DaVinci Institute of Oklahoma (2010); George W. Tauxe Outstanding Professor Award in School of Civil Engr. & Env. Sci. – OU (2010); Outstanding Educator Award: Outstanding Contribution to Environmental Engineering and Science Education (Association of Environmental Engineering and Science Professors - 2008); Japanese Oil Chemist Society Lectureship Award (2006); David Ross Boyd Professor – University of Oklahoma (2005); Sun Oil Company Endowed Chair – University of Oklahoma (2002).

8. **Service activities**
   a. **University Level:** Director, Water Technology for Emerging Region (WaTER) Center. Associate Director, Institute for Applied Surfactant Research
   b. **College Level:** Member**,** College Tenure and Promotion Committee
   c. **Professional Service:** Editor-in-Chief, *J. of Contaminant Hydrology;* Associate Editor – *J. of Surfactants and Detergents*; Editorial Board: *Journal of Water, Sanitation and Hygiene for Development*. Member of DuPont Chemical Co.

Science Advisory Board for site remediation, the WaterCAMPWS Center at the University of Illinois (an NSF/STC) and the Superfund Research Center at the University of Arizona (NIEHS).

9. Publications in the last 5 years (select)
(4 books appeared, 161 refereed journal articles / book chapters appeared / in press)
Work has been cited 2,307 times with an h-index of 27 (Web of Science – Feb 18, 2011)

Do, L. and Sabatini, D. A. "Pilot Scale Study of Vegetable Oil Extraction by Surfactant-Assisted Aqueous Extraction Process." Separation Science and Technology. 2011, 46, 1-8.

Nguyen, T. T. and Sabatini, D. A. "Characterization and Emulsification Properties of Rhamnolipid and Sophorolipid Biosurfactants and Their Applications." International Journal of Molecular Science. 2011, 12, 1232-1244.

Chen, L., Sabatini, D. A., Kibbey, T. C. G. "Retention and Release of TiO_2 Nanoparticles in Unsaturated Porous Media During Dynamic Saturation Change." Journal of Contaminant Hydrology. 2010, 118, 199-207.

Soontravanich, S., Lopez, H., Scamehorn, J. F., Sabatini, D. A. and Scheuing, D. R. "Dissolution Study of Salt of Long Chain Fatty Acids (Soap Scum) in Surfactant Solutions. Part I: Equilibrium Dissolution." Journal of Surfactants and Detergents 13, 2010, 367 - 372.

Tanthakit, P., Ratchatawetchakul, P., Chavadej, S., Scamehorn, J. F., Sabatini, D. A., Tongcumpou, C. and Tongcumpou, C. "Palm Oil Removal from Fabric using Microemulsion-based Formulations." Journal of Surfactants and Detergents. 13, 2010, 485-495.

Do, L. and Sabatini, D. A. "Aqueous Extended-Surfactant Based Method for Vegetable Oil Extraction: Proof of Concept." Journal of American Oil Chemists' Society 2010, 87, 1211-2120.

Kibbey, T. C. G., Chen, L., Sabatini, D. A., Mills, M. A. and Nietch, C. "Model Stream Channel Testing of a UV-transparent Polymer-based Passive Sampler for Ultra-low-cost Water Screening Applications." Chemosphere. 2010, 80, 908-913.

Nguyen, T. T., Edelen, A., Neighbors, B. and Sabatini, D. A. "Biocompatible Lecithin-Based Microemulsions with Rhamnolipid and Sophorolipid Biosurfactants: Formulation and Potential Applications." Journal of Colloid and Interface Science. 2010, 348, 498-504.

Damrongsiri, S., Tongcumpou, C., Weschayanwiwat, P. and Sabatini, D. A. "Solubilization of Dibutyltin Dichloride with Surfactant Solutions in Single and Mixed Oil Systems." Journal of Hazardous Materials. 2010, 181, 1109-1114.

Nguyen, T., Do, L. and Sabatini, D. A. "Biodiesel Production via Peanut Oil Extraction using Diesel-based Reverse Micellar Microemulsions." Fuel. 2010, 89, 2285-2291.

Phan, T. P., Witthayapanyanon, A., Harwell, J. H. and Sabatini, D. A. "Microemulsion-based Vegetable Oil Detergency using an Extended Surfactant." Journal of Surfactants and Detergents. 2010, 13, 313-319.

Mlilo, T. B., Brunson, L. R. and Sabatini, D. A. "Arsenic and Fluoride Removal using Simple Materials." J. Environmental Engineering. 2010, 136(4), 391-398.

