ABET
Self-Study Report

for the

B.S. Civil Engineering Program

at

University of Alaska Fairbanks

Fairbanks, Alaska

June 2011

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UAF College of Engineering & Mines

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BACKGROUND INFORMATION

A. Contact Information

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B. Program History

The Civil Engineering Bachelor of Science (BSCE) degree program at UAF began in 1922 and graduated its first major in 1931. Many of the more than 800 men and women who have graduated since then work in a wide range of positions all over Alaska. More than 60 percent of Alaska's professional engineers practice in civil engineering.

The BSCE program has been accredited since 1944. The program was accredited again after the last ABET EAC general review during the 2005–2006 academic year.

Major changes to the program since the 2005–2006 EAC general review include:

- *Change of Program Educational Objectives and the Objective Assessment Process*
- *Implementation of a New Program Assessment Process*
- *Implementation of a New Student Outcomes Assessment Process – Improvement of Instructional Laboratories for Safety*

Details of the changes will be described in relevant sections of this self-study report.

C. Options

The BSCE program currently offers a Bachelor of Science degree without any other alternative tracks, concentrations, or minors. Students wishing to pursue double majors that include the BSCE degree follow the policies and regulations set by the University.

D. Organizational Structure

The BSCE program is offered by the Department of Civil and Environmental Engineering (CEE) Department, which is organizationally subsidiary to the College of Engineering and Mines (CEM) of the University of Alaska Fairbanks (UAF).

The University of Alaska Fairbanks (UAF), www.uaf.edu, with its main campus in Fairbanks, Alaska, is one of the three universities that together form the University of Alaska (UA) System. The other two are the University of Alaska Anchorage, UAA, with a main campus in Anchorage, Alaska, and the University of Alaska Southeast, UAS, with a main campus in Juneau, Alaska. Academics at UAF are spread primarily across "Schools" and "Colleges," with "Schools" being narrower in focus and smaller in size than "Colleges." There are four colleges at UAF, including the College of Engineering and Mines, the College of Liberal Arts, the College of Natural Science and Mathematics, and College of Rural and Community Development. There are also four schools, including the School of Management, the School of Fisheries and Ocean Sciences, the School of Natural Resources and Agricultural Sciences, and the School of Education.

Academic Organization

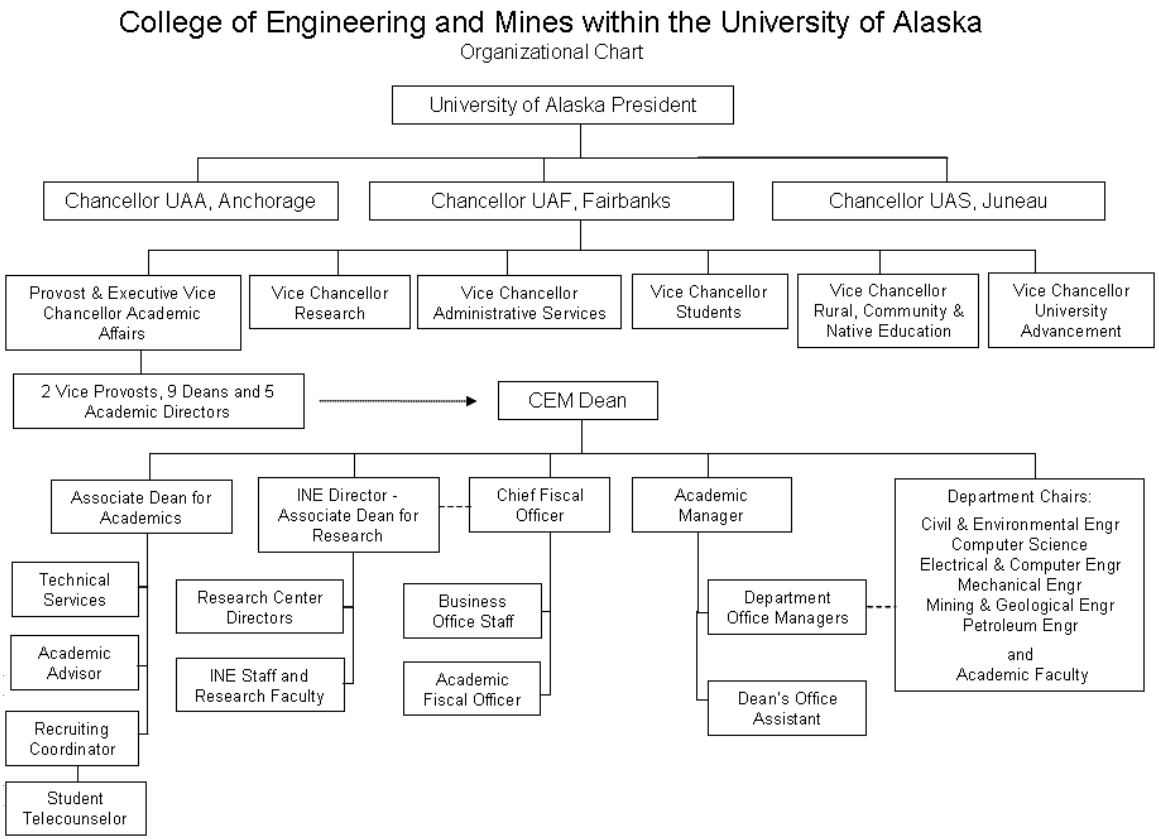
There are six academic departments within the College of Engineering and Mines (CEM), www.alaska.edu/uaf/cem, including the Department of Civil and Environmental Engineering, the Department of Computer Science, the Department of Electrical and Computer Engineering, the Department of Mechanical Engineering, the Department of Mining and Geological Engineering, and the Department of Petroleum Engineering. CEM is led by a Dean and two Associate Deans, one for academics and one for research. The Associate Dean for Research also serves as the Director of the Institute of Northern Engineering.

Research Organization

The Institute of Northern Engineering (INE), ine.uaf.edu, is the research arm of the College of Engineering and Mines. Most college research is conducted through INE, which provides support for proposal preparation and project management for externally funded grants. Within the institute are seven centers in which focused research, development, and testing takes place. INE promotes interdisciplinary and collaborative research and development; promotes partnerships with the natural and social sciences, education, business, geography, natural resource management, and law; promotes outreach; and fosters opportunities for faculty, postdoctoral researchers, and students to engage in research.

The College of Engineering and Mines was formed in 2004 with the merger of the five engineering departments. Prior to 2004, the engineering departments were in two separate colleges, along with other departments. The Computer Science Department joined CEM in 2010.

The following organizational chart shows how the college is organized internally and within the UA System.



G. Program Delivery Modes

The delivery mode for courses of the BSCE program is the traditional lecture/laboratory offering at the Fairbanks main campus. Most courses are offered during weekdays, but some are offered during weekday evenings due to the necessity of resolving conflicts in schedules.

H. Program Locations

Currently, all courses of the BSCE program are offered at the Fairbanks main campus, except in the case of transfer students who have taken certain courses and transferred the credits from other campuses or universities.

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

The initial decisions of the 2005–2006 EAC general review identified two weaknesses and one concern for the BSCE program. One weakness was addressed within the 30 days of the initial decisions. The remaining weakness is in Criterion 2, and the concern is in Criterion 3. The reaccreditation interim visit in October 2007 downgraded the weakness to a concern, and the Criterion 3 concern remains.

G.1 Results of the 2005–2006 ABET EAC General Review

Weaknesses 1: Criterion 2, Program Educational Objectives

The ABET EAC noted that the BSCE program relies on surveys and professional engineering rolls as evaluation methods. EAC further indicated that survey results may not be representative until a sufficient number of respondents is reached. The professional engineering rolls as an evaluation method do not address the stated objective of activity in the professional civil engineering community, contribution to the profession, or the pursuit of lifelong learning.

In the 30-day response to ABET's initial decision, the BSCE program indicated that its program educational objective had been rewritten to read, "Graduates will recognize the importance of continued education and professionalism through professional registration." Responding to the rewritten objective, ABET reiterated that Criterion 2 calls for a process based on the needs of the program's various constituents, in which objectives are determined and periodically evaluated. Rewriting the objective without apparent input from constituents in order to ease measurement problems does not meet the spirit of the criterion. Furthermore, the rewrite does not address lifelong learning.

The EAC's final statement regarding this weakness is that the weakness remains and will be a focus of next reviews.

Weakness 2: Criterion 8, Program Criteria

This criterion requires that students be proficient in probability and statistics, and in four areas of civil engineering. The EAC noted that, based on their review of transcripts from BSCE students, the subject of probability and statistics is not covered adequately, and the four areas of civil engineering are not proficiently covered.

In the 30-day response to ABET, the BSCE program responded to this weakness by making the course ESM 422 (Engineering Decisions) a required course. Additionally, the program now requires BSCE students to take one of two civil engineering electives, either in transportation engineering or environmental engineering.

With the changes stated in the 30-day response, EAC acknowledged that this weakness is resolved.

Program Concerns: Criterion 3, Program Outcomes and Assessment

The EAC noted that the BSCE program seems to rely heavily on the major design courses and senior surveys. Other ways to assess results should be developed.

The BSCE program's 30-day response stated that other assessment procedures are in use, including feedback from the advisory board; annual reviews of the overall program; and in a new effort starting this year, the use of individual course outcomes surveys and assessments.

The EAC's final statement regarding this program concern is that the concern remains until the assessment process has been applied to the further development of the program.

G.2 Results of 2007 Interim Visit

The reaccreditation interim visit took place in October 2007. The ABET team reviewed the shortcomings identified during the 2005–06 EAC general review.

G.2.1 Interim Visit Program Weakness: Program Educational Objectives

The interim visit team noted that the published BSCE program educational objectives continue to resemble a composite statement of learning outcomes (i.e., knowledge and skills graduates will have). There is also ambiguity in the definition of program educational objectives as to whether the envisioned period over which data collection will occur includes the first few years after graduation.

The team noted that the processes used for assessment of program objectives were based on surveys. Due to the way the program objectives are framed, most of the survey questions seem to relate more directly to program outcomes.

In summary, the reviewers recognized that the BSCE program appears to satisfy the criteria with an objective assessment process, but the process should be improved and time is needed to fully implement and evaluate the improved process.

The reaccreditation review downgraded the existing weakness of Criterion 2 to a concern.

G.2.2 Interim Visit Program Concern: Student Outcomes

The review team recognized that the BSCE program had implemented an outcomes process and had been using the assessment results to effect program improvement. However, the reviewers noted that the assessment process should be better organized and simplified, and keyed to a system of better documentation so that the process is sustainable over time and continued full compliance is ensured.