1. **Name:**
   KEITH STREVETT

2. **Education**
   B.S. Microbiology and Public Health, Michigan State University, 1992
   B.S. Civil and Environmental Engineering, Michigan State University, 1992
   Ph.D. Environmental Engineering, University of Connecticut, 1995

3. **Academic experience** –
   University of Oklahoma, Professor, School of Civil Engineering and Environmental Science, 1995- Present, Full-time, 1995 - Present

4. **Non-academic experience**
   Michigan Biotechnology Institute, Research Assistant, 1986 – 1992
   Hoag and Grasso, Inc., Engineer Intern, 1993 – 1995 ,

5. **Certifications or professional registrations**
   Engineering-in-Training, 1992

6. **Current membership in professional organizations**
   Member, American Society of Civil Engineers, Member, Association of Environmental Engineering and Science Professors, Member, American Society of Ecological Engineering Society

7. **Honors and awards**
   The Regents' Award for Superior Teaching (2003); UOSA Outstanding Faculty Award, (2002); COE Outstanding Faculty Advising Award (2002); George W. Tauxe Award, The University of Oklahoma (2001, 2000, 1997); Larry Canter Environmental Award, The University of Oklahoma (2004, 2001); Distinguished Service Award, Association of Environmental Engineering and Science Professors (2000); Who's Who in Science and Engineering, Marquis Biographies (1999), CAREER Award, National Science Foundation (1998); Sigma Xi — Scientific Research (1995); Chi Epsilon — Civil Engineering (1995); Gieb Fellowship, The University of Connecticut (1994); Environmental Engineering Fellowship, The University of Connecticut (1994).

8. **Service activities**
   a. **University Level:** Member, Graduate College Academic Appeals Board; Reviewer, Undergraduate Research Opportunities Program' Faculty Advisor, Eden on Campus.
   b. **College Level:** none
   c. **School Level:** Member, Graduate Studies Committee; Member, Undergraduate Studies Committee; Faculty Advisor, Chi Epsilon
   d. **Professional Service:** Associate Editor for *Biochemical Engineering Journal*, Board Member of Oklahoma Corporation Commission-Remediation License Board.

e. Community Service: Scoutmaster, Troop 242; AWANA Leader, 1504; Committee Member, Central Oklahoma Science Fair.

9. Publications in the last 5 years

Evenson, C and KA Strevett 2006 "Discriminant Analysis of Fecal Bacterial Species Composition for Use as a Phenotypic Microbial Source Tracking Method" *Research in Microbiology* 157: 437-444.

Winfrey B., W. Strosnider, R Nairn and K. Strevett 2010 "Highly Effective Reduction of Fecal Indicator Bacteria Counts in an Ecologically-Engineered Municipal Wastewater and Acid Mine Drainage Passive Co-Treatment System" ECOL. ENG. 36: 1620-1626.

Presentations in the last 5 years

Nairn, R.W., Strevett, K., LaBar, J.A., Hensley, D., Sutter, A., Clifton, J., Strosnider, W., Santamaria, B., Lutes, D., McAllister, J., Brewer, A., Roberts, M., Brumley, J., Kauk, K. (2008). "Watershed-scale environmental monitoring to prioritize mine drainage passive treatment implementation." *Proceedings of the 25th National Conference of the American Society of Mining and Reclamation*, Richmond, VA, June 14-19, pp. 1232-1251.

Nairn, R., T. Beisel, R. Thomas, J. LaBar, K. Strevett, D. Fuller, W. Strosnider, W. Andrews, J. Bays, R. Knox (2009) "*Challenges in Design and Construction of A Large Multi-Cell Passive Treatment System for Ferruginous Lead-Zinc Mine Waters Proceedings of the 26th National Conference of the American Society of Mining and Reclamation*, Lexington, KY, June 1-5, pp. 871-893.

Nairn, R., J.A. LaBar, K.A. Strevett, W.H. Strosnider, D. Morris, A.E. Garrido, C.A. Neely and K. Kauk (2010) "Evaluation of large multi-cell passive treatment system for net-alkaline ferruginous lead min waters" *Proceedings of the 27th National Conference of the American Society of Mining and Reclamation*, Pittsburgh, PA, June 5-11, pp..