The final reaccreditation decision stated that the concern for Criterion 3 is unresolved.

G.3 Actions Taken

G.3.1 Change of Program Objectives and Objective Assessment Process

To address ABET EAC's concern regarding the ambiguity (i.e., fail to distinguish educational objectives from student outcomes) of the BSCE educational objectives, the BSCE program worked continuously with its constituents and an outside consultant from fall 2007 to spring 2011 to revise the objectives and ensure that the BSCE educational objectives meet ABET's definitions and criteria. After a series of revisions, the final version of the

BSCE education objectives was approved by the program's constituents at the 2011 Advisory Board Meeting on April 29.

1. *Graduates develop careers in civil engineering and other related fields.*
2. *Graduates are productive engineers, accomplishing independent task assignments and working effectively in teams with other professionals.*
3. *Graduates are active in the professional community, pursue licensure and lifelong learning, and demonstrate high ethical standards.*

The "Graduates" of the BSCE program are defined as those who graduate from the program within 3 to 5 years.

A new process has been instituted for the assessment of educational objectives. The process includes employer surveys, alumni surveys, and meetings with the program's constituents. A formal description of the program educational objectives and the revision process is provided in Criterion 2. Educational Objectives. Details of the assessment process are described in Criterion 4. Continuous Improvement.

G.3.2 New Process for Direct Assessment of Student Outcomes

A new process for direct assessment of student outcomes has been developed to replace the old process that relied on student opinions. The new process collects and assesses student products from course work and other activities related to the BSCE curriculum. The new process has been implemented since 2009.

Details of the new process are described in Criterion 4. Continuous Improvement.

G.3.3 New Program Assessment Process

To facilitate the improvement of student outcomes and feedback from student outcomes assessment to the attainment of program educational objectives, a new process of overall program assessment was instituted in the 2009–2010 academic year.

Details of the assessment process are described in Criterion 4. Continuous Improvement.

J. Joint Accreditation

The BSCE program is not accredited jointly with any other program.

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

There are three pathways for a student to be admitted to the BSCE program. The requirements are:

1. As a first time freshmen, the student needs, at the minimum, all of the following:
    a. High school diploma or equivalent
    b. Pass a high school core of 16 credits with a minimum GPA of 2.5
    c. Must have taken SAT/ACT in the past two years
    d. High school GPA of 3.0 OR
        i. High school GPA of 2.5 AND
        ii. ACT composite score of 18 or SAT total score of 1290 (writing skills included)
    e. Must have completed the following in high school: 4 credits of English, 2 credits of algebra, 1 credit of geometry, ½ credit of trigonometry (an additional ½ credit of advanced math is recommended), 3 credits of social sciences, 1 credit of physics or chemistry, 1 credit of natural sciences, 1 credit of elective. Both physics and chemistry are recommended.
2. As a transfer student, the student needs, at the minimum, all of the following:
    a. If the student is transferring with at least 30 credits, then
        i. Must have left the previous institution in good academic standing
        ii. Must have a minimum GPA of 2.0 in each transferred course
        iii. Transferred course work must be relevant to engineering
    b. If the student is transferring with less than 30 credits, then they must meet freshmen admission standards.
3. As a change of major for a current UAF student in a four-year degree program, the student needs the approval of the department chair. A student in a two-year program cannot change their major into a four-year degree program; they have to apply for admission into the program.

If a student does not meet the requirements, they are placed into a “pre-major” sub-group of the department. This applies even to change of majors. The first two pathways are administered by the Office of Admissions (including making the admission decision), while the last pathway is handled by the Registrar’s Office, with the admission decision resting on the chair of the department.

B. Evaluating Student Performance

UAF requires early grade reports for all freshmen students at the end of 6 weeks. These grades are reported to students on their UA Online account. The goal is to give freshmen students early feedback on their performance in all classes. With early grade information students can take appropriate action of seeking help in specific classes, giving more attention to classes where they are not performing optimally, or if necessary withdrawing from a class before the deadline for student-initiated withdrawal. Help is available in several tutoring centers, including the College of Engineering and Mines Tutoring Center, the Math Lab, and others. CEM employs an academic advisor, who concentrates on incoming freshmen and lower-division students, but can advise students at all levels. The CEM Academic Advisor can provide guidance to students on their options to appropriately deal with lower than optimum early grade reports.

To remain in good academic standing, UAF requires undergraduate students maintain a cumulative GPA and most recent semester GPA of 2.0 or better.

Students whose cumulative and/or semester GPA falls below 2.0 after each fall and spring semester will be put on academic probation. Students on probation may not enroll in more than 13 credits a semester, unless an exception is granted by the appropriate dean. Probation may include additional conditions, as determined by the dean of the college or school in which the student's major is located. Students on probation will be referred for developmental advising/education and/or to an advising or support counseling center. Removal from probation requires the student's cumulative and semester GPAs to be at least 2.0.

The CEM Academic Advisor communicates with all CEM students on probation after each semester, seeking to guide them on appropriate actions to take, including revising course selection for the following semester.

The UAF registration system implemented the "Banner Mandatory Placement" prerequisite and co-requisite verification prior to registration on each course a couple of years ago, with CEM volunteering to be a test college. All registration occurs online, and students cannot register for courses for which they do not have the proper prerequisites and co-requisites. This process has greatly reduced problems of students being in courses without having the proper prerequisites, a condition which sets them up for trouble and possible failure. There are occasionally extenuating circumstances. CEM has a prerequisite and co-requisite waiver form that is used to document any waived prerequisite or co-requisite, justification for the waiver, including conditions and date conditions, and student, instructor, advisor and department chair signatures.

Faculty and students also have access to *DegreeWorks*©, an online system that allows them to monitor progress and conduct what-if analysis with graduation. This is in addition to *UAOnline* that allows them to view transcripts online.

The BSCE program faculty hold regular biweekly faculty meetings to discuss departmental affairs that include student performance from individual courses. The meetings provide faculty

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advisors with information to advise students and help them improve their course work performance.

In addition, the results of the most recent FE exams taken by the BSCE students (i.e., an indication of student knowledge retention) are presented to the faculty immediately after release of the results from NCEES. Measures to improve student performance are discussed and implemented. The most notable example is the FE exam review services provided by the BSCE faculty prior to every FE exam since 2009.

C. Transfer Students and Transfer Courses

A transfer student is defined as someone coming into the university with at least 30 transferable semester credits. Transfer students are eligible for admission to a baccalaureate program if they have a 2.0 GPA in their previous course work and left their previous institution(s) in good standing. If applying to a technical or scientific program, students may need to present a higher grade average and proof that they have completed appropriate background courses before they will be admitted. Students transferring into a baccalaureate degree program with fewer than 30 semester hours of transferable credit must also meet the freshman admission requirements. Admission status for students who have attended an unaccredited postsecondary institution will be determined on an individual basis.

Credit accepted at UAF that has been earned from other regionally accredited institutions, through military educational experiences or credit accepted by special approval is considered transfer credit. Where possible, transfer credit is equated with UAF courses. Lists of substitutions within the University of Alaska System are available on page 36 of the UAF Catalog. Standard substitutions from non-University of Alaska institutions are also available on page 37 of the catalog. UAF is a member of the Servicemembers Opportunity Colleges (SOC) network. For additional information about the SOC program, contact the Office of Admissions.

UAF's transfer credit resource website (uaonline.alaska.edu) is an unofficial reference for undergraduate students who are considering transferring to UAF. An official evaluation of transfer credits may be obtained only after formal application and admission to degree-seeking status with UAF.

In order to serve students who transfer among the three institutions that make up the University of Alaska system, UAF, UAA and UAS have identified fully transferable general education requirements for baccalaureate degrees. Credit for course work successfully completed at one UA institution that applies to general education requirements will fulfill the same categories at all other institutions. This applies even if there is no directly matching course work at the institution to which the student transfers. Transfer students from UAA or UAS who have completed all general education requirements in the baccalaureate program prior to transferring to UAF will have completed all requirements for the UAF baccalaureate core. Courses taken to complete the general education requirements at UAA or UAS will meet UAF baccalaureate core requirements according to the current table of substitutions for intra-UA transfers. Completion of the 35-credit lower-division requirements (100- and 200-level courses) of the UAF baccalaureate

core meets the general education requirements at the UAA and UAS. More information about transfer credit is available at www.uaf.edu/admissions/undergrad/transfer. The Transfer Credit Resource Database is used to facilitate transfer of other courses.

The UAF Admissions Office evaluates transfer students and course credits, often calling the department chair for specific engineering or computer science course-transfer equivalencies. The standard approach for evaluating course equivalency is to compare course syllabi, noting course content, course level, prerequisites, course textbook, and credit hours. Sometimes there may not be a direct 1-to-1 course transfer equivalency, but there is often a block of transfer courses that can be demonstrated to be equivalent to several UAF courses. This type of block transfer is especially important when students transfer from a university on the quarter system. Each quarter credit hour is equivalent to 2/3 of a semester credit hour.

D. Advising and Career Guidance

At the college level, CEM employs an academic advisor, who concentrates on incoming freshmen and lower-division students, but can advise students at all levels. Once engineering and computer science students start taking classes within their department, advising is transferred to the department. Some incoming freshmen go straight to the department for advising and bypass the CEM Academic Advisor. The CEM Academic Advisor maintains an office with posted office hours and is generally easy to find. This individual is well trained in many of the questions and situations encountered by incoming freshmen. The duties of the position include the following:

a. Advising students on academic course selection, especially incoming freshmen during the summer months. After students are established in a discipline, they are generally transitioned to department faculty for advising. The advisor position is a 12-month position, so students that visit in the summer or try to register in the summer are generally advised by the CEM Academic Advisor.
b. Helping students with non-academic, as well as academic, issues including housing, financial aid information, university resources for transitioning to college life, study skills workshops, etc.
c. Acting as an early intervention advisor for freshmen who do not perform well in the first few weeks of a semester, as indicated by poor attendance or low homework scores. These students are contacted by the academic advisor to see if something can be done to mitigate the situation.
d. Overseeing the engineering tutoring lab, which includes hiring tutors and maintaining records of use.

Students cannot register without consulting with an advisor. UAF has a central advising operation, the Academic Advising Center. To improve advising across campus, the Academic Advising Center now only sees undeclared majors and general studies students. Students with declared majors are sent to their units for advising. The 12-month availability of the CEM Academic Advisor greatly improves advising for engineering students.