Strevett, KA, R Nairn and J LaBar (2010) "Evaluation of an ecologically-engineered, passive treatment system" 2010 Water Research Symposium. Norman, OK

10. Professional Development Activities

8th annual Teaching Scholars Initiative, Michael Wesch Kansas State University seminar, 11/5/2010; HAZWOPER training from National Environmental Trainers, Inc, 12/16/2010

1. **Name:**
   BAXTER E. VIEUX

2. **Education**
   B.S. Civil Engineering, University of Kansas, 1978
   M.S. Civil Engineering, Kansas State University, 1981

3. **Academic experience** –
   University of Oklahoma, Full Professor, Brandt Professor, School of Civil Engineering and Environmental Science, 2001 - Present, Full-time
   University of Oklahoma, Associate Professor, School of Civil Engineering and Environmental Science, 1995 – 2001, Full-time
   University of Oklahoma, Assistant Professor, School of Civil Engineering and Environmental Science, 1990 – 1995, Full-time
   Michigan State University, Visiting Assistant Professor, Resource Development, 1988 – 1990

4. **Non-academic experience**
   USDA Soil Conservation Service, Various positions with. highest position, Assistant and Acting State Engineer, 1978 – 1988

5. **Certifications or professional registrations**
   P.E., Kansas No. 9330, 1981, Professional Engineer. Michigan No. 31472, 1985, Professional Engineer., Oklahoma No. 16257, 1991 Professional Engineer. And NCEES Model Engineer with licenses in Texas, Maryland, and Ohio.

6. **Current membership in professional organizations**
   American Meteorological Society, Member, 1997, American Geophysical Union, Member, 1994. European Geophysical Society, Member, 1994, American Society of Engineering Education, Member, 1992, Tau Beta Pi, Life Member, 1978, National Society of Professional Engineers, Member, 1978, American Society of Civil Engineers, Member, 1978

7. **Honors and awards**
   Brandt Professor, 2008-present
   President's Associates Presidential Professor, 2003-2008

8. **Service activities**
   a. **University Level:** CDRP Committee Member 2009-2010, Consortium of Universities for the Advancement of Hydrologic Sciences, founding member and delegate, 2002-present, Lead Delegate University Council on Water Resources, 1997-present, Delegate University Consortium on GIS, 1997-present, CIMMS Advisory Board and Fellow, Cooperative Institute for Mesoscale Meteorological Studies, 1994-present
   b. **College Level:**
   c. **School Level:** Director, Center for Natural Hazards and Disaster Research, 1999-2010

d. Professional Service: Session Organizer and Moderator, NEXRAD ASCE/EWRI; Session Chair, Oklahoma Governor's Water Conference & OWRRI Water Research Symposium; IAHR/GUR Scientific Committee Member; 4) Guest Editor, Journal of Hydrology;

e. Community Service: Lake Thunderbird, District Board Member, Central Oklahoma Master Conservancy District. Board Member, Parents Helping Parents.

9. Publications in the last 5 years (Selected)

Vieux, B.E., 2008. Distributed Hydrologic Modeling Using GIS. Chapter in *Encyclopedia of GIS*. Eds. Shashi Shekhar and Hui Xiong. Springer Reference, ISBN: 978-0-387-35973-1, pp. 1377.

Bedient, P.B., W.C. Huber, B.E. Vieux, 2008. *Hydrology and Floodplain Analysis.* Fourth Edition, Prentice-Hall, Inc., One Lake St., Upper Saddle River, NJ 07458. ISBN 0131745891. p. 816.

Fang, Z., A. Zimmer, P.B. Bedient, H. Robinson, J. Christian, and B.E. Vieux. 2010. Distributed Hydrologic Model to Evaluate the Location of Urban Development and Flood Control Storage. J. of Water and Resources planning and Management.

T. Lebel, B. Cappelaere, S. Galle, N. Hanan, L. Kergoat, S, Levis, B. Vieux, L. Descroix, M. Gosset, E. Mougin, C. Peugeot, L. Seguis, 2009. AMMA-CATCH studies in the Sahelian region of West-Africa: An Overview. In Press, Available on line July 2009: doi:10.1016/j.jhydrol.2009.03.020.

Vieux, B.E., J. Park, and B. Kang, 2009. On Distributed Hydrologic Prediction: Sensitivity to Accuracy of Initial Soil Moisture Conditions and Radar Rainfall Input. Journal of Hydrologic Engineering. July, Vol. 14, Issue 7, pp. 671-689.

Gourley, J.J. and B.E. Vieux, 2006. A Method for Identifying Sources of Model Uncertainty in Rainfall-Runoff Simulations. Journal of Hydrology. Available online 20 February 2006, doi:10.1016/j.jhydrol.2005.11.036.

Presentations in the last 5 years (Selected)

Abstract and Poster, AGU 2009, Fall Meeting. H51I-0872 POSTER Statistical Analysis and water Quality Modeling for a Drinking Water Source Watershed for the City of Houston, Texas: A Teague, P Bedient, B.E. Vieux.

Abstract and Poster, AGU 2010 Fall Meeting. H31D-0804 POSTER Precipitation Estimation using NEXRAD Over A Sparse Rain Gauge Network: S Rendon, B.E. Vieux, C S Pathak.

Abstract and Presentation. Imgarten, J.M., J.P. Looper, B.E. Vieux. Assessing the accuracy and scaling properties of high- resolution radar rainfall estimates for urban and rural flood prediction. 8th INTERNATIONAL WORKSHOP on PRECIPITATION IN URBAN AREAS. 10-13 December, 2009, St. Moritz, Switzerland.

10. Professional Development Activities

Technology Firm, Chief Technology Officer, Vieux & Associates, Inc.; Stormwater Master Plan, City of Norman, PBS&J; Critical Needs Study, Tetra Tech.

1. **Name and Title**
   Musharraf Zaman, Professor of Civil Engineering and Environmental Science, and Professor of Petroleum and Geological Engineering

2. **Education**
   B.S., Civil Engineering, Bangladesh Univ. of Engineering and Technology, 1975
   M.S., Civil Engineering, Carleton University, Ottawa, Canada, 1979
   Ph.D., Civil Engineering, University of Arizona, Tucson, 1982

3. **Academic experience**
   University of Oklahoma, Professor of Petroleum and Geological Engineering, 2010 – Present, Full time
   University of Oklahoma, Professor of Civil Engineering and Environmental Science, David Ross Boyd Professor, 1993 – Present
   University of Oklahoma, Associate Professor of Civil Engineering and Environmental Science, 1988 – 1993
   University of Oklahoma, Assistant Professor of Civil Engineering and Environmental Science, 1982 - 1988

4. **Non-academic experience**
   Argonne National Lab, Summer Faculty Research Participant, May – Aug. 1986
   University of Arizona, Research Associate, 1981 – 1982

5. **Certifications or professional registrations**
   Registered Professional Engineer (Oklahoma #16199)

6. **Current membership in professional organizations**
   Transportation Research Board (1997-2003), Society of Petroleum Engineers (SPE) (1997 - 2000), American Society of Engineering Education (ASEE) (since 1997).

7. **Honors and awards**
   David Ross Boyd Professorship (2003, life-time teaching award for outstanding contributions to teaching); Kerr McGee Presidential Professor (1997-2001); Regents' Award for Superior Research and Creative Activity, The University of Oklahoma (1992); Regents' Award for Superior Teaching, The University of Oklahoma (1990);

8. **Service activities**
   Co-Chair, 12th IACMAG Conference, held at Goa, India, Oct. 1-6, 2008; Chief Proctor, EIT Exam. (ELSES) (from 2002 to 2010); Co-Chair, 13th IACMAG Conference, held in Melbourne, Australia, May 9-11, 2011.

9. **Important Publications in the last 5 years**

- "Estimation of Bearing Capacity of Basalts at Atasu Dam Site, Turkey" (S. Alemdag, Z. Gurocak, P. Solanki, and M. Zaman). Bulletin of Eng. Geology and The Env., Vol. 67, No. 1, 2008, pp. 79-85.

- "Rock Slope Stability and Excavability Assessment of Rocks at the Kapikaya Dam Site, Turkey" (Gurocak, Z., Alemdag, S. and Zaman, M.). Engineering Geology, Vol. 96, 2008, pp. 17-27.
- "Finite Element Modeling of Cementitiously Stabilized Unnotched Beams Using a Smeared Fracture Approach" (M. Zaman, N. Khoury, and P. Solanki). International J. of Geomech., ASCE, Vol. 9, No. 1, 2009, pp. 34-42.
- "Evaluation of Resilient Moduli of Pavement Layers at an Instrumented Section on I-35 in Oklahoma" (Solanki, P., Zaman, M., Muraleetharan, K. and Timm, D.). International J. Road Materials and Pavement Design, Vol. 10 (Special issue), 2009, pp. 167-188.
  "Polymeric Aggregate Treatment Using Styrene-Butadiene Rubber (SBR) for Moisture-Induced Damage Potential" (Wasiuddin, N.M., Zaman, M. and O'Rear, E.). Int. J. of Pavement Research and Tech., Vol. 3, No. 1, Jan. 2010, pp. 1-9.

10. Some Important Recent Presentations

- "Continuous Real-Time Measurement of Pavement Quality during Construction" (Singh, D.V., Commuri, S., and Zaman, M.). ODOT-OkTC Research Day, held in OKC on Oct. 14, 2010 ***(Awarded 1st Prize)***.
- "Improvement of Subgrade Soil Properties Using Chemical Stabilization: A Case Study" Singh, D.V., Ghabchi, R., Laguros, J.G., and Zaman, M.M.). BGSA Research Symposium, The University of Oklahoma, Norman, 2010. ***(Awarded 2nd Prize)***.
- "Tube Suction Test for Evaluating Durability of Cementitiously Stabilized Soils" (Solanki, P., Zaman, M. M., and Khalife, R.). ODOT-OTC Research Day, Poster Presentation, held in OKC on Oct. 14, 2010 ***(Received Second Prize)***.
  (numerous others).