The BSCE program assigns students with advisors at the time they are admitted to the program. All faculty members serve as advisors to undergraduate students. The assignments are random with the exception of students that request a specific advisor or identify a sub-discipline. If a student wishes to change advisors, he or she contacts the department chair to request the change. A list of majors and advisors is printed each year to balance the advising load among the faculty. BSCE students are encouraged to work with their advisor early to develop a plan through to graduation. This plan is kept on file by the advisor and is utilized in future planning throughout the student's academic career. This helps students with load balancing and assists the faculty in planning course offerings.

The BSCE faculty are diverse in terms of age and experience, and (to a lesser extent) in terms of gender and cultural background, which makes it easy for students to find a mentor that meets their needs. While advising assignments are randomly chosen, students and faculty are free to negotiate a change in assignments to better meet the needs of the student. Such changes occur several times a year as students become more familiar with the faculty while progressing through the BSCE program.

By getting to know students individually, BSCE advisors can provide letters of recommendation, offer ideas for internships and job possibilities that match a student's interests, and inform advisees about student opportunities within the department. When a student applies for graduation, the department is sent a copy of the student's academic record and progress towards his or her degree. This is the department's opportunity to ensure that all BSCE program requirements have been met. Another mechanism that brings students to their advisor is the need for approval of academic petitions, which normally occurs when transfer students are attempting to get credit for courses taken elsewhere or when students are seeking substitutions in the curriculum.

The BSCE program sponsors an open "Advising Week" for students, when BSCE faculty provide prospective and returning majors with information on scheduling, registration, elective and minor options, graduation plans, and assistance with submission of forms. Many students attend this event, which is held each semester. Advising Week facilitates easy access for students to meet with faculty on all advising matters.

Career guidance for BSCE students is handled by the faculty advisor and by student groups (e.g., the ASCE student chapter), which provide programs to expose students to the practicing world of engineering. In addition, a significant number of BSCE students gain valuable experience by the time they are in their senior year from internships with local civil engineering companies. Local employers, included in the BSCE program constituencies, regularly facilitate internship opportunities. In addition, the CEE Department organizes and maintains a bulletin board posting for all employment opportunities that the department receives.

Student chapters of the professional organizations ASCE, AGC, and SWE routinely advise students on extracurricular opportunities, and encourage them to play an active role within the organization, which enhances their career opportunities. Examples of these opportunities include the annual Ice Arch design build event, and regional and national Steel Bridge competitions.

These events provide students with opportunities to interact with and seek support directly from local civil engineering professionals.

In addition to the career services provided by the BSCE program, students have access to the UAF Career Services office. The mission of UAF Career Services assists individual students in identifying and implementing career choices. Career Services provides career counseling, job search and internship advising, and on-campus employer recruiting to students, alumni, staff, and faculty. Career Services is active in providing engineering and computer recruiting events, and holds multiple targeted recruitment/employer events on campus every year.

E. Work in Lieu of Courses

While it is possible for a student to utilize past professional experience to obtain course credit, this is generally not granted except for general introductory courses when the student has good work experience in the field. Most professional experiences do not cover every aspect of an engineering course, and most engineering courses include calculus-based analysis and design aspects, which is a much deeper level of comprehension than the technician-level experience of most pre-engineering work experience. Other ways to obtain credits for work in lieu of courses include advanced placement (AP) credit, high SAT/ACT scores, and testing out. Advanced placement in certain courses is possible for incoming students provided they have a 3 or above in the appropriate College Board (CEEB) AP course test from high school. Similarly, students with high SAT/ACT scores in the appropriate category can get credit for ENGL 111X. Students can test out of a few courses through the nationwide College Level Examination Program (CLEP). However, both advance placement and testing out are possible only for a few credits of lower-level courses. The UAF Catalog details alternate ways to obtain credit (www.uaf.edu/catalog/current/admissions/transfer_placement.html#Alternate_Ways).

F. Graduation Requirements

The BSCE graduation requirements listed in the 2010–2011 UAF Catalog are as follows:

Major – B.S. Degree

1. Complete the general university requirements. (As part of the core curriculum requirements, complete: MATH F200X*, CHEM F105X* and CHEM F106X*.)
2. Complete the B.S. degree requirements. (As part of the B.S. degree requirements, complete: MATH F201X*; PHYS F211X* and PHYS F212X*.)
3. Complete the following program (major) requirements:*
   CE F112 – Elementary Surveying – 3 credits
   CE F302 – Introduction to Transportation Engineering – 3 credits
   CE F326W – Introduction to Geotechnical Engineering – 4 credits
   CE F331 – Structural Analysis – 3 credits
   CE F334 – Properties of Materials – 3 credits
   CE F344 – Water Resources Engineering – 3 credits
   CE F400 – FE Exam – 0 credits

CE F432 – Steel Design – 3 credits
CE F438W,O – Design of Engineered Systems – 3 credits
CE F441 – Environmental Engineering – 4 credits
CE F490 – Civil Engineering Seminar – .5 credit
CE F491 – Civil Engineering Seminar – .5 credit
DRT F170 – Beginning AutoCAD – 3 credits
ES F101 – Introduction to Engineering – 3 credits
ES F201 – Computer Techniques – 3 credits
ES F209 – Statics – 3 credits
ES F210 – Dynamics – 3 credits
ES F301 – Engineering Analysis – 3 credits
ES F331 – Mechanics of Materials – 3 credits
ES F341 – Fluid Mechanics – 4 credits
ESM F422 – Engineering Decisions – 3 credits
ESM F450W – Economic Analysis and Operations – 3 credits
GE F261 – General Geology for Engineers – 3 credits
MATH F202X – Calculus III – 4 credits
MATH F302 – Differential Equations – 3 credits
Technical electives** – 12 credits

4. Minimum credits required – 134 credits

* Student must earn a C grade or better in each course.

** Technical electives must include 3 credits in the field of environmental engineering or transportation, 6 credits of CE, ENVE, ESM courses or approved technical courses, and 3 credits of either ES F307 or ES F346. Students must earn a C grade or better in each technical elective course. Up to two graduate-level courses may be used towards graduation. Graduate-level courses must be approved by advisor and the students must be within two semesters of graduation and have at least a 3.0 GPA to take graduate-level courses.

The general UAF bachelor degree requirements listed in the 2010–2011 UAF Catalog are as follows:

REQUIREMENTS

COMMUNICATION (9 CREDITS)

ENGL F111X – Introduction to Academic Writing (3)
ENGL F190H may be substituted.

Complete one of the following:

- ENGL F211X – Academic Writing about Literature (3)
- ENGL F213X – Academic Writing about the Social and Natural Sciences (3)

Complete one of the following:

- COMM F131X – Fundamentals of Oral Communication: Group Context (3)

- COMM F141X – Fundamentals of Oral Communication: Public Context (3)

PERSPECTIVES ON THE HUMAN CONDITION (18 CREDITS)

Complete all of the following four courses:
- ANTH F100X/SOC F100X – Individual, Society and Culture (3)
- ECON F100X or PS F100X – Political Economy (3)
- HIST F100X – Modern World History (3)
- ENGL/FL F200X – World Literature (3) 12

Complete one of the following three courses:
- ART/MUS/THR F200X – Aesthetic Appreciation: Interrelationship of Art, Drama and Music (3)
- HUM F201X – Unity in the Arts (3)
- ANS F202X – Aesthetic Appreciation of Alaskan Native Performance (3) 3

Complete one of the following six courses:
- BA F323X – Business Ethics (3)
- COMM F300X – Communicating Ethics (3)
- JUST F300X – Ethics and Justice (3)
- NRM F303X – Environmental Ethics and Actions (3)
- PS F300X – Ethics and Society (3)
- PHIL F322X – Ethics (3) 3

Or complete 12 credits from the above courses plus one of the following:
- Two semester-length courses in a single Alaska Native language or other non-English language
- Three semester-length courses (9 credits) in American Sign Language taken at the university level. 6 - 9

MATHEMATICS (3 CREDITS)

Complete one of the following:
- MATH F103X – Concepts and Contemporary Applications of Mathematics (3)
- MATH F107X – Functions for Calculus* (4)
- MATH F161X – Algebra for Business and Economics (3)
- STAT F200X – Elementary Probability and Statistics (3)
  ** No credit may be earned for more than one of MATH F107X or F161X.*

Or complete one of the following:*
- MATH F200X – Calculus I (4)
- MATH F201X – Calculus II (4)
- MATH F202X – Calculus III (4)
- MATH F262X – Calculus for Business and Economics (4)
- MATH F272X – Calculus for Life Sciences (4)
  **Or any math course having one of these as a prerequisite* 3 - 4

NATURAL SCIENCES (8 CREDITS)

Complete any two (4-credit) courses.

- ATM F101X – Weather and Climate of Alaska (4)
- BIOL F100X – Human Biology (4)
- BIOL F103X – Biology and Society (4)
- BIOL F104X – Natural History (4)
- BIOL F111X – Human Anatomy and Physiology I (4)
- BIOL F112X – Human Anatomy and Physiology II (4)
- BIOL F115X – Fundamentals of Biology I (4)
- BIOL F116X – Fundamentals of Biology II (4)
- CHEM F100X – Chemistry in Complex Systems (4)
- CHEM F103X – Basic General Chemistry (4)
- CHEM F104X – Beginnings in Biochemistry (4)
- CHEM F105X – General Chemistry (4)
- CHEM F106X – General Chemistry (4)
- GEOG F111X – Earth and Environment: Elements of Physical Geography (4)
- GEOS F100X – Introduction to Earth Science (4)
- GEOS F101X – The Dynamic Earth (4)
- GEOS F112X – History of Earth and Life (4)
- GEOS F120X – Glaciers, Earthquakes and Volcanoes (4)
- GEOS F125X – Humans, Earth and Environment (4)
- MSL F111X – The Oceans (4)
- PHYS F102X – Energy and Society (4)
- PHYS F103X – College Physics (4)
- PHYS F104X – College Physics (4)
- PHYS F115X – Physical Science I (4)
- PHYS F116X – Physical Science II (4)
- PHYS F175X – Astronomy (4)
- PHYS F211X – General Physics (4)
- PHYS F212X – General Physics (4)
- PHYS F213X – Elementary Modern Physics (4) 8

LIBRARY AND INFORMATION RESEARCH (0 – 1 CREDIT)

Successful completion of the library skills competency test or LS F100X or LS F101X prior to junior standing 0 – 1

UPPER-DIVISION WRITING AND ORAL COMMUNICATION

Complete the following at the upper-division level:
Two writing-intensive courses designated (W) and one oral communication-intensive course designated (O), or two oral communication-intensive courses designated (O/2) (see degree and/or major requirements)

TOTAL CREDITS REQUIRED 38 – 39

See pages 150 and 151 of the UAF 2010–2011 Catalog for more information on specific program requirements.