Appendix C – Equipment

In addition to the facilities covered in Criterion 7, the following equipment items are available for use in undergraduate instruction. The list includes laboratory sample preparation and testing equipment, field sampling and testing equipment, and additional computing resources.

ITEM	BUIDLING	ROOM NUMBER
SUN ENTERPRISE 250 SERVER	Carson Engineering Center	302
SERVER T10-108A08GA1P	Carson Engineering Center	302
SUN BLADE 2000 A 29 PSI 9C 1GM	Carson Engineering Center	302
A 29 PYI 9Y 1GMAJ SUNN BLADE 2	Carson Engineering Center	302
A 29 PYI 9Y 1GMAJ SUN BLADE 20	Carson Engineering Center	302
COMPUTER WORKSTATION TO INCLUD	Carson Engineering Center	303
SPECTROPHOTOMETER UV 1601 UV V	Carson Engineering Center	S11
BASIC EDUCATION TRIAXIAL SET F	Carson Engineering Center	S11
DYNAMIC HOLLOW CYLINDER TESTING	Carson Engineering Center	S11
DIGITAL CONTROLLER 1000 CC 2M	Carson Engineering Center	S11
VARIAN VISTA PRO	Carson Engineering Center	S15
SPS3 Sample Preparation System	Carson Engineering Center	S15
YSI MODEL 600 OMS OPTICAL MONITOR	Carson Engineering Center	S17
YSI MODEL 600QS WATER QUALITY PROBE	Carson Engineering Center	S17
YSI MODEL 600QS WATER QUALITY PROBE	Carson Engineering Center	S17
METROHM DUAL ANION AND CATION ANALYZER	Carson Engineering Center	S17
CARBON ANALYZER	Carson Engineering Center	S17
TOTAL STATION TOPCON GTS211D	Carson Engineering Center	S17
1 EA TRIMBLE 5700 BASE KIT SW	Carson Engineering Center	S17
SONTEK FLOW TRACKER	Carson Engineering Center	S17
YSI 6920 V2-2 M	Carson Engineering Center	S17
YSI 600XLM-V2-S	Carson Engineering Center	S17
YSI 600XLM-V2-S	Carson Engineering Center	S17
REPLACEMENT GLOVE CHAMBER	Carson Engineering Center	S21A
ION Chromatograph	Carson Engineering Center	S21A
SHIMADZU GAS Chromatograph	Carson Engineering Center	S21A
GLOVE BOX CONTROLLED ENVIRONMENTAL CHAMBER	Carson Engineering Center	S22
BENCHTOP FERMENTOR BIOFLO III	Carson Engineering Center	S22
SEDEX 75 ELS DETECTOR SED7500	Carson Engineering Center	S24
SHIMADZU HPLC GC SYSTEM USE	Carson Engineering Center	S24
PROGRAMMABLE FLUORESCENCE DETECTOR	Carson Engineering Center	S24

Appendix D – Institutional Summary

1. The Institution

a. Name and address of the institution

The University of Oklahoma
660 Parrington Oval, Room 110
Norman, OK, 73019

http://www.ou.edu

b. Name and title of the chief executive officer of the institution

Mr. David L. Boren, President

c. Name and title of the person submitting the self-study report.

Dr. Thomas L. Landers, Dean of College of Engineering

d. Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

The University of Oklahoma is accredited by the Higher Learning Commission of the North Central Association of Colleges and Schools. The initial accreditation was in 1913. Most recent evaluation was conducted in 2001-2002 and the accreditation was extended to 2012. Next comprehensive evaluation is in 2011-2012.

2. Type of Control

The Oklahoma State System of Higher Education is the state's legal structure for providing public education at the collegiate level. It is a coordinated system of colleges and universities located throughout the state.

The State System is comprised of 25 colleges and universities – including two research universities, 11 regional universities and 12 community colleges – and 11 constituent agencies and one higher education center. The State System is coordinated by the Oklahoma State Regents for Higher Education, and each institution is governed by a board of regents.

The University of Oklahoma is a state-supported research university. The official governing body of the university is the Board of Regents, composed of seven citizens appointed by the Governor with the advice and consent of the State Senate. Each Regent serves a seven-year term.