G. Transcripts of Recent Graduates

Two transcripts of recent graduates are included: Jeromy J. Jones and Casey G. Walsh.

Transcript of Jeromy J. Jones (Class of 2011)

Name : Jeromy J. Jones

Curriculum Information

College:	UAF Coll of Engineer & Mines
Major and Department:	Civil Engineering, Civil Engineering
Minor:	Mathematics

This is NOT an Official Transcript

DEGREES AWARDED:

Bachelor's Pending:	Bachelor of Science	**Degree Date:**
Institutional Honors:	Cum Laude	

Curriculum Information

Major:	Civil Engineering
Minor:	Mathematics

TRANSFER CREDIT ACCEPTED BY INSTITUTION -Top-

WI04: Brigham Young Univ-Idaho

Subj	Course	Title	Grade	Credit Hours	Quality Points	R
PS	F101	Intro to Amer Govt & Politics	A	3.000	0.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	3.000	0.000	0.00	0.00

FA98 - FA03: Pierce College

Subj	Course	Title	Grade	Credit Hours	Quality Points	R
ABUS	F155	Business Math	A	3.335	0.00	
ABUS	F179	Fundamentals of Supervision	A	3.335	0.00	
ASLG	F101	American Sign Language I	A	3.335	0.00	
CIOS	F1	Comp Info & Off Sys Elective	A	3.335	0.00	
COMM	F141X	Fund Oral Comm-Public Context	A	3.335	0.00	
ENGL	F1X	English F111X - Substitution	A	3.335	0.00	
ENGL	F2H	English Elective	A	3.335	0.00	
GEOG	F203	World Economic Geography	A	3.335	0.00	
GEOS	F1NLX	Natural Sci Core Substitute	A	3.335	0.00	
HIST	F2S	History Elective	A	3.335	0.00	
MATH	F107X	Functions for Calculus	A	3.335	0.00	
MATH	F108	Trigonometry	A	3.335	0.00	
MATH	F200X	Calculus I	A	5.002	0.00	
MATH	F201X	Calculus II	A	5.002	0.00	
PHYS	F1NLX	Natural Sci Core Substitute	A	3.335	0.00	
PS	F2S	Political Science Elective	A	3.335	0.00	
PSY	F101	Introduction to Psychology	A	3.335	0.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	60.029	0.000	0.00	0.00

SP05 - SP06: Univ of Alaska Anchorage

Subj	Course	Title	Grade	Credit Hours	Quality Points	R
CHEM	F105X	General Chemistry I	A	4.000	0.00	
CHEM	F1N	Chemistry Elective(No Lab)	C	3.000	0.00	
ENGL	F2HX4	ENGL/FL F200X Substitute	A	3.000	0.00	
ES	F101	Introduction to Engineering	B	3.000	0.00	
ES	F201	Computer Techniques	A	3.000	0.00	
ES	F209	Statics	A	3.000	0.00	
MATH	F202X	Calculus III	A	4.000	0.00	
MATH	F302	Differential Equations	B	3.000	0.00	
PHYS	F211X	General Physics I	B	4.000	0.00	
PHYS	F212X	General Physics II	B	4.000	0.00	
STAT	F300	Statistics	A	3.000	0.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	37.000	0.000	0.00	0.00

FA09: Brigham Young University

Subj	Course	Title	Grade	Credit Hours	Quality Points	R

ES	F210	Dynamics		B	3.000	0.00

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	3.000	0.000	0.00	0.00

FA10: CLEP Exams

Subj	Course	Title	Grade	Credit Hours	Quality Points	R
SOC	F1SX3	ANTH/SOC F100X Substitute	T	3.000	0.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	3.000	0.000	0.00	0.00

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Fall Semester 2009 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing
Additional Standing: Dean's List

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F334	UF	Properties of Materials	A+	3.000	12.00		
UAF - Main Campus	ES	F301	UF	Engineering Analysis	A+	3.000	12.00		
UAF - Main Campus	ES	F331	UF	Mechanics of Materials	A-	3.000	11.10		
UAF - Main Campus	ES	F341	UF	Fluid Mechanics	A	4.000	16.00		
UAF - Main Campus	ES	F346	UF	Basic Thermodynamics	B-	3.000	8.10		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	16.000	16.000	59.20	3.70
Cumulative:	16.000	16.000	59.20	3.70

2009-10 Indp Learn Year Long Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing:

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Correspondence Study(CS)	ENGL	F213X	UF	Acad Writng Social/Natural Sci	NB	(3.000)	0.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	0.000	0.000	0.00	0.00
Cumulative:	16.000	16.000	59.20	3.70

Spring Semester 2010 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F112	UF	Elementary Surveying	B	3.000	9.00		
UAF - Main Campus	CE	F302	UF	Int Transportation Engineering	A	3.000	12.00		

UAF - Main Campus	CE	F326	UF	Intro Geotechnical Engineering	B	4.000	12.00
UAF - Main Campus	CE	F331	UF	Structural Analysis	A	3.000	12.00
UAF - Main Campus	CE	F341	UF	Environmental Engineering	B+	4.000	13.20

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	17.000	17.000	58.20	3.42
Cumulative:	33.000	33.000	117.40	3.55

Summer 2010 Unofficial Transcript

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing:

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CHEM	F197	UF	Gen Chem II Lab	A	1.000	4.00		
UAF - Main Campus	COMM	F300X	UF	Communicating Ethics Grade Changed From Incomplete	B	3.000	9.00		
UAF - Main Campus	ECON	F100X	UF	Political Economy	A	3.000	12.00		
UAF - Main Campus	HIST	F100X	UF	Modern World History Grade Changed From Incomplete	A	3.000	12.00		
UAF - Main Campus	MATH	F314	UF	Linear Algebra	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	13.000	13.000	49.00	3.76
Cumulative:	46.000	46.000	166.40	3.61

Fall Semester 2010 Unofficial Transcript

Term Comments: Passed: Library Skills Competency Exam-12/20/2010

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing: Good Standing

Additional Standing: Dean's List

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F344	UF	Water Resources Engineering	A	3.000	12.00		
UAF - Main Campus	CE	F400	UF	FE Exam	P	0.000	0.00		
UAF - Main Campus	CE	F406	UF	Traffic Engineering	A	3.000	12.00		
UAF - Main	CE	F432	UF	Steel Design	A	3.000	12.00		

Campus							
UAF - Main Campus	CE	F490	UF	Civil Engineering Seminar	P	0.500	0.00
UAF - Main Campus	DRT	F170	UF	Beginning CAD	A	3.000	12.00
UAF - Main Campus	ESM	F450	UF	Economic Analysis & Operations	B	3.000	9.00

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	15.500	15.000	57.00	3.80
Cumulative:	61.500	61.000	223.40	3.66

Spring Semester 2011 Unofficial Transcript

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing: Good Standing

Additional Standing: Dean's List

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F433	UF	Reinforced Concrete Design	A	3.000	12.00		
UAF - Main Campus	CE	F435	UF	Design/Construction of Bridges	A+	3.000	12.00		
UAF - Main Campus	CE	F438	UF	Design of Engineered Systems	A-	3.000	11.10		
UAF - Main Campus	CE	F491	UF	Civil Engineering Seminar	P	0.500	0.00		
UAF - Main Campus	ENGL	F213X	UF	Acad Writng Social/Natural Sci	B+	3.000	9.90		
UAF - Main Campus	ESM	F422	UF	Engineering Decisions	A	3.000	12.00		
UAF - Main Campus	GE	F261	UF	General Geology for Engineers	A-	3.000	11.10		
UAF - Main Campus	MUS	F200X	UF	Interrelation Art/Drama/Music	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	21.500	21.000	80.10	3.81
Cumulative:	83.000	82.000	303.50	3.70

TRANSCRIPT TOTALS (UNDERGRADUATE - UAF) -Top-

	Earned Hours	GPA Hours	Quality Points	GPA
Total Institution:	83.000	82.000	303.50	3.70
Total Transfer:	106.029	0.000	0.00	0.00
Overall:	189.029	82.000	303.50	3.70

Transcript of Casey G. Walsh (Class of 2009)

Name : Casey G. Walsh

Curriculum Information

College: UAF Coll of Engineer & Mines

Major and Department: Civil Engineering, Civil Engineering

This is NOT an Official Transcript

DEGREES AWARDED:

Bachelor's Awarded: Bachelor of Science **Degree Date:** May 10, 2009

Curriculum Information

Major: Civil Engineering

TRANSFER CREDIT ACCEPTED BY INSTITUTION -Top-

FA05 - SP06: University of Alaska SE

Subj	Course	Title	Grade	Credit Hours	Quality Points	R
CHEM	F106X	General Chemistry II	D	4.000	0.00	
COMM	F141X	Fund Oral Comm-Public Context	A	3.000	0.00	
ECON	F2SX2	ECON/PS F100X Substitute	A	3.000	0.00	
HIST	F1SX1	HIST F100X Substitute	C	3.000	0.00	
MATH	F200X	Calculus I	C	4.000	0.00	
MATH	F201X	Calculus II	A	4.000	0.00	
MUS	F1HX5	ART/MUS/THR F200X Substitute	C	3.000	0.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	24.000	0.000	0.00	0.00

INSTITUTION CREDIT -Top-

Fall Semester 2004 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Probation

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CHEM	F105X	UF	General Chemistry I	F	(4.000)	0.00		E
UAF - Main Campus	DRT	F170	UF	Beginning AutoCad	C	3.000	6.00		
UAF - Main Campus	ENGL	F111X	UF	Intro to Academic Writing	A	3.000	12.00		
UAF - Main Campus	ES	F101	UF	Introduction to Engineering	C	3.000	6.00		
UAF - Main Campus	MATH	F200X	UF	Calculus I	F	(4.000)	0.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	9.000	13.000	24.00	1.84
Cumulative:	9.000	13.000	24.00	1.84

Spring Semester 2005 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Probation

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F112	UF	Elementary Surveying	D	(3.000)	0.00		E
UAF - Main Campus	CHEM	F105X	UF	General Chemistry I	C	4.000	8.00		I
UAF - Main Campus	ENGL	F211X	UF	Academic Writing About Lit	C	3.000	6.00		
UAF - Main Campus	SOC	F100X	UF	Individual, Society & Culture	B	3.000	9.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	10.000	10.000	23.00	2.30
Cumulative:	19.000	23.000	47.00	2.04

Fall Semester 2006 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and	R

								End Dates
UAF - Main Campus	ES	F201	UF	Computer Techniques	B	3.000	9.00	
UAF - Main Campus	ES	F209	UF	Statics	B	3.000	9.00	
UAF - Main Campus	MATH	F202X	UF	Calculus III	AU	(4.000)	0.00	
UAF - Main Campus	PHYS	F211X	UF	General Physics I	C	4.000	8.00	

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	10.000	10.000	26.00	2.60
Cumulative:	29.000	33.000	73.00	2.21

2006-07 Indp Learn Year Long Unofficial Transcript

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing:

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Correspondence Study(CS)	MATH	F202X	UF	Calculus III	B	4.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	4.000	4.000	12.00	3.00
Cumulative:	33.000	37.000	85.00	2.29

Spring Semester 2007 Unofficial Transcript

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F441	UF	Environmental Engineering	B	4.000	12.00		
UAF - Main Campus	ES	F210	UF	Dynamics	A	3.000	12.00		
UAF - Main Campus	ES	F346	UF	Basic Thermodynamics	C	3.000	6.00		
UAF - Main Campus	GE	F261	UF	General Geology for Engineers	B	3.000	9.00		
UAF - Main Campus	PHYS	F212X	UF	General Physics II	C	4.000	8.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	17.000	17.000	47.00	2.76
Cumulative:	50.000	54.000	132.00	2.44

Fall Semester 2007 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F334	UF	Properties of Materials	A-	3.000	11.10		
UAF - Main Campus	CE	F442	UF	Environmental Engineering II	A	3.000	12.00		
UAF - Main Campus	CE	F603	UF	Arctic Engineering	C	3.000	6.00		
UAF - Main Campus	ES	F331	UF	Mechanics of Materials	C	3.000	6.00		
UAF - Main Campus	ES	F341	UF	Fluid Mechanics	C	4.000	8.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	16.000	16.000	43.10	2.69
Cumulative:	66.000	70.000	175.10	2.50

Spring Semester 2008 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F112	UF	Elementary Surveying	B	3.000	9.00		I
UAF - Main Campus	CE	F326	UF	Intro Geotechnical Engineering	A-	4.000	14.80		
UAF - Main Campus	CE	F331	UF	Structural Analysis	B-	3.000	8.10		
UAF - Main Campus	JUST	F300X	UF	Ethics and Justice	B	3.000	9.00		
UAF - Main Campus	MATH	F302	UF	Differential Equations	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	16.000	16.000	52.90	3.30
Cumulative:	82.000	86.000	228.00	2.65

Summer 2008 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing:

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	ENGL	F200X	UF	World Literature	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	3.000	3.000	12.00	4.00
Cumulative:	85.000	89.000	240.00	2.69

Fall Semester 2008 Unofficial Transcript

Term Comments: Passed: Library Skills Competency Exam-10/31/2008
College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F344	UF	Water Resources Engineering	B	3.000	9.00		
UAF - Main Campus	CE	F400	UF	FE Exam	P	0.000	0.00		
UAF - Main Campus	CE	F432	UF	Steel Design	B	3.000	9.00		
UAF - Main Campus	CE	F493	UF	Traffic Eng/Intro to Trans Eng	A-	3.000	11.10		
UAF - Main Campus	ES	F301	UF	Engineering Analysis	C+	3.000	6.90		
UAF - Main Campus	ESM	F450	UF	Economic Analysis & Operations	B	3.000	9.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	15.000	15.000	45.00	3.00
Cumulative:	100.000	104.000	285.00	2.74

Spring Semester 2009 Unofficial Transcript

College: UAF Coll of Engineer & Mines
Major: Civil Engineering
Academic Standing: Good Standing

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	CE	F433	UF	Reinforced Concrete Design	B-	3.000	8.10		
UAF - Main Campus	CE	F438	UF	Design of Engineered Systems	A	3.000	12.00		
UAF - Main Campus	CE	F445	UF	Hydrologic Analysis & Design	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA

Current Term:	9.000	9.000	32.10	3.56
Cumulative:	109.000	113.000	317.10	2.80

Fall Semester 2010 Unofficial Transcript

College: UAF Coll of Engineer & Mines

Major: Civil Engineering

Academic Standing:

Campus	Subj	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
UAF - Main Campus	ME	F450	UF	Theory of Flight	A	3.000	12.00		

	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	3.000	3.000	12.00	4.00
Cumulative:	112.000	116.000	329.10	2.83

TRANSCRIPT TOTALS (UNDERGRADUATE - UAF) **-Top-**

	Earned Hours	GPA Hours	Quality Points	GPA
Total Institution:	112.000	116.000	329.10	2.83
Total Transfer:	24.000	0.000	0.00	0.00
Overall:	136.000	116.000	329.10	2.83

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

The mission of the UAF BSCE program is to provide its graduates with the knowledge and skills necessary for professional practice and growth in the recognized major areas of Civil Engineering with an emphasis on Alaska and other cold regions.

B. Program Educational Objectives

The most current educational objectives of the BSCE program were formally reviewed and approved by the program's constituents at its Advisory Board meeting in April 2011.

1. *Graduates develop careers in civil engineering and other related fields.*
2. *Graduates are productive engineers, accomplishing independent task assignments and working effectively in teams with other professionals.*
3. *Graduates are active in the professional community, pursue licensure and lifelong learning, and demonstrate high ethical standards.*

The "Graduates" of the BSCE program are defined as those who graduate from the program within 3 to 5 years.

The objectives can be found on the BSCE program website at:
http://www.alaska.edu/uaf/cem/cee/about/abet.xml

Note that this set of objectives is a result of a revision process that began in fall 2007. The process is described in *Process for Revision of the Program Educational Objectives* in the latter part of this section.

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

The mission statement of the College of Engineering and Mines (CEM) of UAF states:

> *The College of Engineering and Mines at the University of Alaska Fairbanks advances and disseminates technical and scientific knowledge through innovative teaching, research and public service with an emphasis on Alaska and other high-latitude regions. The College promotes students' self motivation to excel and guides them towards professional careers and entrepreneurship in an environment of life-long learning.*

The BSCE program educational objectives were chosen to be consistent with the mission of CEM, to reflect the needs of BSCE program constituents in providing proficiency in the recognized major areas of civil engineering, and to provide graduates of the program with the skills necessary for professional practice and growth, with an emphasis on Alaska and other cold regions.

D. Program Constituents

D.1 Constituents

The BSCE program has identified the following constituents:

1. ***Employers of BSCE program graduates***
   The BSCE Department maintains a list of firms and organizations that employ or have the potential to employ graduates of the BSCE program. Once every two years, a third of these employers are surveyed in order to assess the achievement of the BSCE program's objectives and general performance. No one employer receives a survey more than one time every three years.

   All three BSCE program educational objectives address the needs of employers of BSCE graduates. Graduates meeting these three objectives represent consistently productive employers in the field of civil engineering.

2. ***Alumni of the BSCE program***
   Input from BSCE alumni is collected via alumni surveys. BSCE alumni are regularly contacted via their forwarding addresses on file with the program. Alumni are also asked to volunteer to serve as members of the Advisory Board (AB), which interacts directly with the BSCE program via the annual meetings.

   All three objectives address the needs of the alumni, because they are essential qualities needed to lead a successful career as a civil engineer.

3. ***Faculty of the BSCE program***
   The BSCE faculty play a pivotal role in developing and modifying the BSCE program educational objectives and outcomes. BSCE faculty members meet during the course of the academic year to review student performance and to share observations related to potential ways of improving student performance relative to the BSCE program outcomes. The faculty are split into committees that are responsible for overseeing the curriculum of the sub-disciplines (e.g., water and environmental, structures and geotechnical, transportation, and engineering science).

   The BSCE program faculty are ultimately responsible for the quality of the program curriculum and the overall education experience offered to the students.

4. ***Current students of the BSCE program***
   The BSCE program maintains a casual atmosphere and a variety of forums for its students to express their needs to the program. Current students are also asked to participate in the AB meetings where they express their opinions and needs for the BSCE program to other constituents of the program without the presence of the program faculty members and staff.

D.2 Advisory Board Meetings

The most direct form of interaction between the program and its constituents is the annual AB meeting. The BSCE program created the AB in 2001 as a means of forming an important and mutually beneficial partnership with program constituents. The membership is made up of practicing civil and environmental engineers from local companies and agencies. All of the members are either employers or supervisors of our graduates and some of them are alumni of the program. The AB size is moderate (i.e., 10 members) and knowledgeable about issues facing the BSCE program.

The AB meets yearly with BSCE faculty and students. The meetings take place in two forms that alternate every year. The long-form meetings last a whole day; the short-form meetings last less than four hours. Assessment of the program educational objectives takes place biannually at the long meeting.

Feedback that the BSCE program receives from the AB is more helpful than results of anonymous surveys of our alumni or employers, as it provides an excellent opportunity to receive face-to-face dialogue.

E. Process for Revision of the Program Educational Objectives

The process for revision of the BSCE program educational objectives follows a two-year cycle, with the pivot point for change occurring at the long meeting of the Advisory Board that takes place once every two years.

The revision process begins with faculty reviewing and assessing the results of the alumni and employer surveys that are conducted once every two years. A draft of the revision is produced by the faculty and presented together with the results of surveys to the members of the AB at the meeting. Members of the AB evaluate the results and provide comments to the draft objectives at the meeting. After another round of revision to address the comments, the AB members approve the objectives.

More details about the revision of objectives and employer and alumni surveys can be found in Criterion 4. Continuous Improvement.

E.1 First Revision (Abandoned after October 2010)

The revision process was implemented for the first time with a series of discussions during faculty meetings that began in November 2007, right after the reaccreditation interim visit in October of the same year. The discussions eventually led to a draft version of the new objectives. The draft objectives were then reviewed and assessed by BSCE program constituents during the BSCE Advisory Board meeting in April 2009. An employer survey questionnaire designed to assess achievement of the objectives was also administered to

gather input from program constituents. Results of the employer survey collected from the Advisory Board members are presented in Criterion 4. Continuous Improvement.