3. Educational Unit

The College of Engineering is led by Dean Thomas L. Landers. The college is comprised of six schools and two programs as shown in Figure D.1. The two programs are Engineering Physics and the Bio-engineering programs. The Architectural Engineering program is in the School of Civil Engineering and Environmental Science. Bio-engineering program offers graduate degrees with a cross disciplinary faculty. Mewbourne College of Earth and Energy houses the MPGE. The College is led by Dean Larry Grillot. While the MPGE students are officially in a separate college, they are an integral part of the College of Engineering student mentoring and enrichment activities.

Dean Tom Landers reports to the Provost Dr. Nancy Mergler, who in turn reports to the President David Boren. The organizational charts of the President and the Provost are in Figures D.2 and D.3, respectively.

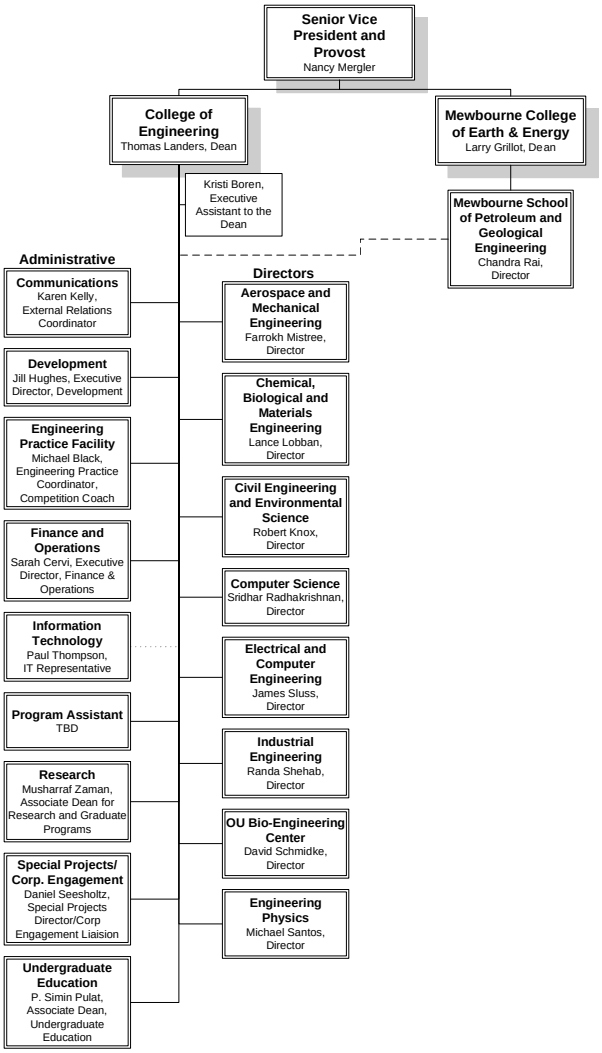

Figure D.1. The University of Oklahoma College of Engineering Organizational Chart