After incorporating input from program constituents, a set of new objectives was instituted at the beginning of the 2009–2010 academic year:

1. *Graduates are proficient in data collection and analysis, and in engineering design accommodating the total project environment, including the challenges of northern engineering issues.*
2. *Graduates communicate effectively.*
3. *Graduates are active in the professional community, demonstrate high ethical standards, obtain licensure, and pursue lifelong learning.*

The "Graduates" of the BSCE program are defined as those who graduate from the program within 3 to 5 years.

Note that this version of the BSCE educational objectives was again revised after one year of institution, because the statements are not consistent with ABET's definition of educational objectives, in that objectives are "broad statements that describe what graduates are expected to attain within a few years of graduation." This set of objectives cannot be clearly distinguished from statements of outcomes (i.e., abilities) rather than attainment of goals and/or objectives.

E.2 Second Revision (Current Version)

In Fall 2010, the College of Engineering and Mines hired a consultant who is experienced with the ABET accreditation process to conduct a mock ABET review for the college. The consultant reviewed a draft self-study for the BSCE program and noted that the newly revised BSCE educational objectives still resemble statements of outcomes. The objectives were again revised, and the second revision was presented to the BSCE Advisory Board at the annual meeting in April 2011. The Advisory Board made comments and suggestions during the meeting. Their input was incorporated in the most current version of the official BSCE educational objectives:

1. *Graduates develop careers in civil engineering and other related fields.*
2. *Graduates are productive engineers, accomplishing independent task assignments and working effectively in teams with other professionals.*
3. *Graduates are active in the professional community, pursue licensure and lifelong learning, and demonstrate high ethical standards.*

The "Graduates" of the BSCE program are defined as those who graduate from the program within 3 to 5 years.

The most current BSCE educational objectives are consistent with ABET's definition of educational objectives, in that the objectives describe *accomplishments* and *roles* that we expect our graduates to attain a few years after graduation. In addition, the second objective

was structured to meet the needs of one of the program constituents, the employers. At the BSCE Advisory Board (AB) meeting in April 2011, members of the AB noted that they expect a junior staff (i.e., within 3 to 5 years after graduation) to fit the description of the second objective.

A new Employer Survey questionnaire was designed and implemented in May 2011. The survey was conducted online via the Survey Monkey website. Results of the survey are described in Criterion 4. Continuous Improvement.

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

The BSCE program outcomes are a set of characteristics and abilities that its students should have when they receive their BSCE degree. These characteristics and skills are ones that a graduate of the program should possess upon leaving the BSCE program. ABET specifies a minimum set of outcomes that the industry has indicated are essential. The current set of BSCE program student outcomes is the product of the previous cycle of ABET EAC general review in 2005–2006. Initially, the UAF BSCE program adopted all of the ABET outcomes. After reevaluating the BSCE program objectives and outcomes with the Advisory Board in spring 2004, it was decided to modify the outcomes to include an Outcome ***l***, stating that "*students will have knowledge of northern issues,"* something that is extremely important to the civil engineering industry in Alaska and other cold regions.

The BSCE program outcomes, which are published on the BSCE website, are directly from the ABET outcomes:

(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 multi-disciplinary 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 lifelong learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
(l) knowledge of northern issues

The student outcomes of the UAF BSCE program can be accessed via the department website at: http://www.alaska.edu/uaf/cem/cee/about/abet.xml

B. Relationship of Student Outcomes to Program Educational Objectives

The new BSCE educational objectives were determined such that achievement of the student outcomes upon graduation provides a graduate with the abilities for a successful civil engineering career. There is direct mapping between educational objectives and student outcomes, as shown in Table 3-1.

Table 3-1. Direct Mapping of Educational Objectives to Student Outcomes

Educational Objectives		Program Student Outcomes
Objective 1: *Graduates develop careers in civil engineering and other related field*	***a-l***	This objective encompasses all outcomes, since possession of these abilities and qualities is critical for having a successful career in civil engineering and other related fields.
Objective 2: *Graduates are productive engineers, accomplishing independent task assignments and working effectively in teams with other professionals.*	***a***	math, science, engineering skills
	b	design and conduct experiments and analyze data
	c	design a system or process
	e	solve engineering problems
	k	ability to use techniques, skills, and modern engineering tools
	l	northern engineering knowledge and skills
	d	function on multidisciplinary teams
	g	ability to communicate
	h	understand impact of engineering in a global and societal context
	j	knowledge of contemporary issues
Objective 3: *Graduates are active in the professional community, pursue licensure and lifelong learning, and demonstrate high ethical standards.*	***f***	understand ethical and professional responsibility
	i	recognize lifelong learning

CRITERION 4. CONTINUOUS IMPROVEMENT

A new program assessment process was implemented beginning in the 2008–2009 academic year. The process ensures the results of student outcomes assessment feedback to the revision of educational objectives. The time cycle to complete one round of the program assessment process is two years. The process is illustrated in Figure 4-1.

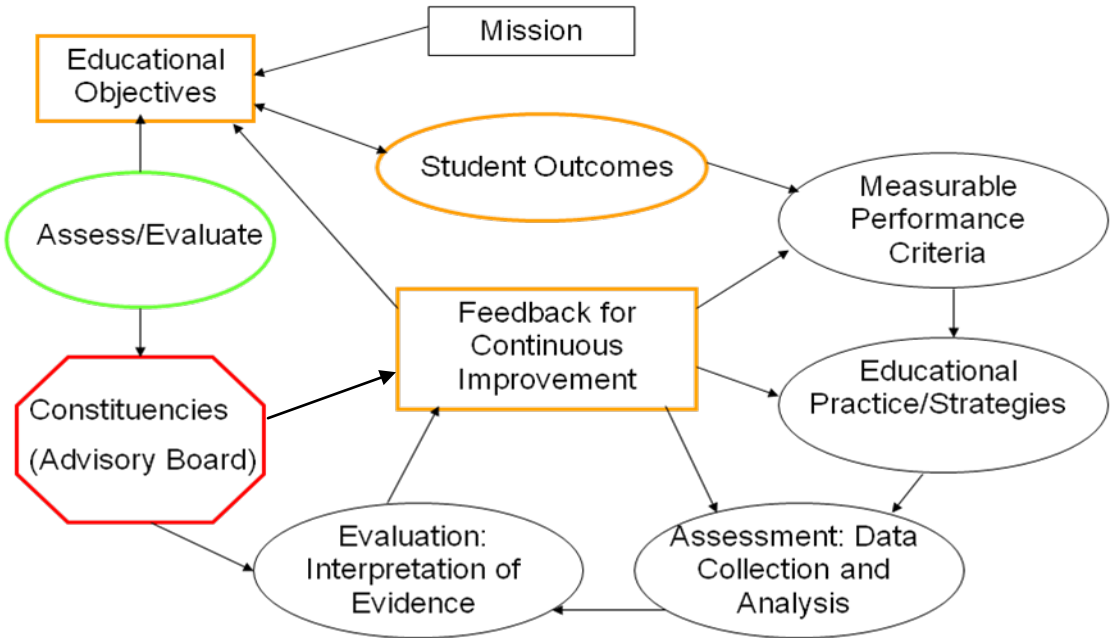

Figure 4-1 BSCE Program Assessment Process

A. Program Educational Objectives

A.1 Assessment Tools

Three tools are used for the assessment of BSCE program educational objectives. The tools and their attributes are:

1. Employer survey
   a. Frame survey questions based on the most current educational objectives
   b. Sample from firms and organizations that employ graduates of the BSCE program
   c. Execute survey once every two years
   d. Rotate samples as much as possible so as not to survey the same sample in two consecutive surveys
   e. Evaluate the results of the survey to identify the attainment of the program educational objectives and the needs for revision of the objectives

2. Alumni survey
   a. Frame survey questions based on the most current educational objectives

b. Sample and distinguish alumni who graduated less than 3 years ago from those within 3 to 5 years, and those over 5 years
c. Execute survey once every two years
d. Rotate samples as much as possible so as not to survey the same sample in two consecutive surveys
e. Evaluate results of the survey to identify the attainment of the program educational objectives and the needs for revision of the objectives
f. Advisory Board meetings: Evaluate the results from the employer and alumni surveys to identify attainment of the objectives and the needs for revisions
g. Suggest revisions of the objectives to reflect current market needs such as new technologies, social and environmental concerns, and new economic policies
h. Approve the revised objectives

A copy of the most recent employer survey questionnaire is included in Appendix E, and a copy of the most recent alumni survey is included in Appendix F.

A.2 Timeline

The employer and alumni surveys are executed once every two years. The Advisory Board meetings take place every year, but the evaluation of the educational objectives is held once every two years at the long meeting (i.e., scheduled from 9 a.m. to 5 p.m.). The timeline of the educational-objective assessment cycle is illustrated in Figure 4-2; it includes all important milestones involved in the new UAF BSCE program assessment process. The timeline is organized by semesters.

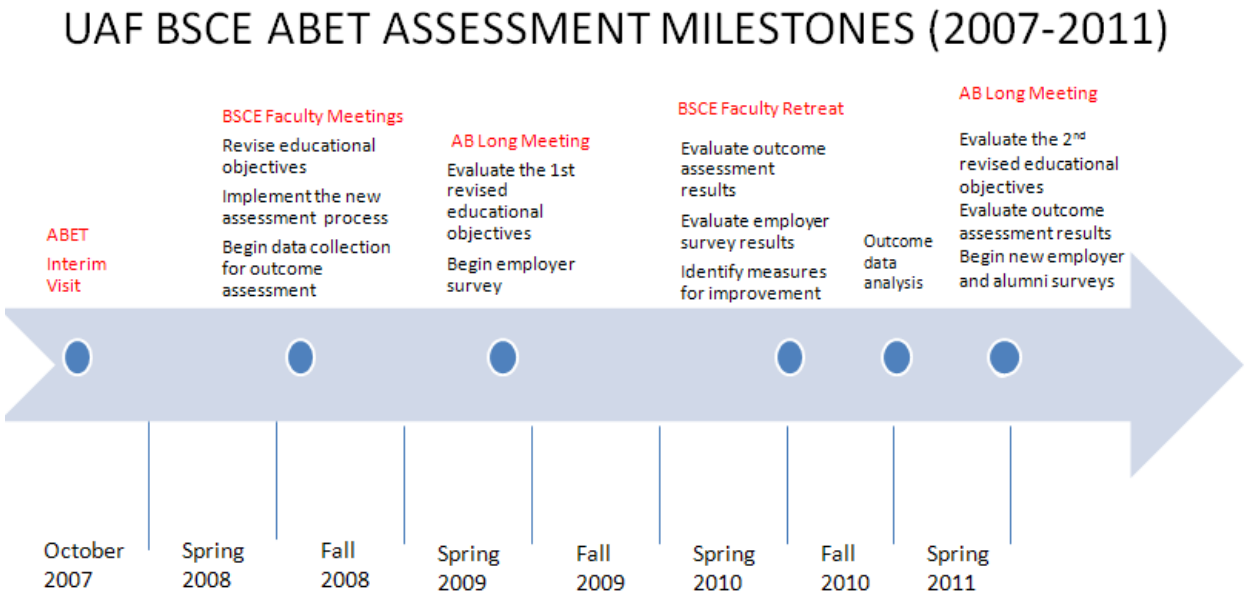

Figure 4-2 Timeline of UAF BSCE ABET Assessment Milestones

Figure 4-2 shows that Advisory Board long meetings were conducted in April 2009 and April 2011. One employer survey was conducted in 2009, and another, in 2011. Alumni surveys

were not conducted between 2009 and 2011, because by fall 2010, it was determined that the educational objectives were to be revised again. Thus, the scheduled alumni survey was abandoned. One alumni survey based on the second revised educational objective was conducted in 2011.

A.3 Results of the 2009 Employer Survey

As mentioned in an earlier section of Criterion 2. Program Educational Objectives, the BSCE program has revised its educational objectives twice since October 2007. The first revision was abandoned after a year of institution, because it was not consistent with ABET's definition of educational objectives. However, one round of employer surveys based on this set of objectives was administered in 2009. The results are presented here (see Table 4-1), because they are viable for assessing employer evaluations of BSCE graduates. Based on the results of this survey, measures to improve the potential for BSCE graduates to attain the objectives were identified and implemented by the program's faculty. The results thus serve as a demonstration of the significant and consistent effort exercised by the BSCE program to continuously improve the program. This survey questionnaire can be found in Appendix F.

Table 4-1. Employer Survey Based on the First Revision of BSCE Educational Objectives

		Average Rating*
Objective 1	Technical skills (i.e., math, science, and engineering)	**4**
	BSCE subdiscipline skills (e.g., structures, water resources, transportation)	**4**
	Ability to analyze data, including use of modern computing tools (e.g. for curve fitting and statistical evaluation)	**4**
	Ability to design a system, component or process	**3.4**
	Critical thinking skills (e.g. identify problems and develop alternative solutions)	**3.4**
	Understanding of northern issues & cold climate engineering	**4**
Objective 2	Oral communication skills	**3.4**
	Written communication skills	**2.4**
	Graphical communication skills	**3**
	Ability to work on a multi-disciplinary team (e.g., team building, communicating, coaching and applying discipline within a group)	**3.8**
	Work attitude and interpersonal skills	**4**
Objective 3	Demonstrating high professional and ethical standards	**4**
	Understanding health, safety, environmental, and social issues associated with engineering	**3.4**
	Overall qualifications of UAF BSCE graduates	**4**
	Number of samples = 5	

*Outstanding=5, Good=4, Satisfactory=3, Poor=2, Very poor=1

The results were presented and discussed in the BSCE faculty retreat prior to the Fall 2010 semester. The BSCE program faculty determined that an average rating of 3 would be the satisfactory score. The results of this survey showed that recent graduates of the BSCE program do not perform well for tasks involving Objective 2. Based on the results of this employer survey, BSCE faculty identified the needs and measures to strengthen student outcomes (i.e., to improve the potentials for graduates to attain the objectives) that involve abilities in design, critical thinking, communication skills, and understanding of various social and environmental issues. Measures to improve the potential for attainment of this objective are described in C. Continuous Improvement.

A.4 Results of the 2011 Employer and Alumni Survey

After institution of the most current official BSCE educational objectives in May 2011, new employer and alumni surveys based on the new objectives were immediately instituted and conducted via the website Survey Monkey.

B. Student Outcomes

B.1 Measurable Performance Criteria

To facilitate assessment of individual student outcomes, measurable performance criteria are defined for the BSCE student outcomes (see Table 4-2). The performance criteria for each outcome are structured to cover different levels of knowledge that are based on Bloom's Taxonomy (i.e., knowledge, comprehension, application, analysis, synthesis, and evaluation). However, for tractability purposes, we combined Bloom's knowledge levels in each performance criterion. For example, the first criterion for each outcome covers Bloom's knowledge and comprehension levels, and the second, application and analysis. For an outcome that contains a third criterion, the third criterion covers the synthesis and evaluation levels.

For some outcomes that have only two performance criteria, the second performance criterion was designed to bridge the application/comprehension and synthesis/evaluation levels.

We also adopted some existing rubrics for certain outcomes (i.e., Outcome ***g,*** communication, in terms of writing and presentation, and Outcome ***d,*** teamwork ability). The performance criteria of these outcomes were defined based on these rubrics. All rubrics are listed in D. Addition Information at the end of this section.

Table 4-2. Performance Criteria for BSCE Student Outcomes

Student Outcomes	Outcome Elements	Performance Criteria	Criteria Code[1]
a. Math/Science Eng Skills		Recognize and describe mathematical functions, and principles of science and engineering applicable to different disciplines of civil engineering	a1
		Apply and integrate mathematical functions, and principles of science and engineering to obtain analytical or numerical solutions	a2
b. Design or Conduct, Analyze Experiments		Is aware of proper ways of conducting and analyzing experiments (e.g., avoid measurement errors and bias, facilitate replicability, use appropriate graphs and tables for data analysis)	b1
		Use proper techniques while conducting and analyzing experiments	b2
		Interpret results with regards to the original hypothesis	b3

[1] For purposes of presenting the results of outcome assessment.

Student Outcomes	Outcome Elements	Performance Criteria	Criteria Code
c. Design a System or Process	Develop conceptual design alternatives	Produce problem definitions and design needs	c11
		Identify and determine design standards and approaches	c12
		Develop conceptual design alternatives satisfying the needs	c13
	Develop the final design and specifications	Define and describe the evaluation and selection process of design alternatives	c21
		Apply appropriate evaluation and selection methods	c22
		Produce a final design and specifications based on the selected alternative	c23
d. Multidisciplinary Teams		Understand one's responsibility	d1
		Follow through on commitments	d2
		Help team create working plans and integrate ideas and information from all members of the team	d3
e. Solve Engineering Problems	Identify problems	Identify solution or experimentation techniques	e11
		Generate solutions based on the problem statement using appropriate techniques	e12
		Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	e13
	Solve problems	Describe solution or experimentation techniques	e21
		Generate solutions based on the problem statement using appropriate techniques	e22
		Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	e23

Student Outcomes	Outcome Elements	Performance Criteria	Criteria Code
f. Understand Ethical and Prof. Responsibility		Is aware of professional codes of conduct and can identify ethical issues concerning a engineering decision	f1
		Apply and integrate relevant aspects of professional codes and ethical thinking in course work	f2
g. Ability to Communicate Effectively	Writing: Material Selection and Organization	Content	g11a
		Support	g11b
		Organization	g11c
		Focus (applies to theses, term papers and essays)	g11d
	Writing: Mechanics	Sentences and paragraphs	g12a
		Word choice	g12b
		Spelling	g12c
		Punctuation	g12d
	Presentation: Visual Aids	Clarity and readability of slides	g21a
		Wording concise	g21b
		Appropriate amount of information per slide	g21c
		Use of tables and figures to facilitate understanding	g21d
	Presentation: Organization	Logical order of topics	g22a
		Introduction and overview: Problem stated	g22b
		Methodology or approach: coverage appropriate (if applicable)	g22c
		Problem solution	g22d
		Conclusions/Recommendations: Significance explained	g22e
	Presentation: Delivery	Voice volume, enunciation, speed	g23a
		Coordinating oral and visual presentation	g23b
		Response to questions	g23c

Student Outcomes	Outcome Elements	Performance Criteria	Criteria Code
h. Understand Global and Societal Context		Identify facets by which engineering impacts modern societies	h1
		Use acquired knowledge to interpret impacts of an engineering solution (can anticipate impacts)	h2
i. Recognition of Lifelong Learning		Identify the sources of information needed in order to conduct research and learn independently	i21
		Research of applicable information (engineering theories, principles, formulas, and/or design standards)	i22
		Integrate the newly learned information with existing knowledge for the accomplishment of project goals and objectives	i23
j. Knowledge of Contemporary Issues		List and describe contemporary issues of a specific civil engineering discipline	j1
		Apply and integrate relevant aspects of contemporary issues in course work	j2
k. Ability to Use Modern Skills and Tools		Understand (be able to describe) the purpose of the tools and the engineering principles behind the tools	k1
		Use the tools to solve engineering problems and produce engineering design	k2
l. Understanding of Northern Issues		Recognize northern issues in engineering practice	l1
		Apply principles of arctic engineering to solve cold region engineering problems	l2

B.2 Educational Practice and Strategies

B.2.1 Assessment Tools

The achievement of student outcomes ***a*** to ***l*** is assessed using the following assessment tools:

1. Student work products
    a. Exam and homework questions
    b. Laboratory reports
    c. Project reports and presentations
    d. FE exam
2. Capstone Design Project
    a. Plans and specifications
    b. Reports and presentations
    c. Faculty's observation of students' ability to work in teams
    d. Students' questionnaires about teamwork
3. Senior survey (i.e., providing supplemental data)

Tools in groups 1 and 2 are for direct assessment of the outcomes. The senior survey is an indirect assessment tool used to supplement direct assessment data.

Table 4-3 shows the assessment tools applied to the performance criteria (see Table 4-2) defined for the BSCE student outcomes. The BSCE courses that provide data for assessing particular student outcome are listed and discussed in the Curriculum Criteria (see Table 5-1). Note that the rubrics used for outcomes assessment are included in D. Additional Information at the end of this section.