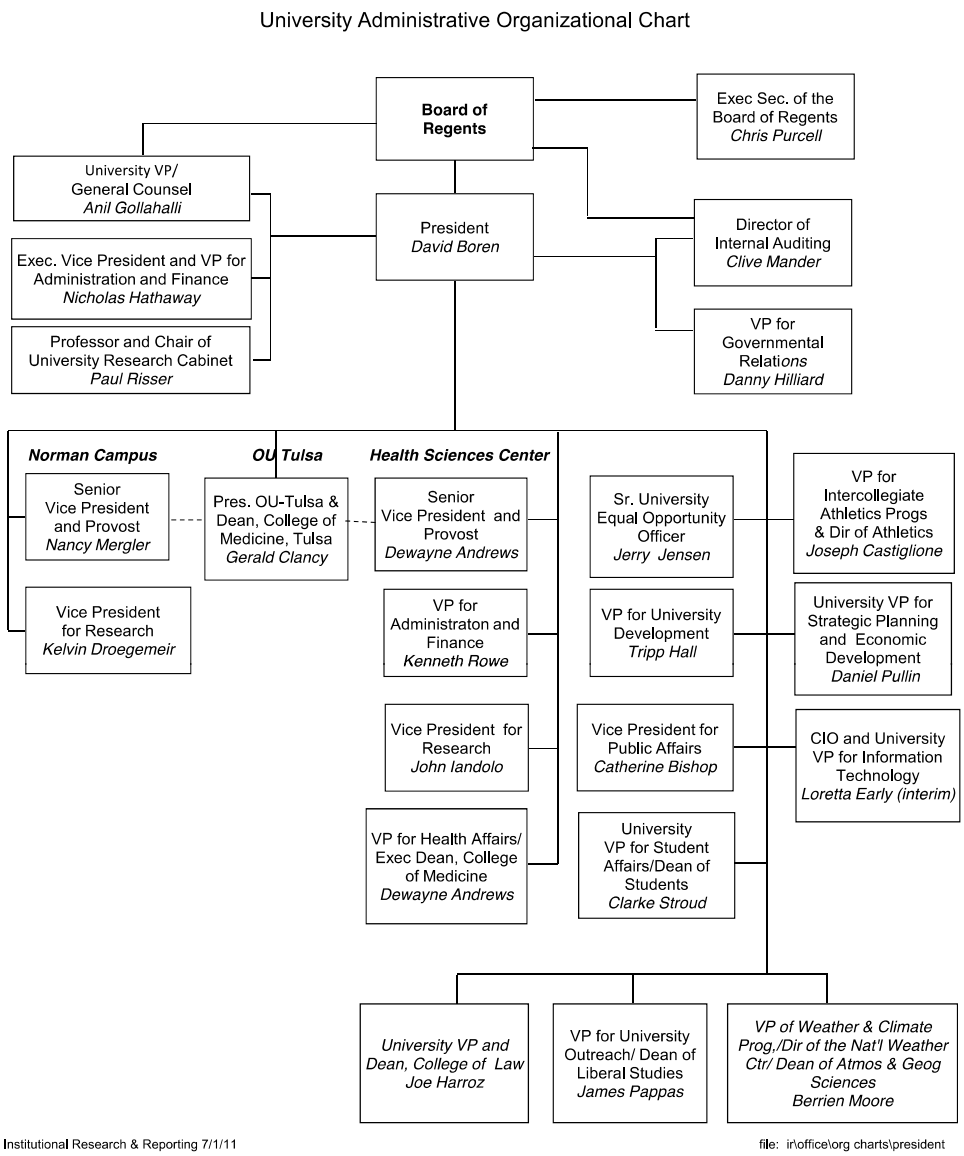

Figure D2. The University of Oklahoma President's Organizational Chart

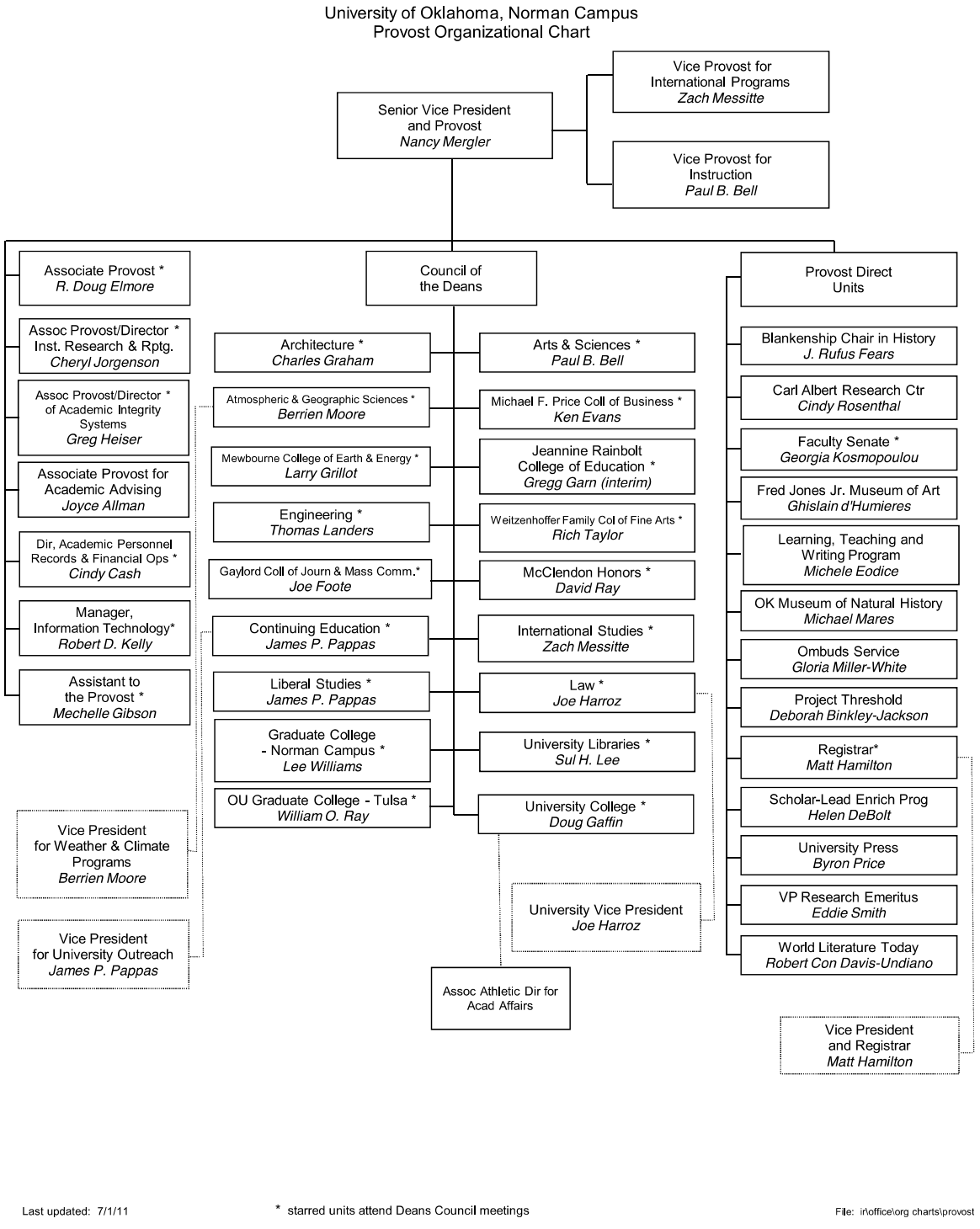

Figure D3. The University of Oklahoma Provost's Organizational Chart

4. Academic Support Units

The College of Engineering and College of Earth and Energy Programs are supported by Schools within several Colleges. The Deans of the Colleges are listed in Figure D3. The names and titles of the school directors are as follows:

College of Architecture, Charles Graham, Dean
- School of Architecture, Joel Dietrich (interim)

College of Arts and Sciences, Paul Bell, Dean
- School of Botany and Microbiology, Gordon Uno
- School of Chemistry and Biochemistry, George Richter-Addo
- School of Communication, Michael Kramer
- School of English, David Mair
- School of History, Robert Griswold
- School of History of Science, Steve Livesey
- School of Mathematics, Paul Goodey
- School of Physics and Astronomy, Greg Parker
- School of Political Science, Greg Russell
- School of Zoology, Randall Hewes

5. Non-academic Support Units

College of Engineering
- Advising, Theresa Marks
- Library, James Bierman
- IT, Paul Thompson
- Tutoring, Lisa Morales

College of Earth and Energy
- Advising, Linda Goeringer
- Library, Jody Bales Foote
- IT, Lisa Hendrix

University of Oklahoma
- Admissions, Mark McMasters
- Enrollment Services, Breck Turkington
- Academic Records, Rick Skeel
- Career Services, Bette Scott
- Center for Learning and Teaching, Michele Eodice

6. Credit Unit

Most OU courses are 3 credit hours. Since each credit hour = 50 minutes of class time per week, a course that meets on Monday/Wednesday/Friday (MWF) will meet 50 minutes each class day for a total of 150 minutes each week. A course that meets on Tuesday/Thursday (TR) will meet 75 minutes each class day for at total of 150 minutes each week. Lab courses are figured differently. For each hour of a lab credit a student receives, the student must double the minutes of class time. One semester represents 15 weeks. So, one academic year will be 30 weeks, exclusive of final examinations.

Table D-1. Program Enrollment and Degree Data

Environmental Engineering

		Enrollment								
		Undergraduate					Graduate		Degrees Awarded	
		Freshman	Sophomore	Junior	Senior	Total	Total		Bachelor's	Master's	Doctorate
Fall 2010	FT	17	12	5	5	39	3	AY10-11	n/a	n/a	n/a
	PT	1	2	1	2	6	7				
Fall 2009	FT	23	5	2	3	33	8	AY09-10	4	3	2
	PT	0	1	0	3	4	6				
Fall 2008	FT	6	2	5	6	19	8	AY08-09	5	2	1
	PT	0	0	0	3	3	3				
Fall 2007	FT	3	5	1	7	16	13	AY07-08	2	5	1
	PT	0	0	1	3	4	1				
Fall 2006	FT	3	1	2	9	15	9	AY06-07	6	0	1
	PT	0	0	0	5	5	1				

FT--full time
PT--part time

Table D-2. Personnel

Environmental Engineering

Year: _2010____

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative	.31	0	.31
Faculty (tenure-track)	10.68	0	5.18
Other Faculty (excluding student Assistants)	3	1	.75
Student Teaching Assistants	4	7	2.40
Student Research Assistants	57	11	9.28
Technicians/Specialists	2	0	.60
Office/Clerical Employees	4	2	1.50
Others	4	1	1.43

Signature Attesting to Compliance

By signing below, I attest to the following:

That _____ (*Name of the program(s)*) 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 Computing Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

_____

Dean's Name (As indicated on the RFE)

_____ _____

Signature **Date**