Table 4-3. Assessment Tools for BSCE Student Outcome Performance Measures

Criteria Code	Performance Criteria	Assessment Tool	Evaluation Method	Supplemental Assessment Tool
a1	Recognize and describe mathematical functions, and principles of science and engineering applicable to different disciplines of civil engineering	FE exam results and exam questions	% of students with correct answers	Senior survey
a2	Apply and integrate mathematical functions, and principles of science and engineering to obtain analytical or numerical solutions	FE exam results and exam questions	% of students with correct answers	Senior survey
b1	Is aware of proper ways of conducting and analyzing experiments (e.g., avoid measurement errors and bias, facilitate replicability, use appropriate graphs and tables for data analysis)	Laboratory reports	Rubrics b	Senior survey
b2	Use proper techniques while conducting and analyzing experiments	Laboratory reports	Rubrics b	Senior survey
b3	Interpret results with regards to the original hypothesis	Laboratory reports	Rubrics b	Senior survey

Criteria Code	Performance Criteria	Assessment Tool	Evaluation Method	Supplemental Assessment Tool
c11	Produce problem definitions and design needs	Capstone design products	Rubrics c	Senior survey
c12	Identify and determine design standards and approaches	Capstone design products	Rubrics c	Senior survey
c13	Develop conceptual design alternatives satisfying the needs	Capstone design products	Rubrics c	Senior survey
c21	Define and describe the evaluation and selection process of design alternatives	Capstone design products	Rubrics c	Senior survey
c22	Apply appropriate evaluation and selection methods	Capstone design products	Rubrics c	Senior survey
c23	Produce a final design and specifications based on the selected alternative	Capstone design products	Rubrics c	Senior survey
d1	Understand one's responsibility	Behavioral observation and student questionnaires	Rubrics d	Senior survey
d2	Follow through on commitments	Behavioral observation and student questionnaires	Rubrics d	Senior survey
d3	Help team create working plans and integrate ideas and information from all members of the team	Behavioral observation and student questionnaires	Rubrics d	Senior survey
e11	Identify solution or experimentation techniques	Capstone design products	Rubrics e	Senior survey
e12	Generate solutions based on the problem statement using appropriate techniques	Capstone design products	Rubrics e	Senior survey
e13	Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	Capstone design products	Rubrics e	Senior survey
e21	Describe solution or experimentation techniques	Capstone design products	Rubrics e	Senior survey
e22	Generate solutions based on the problem statement using appropriate techniques	Capstone design products	Rubrics e	Senior survey
e23	Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	Capstone design products	Rubrics e	Senior survey

Criteria Code	Performance Criteria	Assessment Tool	Evaluation Method	Supplemental Assessment Tool
f1	Is aware of professional codes of conduct and can identify ethical issues concerning a engineering decision	Exam/homework questions	Rubrics f	Senior survey
f2	Apply and integrate relevant aspects of professional codes and ethical thinking in course work	Exam/homework questions	Rubrics f	Senior survey
g11a	Writing: Content	Student reports	Rubrics g1	Senior survey
g11b	Writing: Support	Student reports	Rubrics g1	Senior survey
g11c	Writing: Organization	Student reports	Rubrics g1	Senior survey
g11d	Writing: Focus (applies to theses, term papers and essays)	Student reports	Rubrics g1	Senior survey
g12a	Writing: Sentences and paragraphs	Student reports	Rubrics g1	Senior survey
g12b	Writing: Word choice	Student reports	Rubrics g1	Senior survey
g12c	Writing: Spelling	Student reports	Rubrics g1	Senior survey
g12d	Writing: Punctuation	Student reports	Rubrics g1	Senior survey
g21a	Presentation: Clarity and readability of slides	Student presentation	Rubrics g2	Senior survey
g21b	Presentation: Wording concise	Student presentation	Rubrics g2	Senior survey
g21c	Presentation: Appropriate amount of information per slide	Student presentation	Rubrics g2	Senior survey
g21d	Presentation: Use of tables and figures to facilitate understanding	Student presentation	Rubrics g2	Senior survey
g22a	Presentation: Logical order of topics	Student presentation	Rubrics g2	Senior survey
g22b	Presentation: Introduction and overview: Problem stated	Student presentation	Rubrics g2	Senior survey
g22c	Presentation: Methodology or approach: coverage appropriate (if applicable)	Student presentation	Rubrics g2	Senior survey
g22d	Presentation: Problem solution	Student presentation	Rubrics g2	Senior survey
g22e	Presentation: Conclusions/Recommendations: Significance explained	Student presentation	Rubrics g2	Senior survey
g23a	Presentation: Voice volume, enunciation, speed	Student presentation	Rubrics g2	Senior survey
g23b	Presentation: Coordinating oral and visual presentation	Student presentation	Rubrics g2	Senior survey
g23c	Presentation: Response to questions	Student presentation	Rubrics g2	Senior survey

Criteria Code	Performance Criteria	Assessment Tool	Evaluation Method	Supplemental Assessment Tool
h1	Identify facets by which engineering impacts modern societies	Exam/homework questions	% of students with correct answers	Senior survey
h2	Use acquired knowledge to interpret impacts of an engineering solution (can anticipate impacts)	Exam/homework questions	% of students with correct answers	Senior survey
i1	Identify the sources of information needed in order to conduct research and learn independently	Capstone design products	Rubrics i	Senior survey
i2	Research of applicable information (engineering theories, principles, formulas, and/or design standards)	Capstone design products	Rubrics i	Senior survey
i3	Integrate the newly learned information with existing knowledge for the accomplishment of project goals and objectives	Capstone design products	Rubrics i	Senior survey
j1	List and describe contemporary issues of a specific civil engineering discipline	Exam/homework questions	% of students with correct answers	Senior survey
j2	Apply and integrate relevant aspects of contemporary issues in course work	Exam/homework questions	% of students with correct answers	Senior survey
k1	Understand (be able to describe) the purpose of the tools and the engineering principles behind the tools	Exam/homework questions	% of students with correct answers	Senior survey
k2	Use the tools to solve engineering problems and produce engineering design	Exam/homework questions	% of students with correct answers	Senior survey
l1	Recognize northern issues in engineering practice	Exam/homework questions	% of students with correct answers	Senior survey
l2	Apply principles of arctic engineering to solve cold region engineering problems	Exam/homework questions	% of students with correct answers	Senior survey

B.2.2 Expected Level of Attainment

Homework and exam questions are mainly used to evaluate performance related to Outcome ***a***, math and science abilities. FE exam results are also used to supplement the assessment of Outcome ***a***. Other outcome performance at the knowledge and application levels may also be evaluated with homework and exam questions.

To evaluate outcome performance with homework and exam questions, the percentage of students (over the entire class) who correctly answered the questions is calculated from the sampled data. The BSCE program expected that **60%** of the students would answer the questions correctly. Performance criteria with less than 60% correct are carefully examined by the BSCE faculty for improvement. For FE exam results, the **national average** is adopted as the expected level of attainment.

Rubrics were developed to evaluate outcomes that are assessed with student reports, presentation, and capstone design products. Each rubric is scored with a scale of four levels: Below Expectation, Progressing to Criteria, Meet Criteria, and Exceed Criteria. We also assign points to each level. For example, Below Criteria is scored with 0 to 25 points, Progressing to Criteria, 26 to 50 points; Meet Criteria, 51 to 75 points; and Exceed Criteria, 76 to 100 points. The points allow the evaluator to further differentiate attainment of the outcomes within each score level. The BSCE program determines that **Meet Criteria** (i.e., score > 50) is the satisfactory level. Performance criteria with **less than 50%** of student samples meeting criteria are determined as failure for attainment. The failed outcomes are then examined by the BSCE faculty for improvement.

B.2.3 Data Collection Cycle

For the period between ABET's interim visit in October 2007 and the end of Spring 2011 semester, the data collection cycle is illustrated in Figure 4-2 (i.e., BSCE ABET assessment milestones). Student products have been collected after the end of each semester since Fall semester 2008. Faculty members of the BSCE program were asked to provide three samples of student products including homework, exams, and reports for the courses they taught. No particular instructions were given as to how to sample. The courses that provide data for assessment of particular outcomes are presented in B.3. Summary of Assessment Results.

Prior to the beginning of the Fall 2010 semester, partial results of the collected data were presented to BSCE faculty members at a faculty retreat. The results were evaluated by faculty, and measures to improve outcomes were identified. In addition, the results of outcomes assessment were presented to the Advisory Board at the long meeting in April 2011. Measures of improvement were also identified at the meeting. The discussion of the measures is included in C. Continuous Improvement.

After the beginning of the Fall 2011 semester, it is expected that a regular two-year cycle of data collection and evaluation, as depicted in Figure 4-3, will be followed. The two-year cycle is anchored by the Advisory Board long meetings.

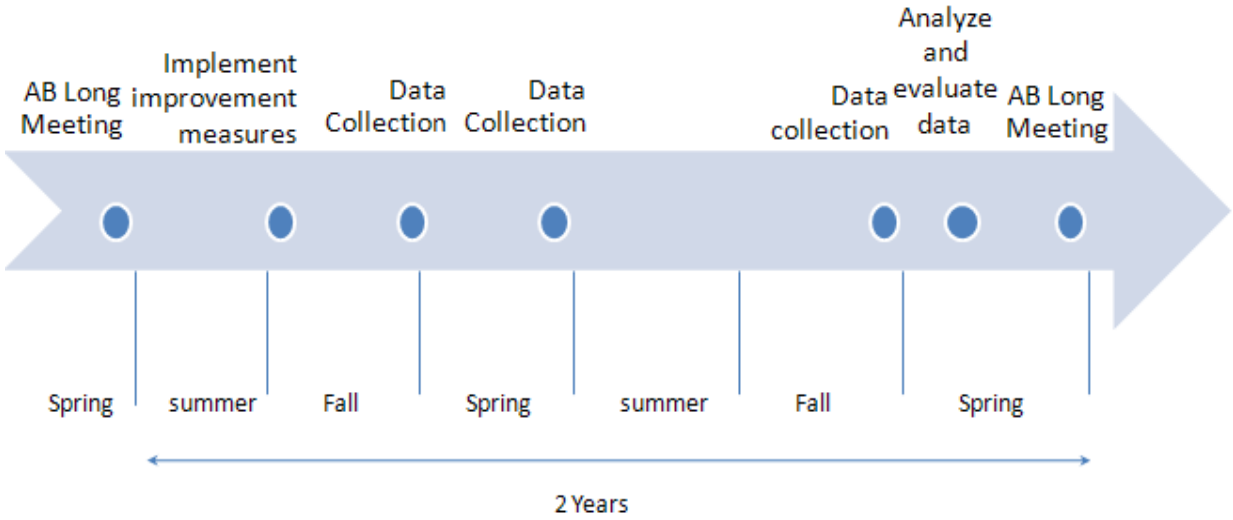

Figure 4-3 Timeline of a Student Outcome Assessment Cycle

B.2.4 BSCE Faculty Outcome Assessment Assignment

Faculty members are assigned to assess student products of particular outcomes. The assignment is based on faculty expertise. Each outcome is assigned more than one faculty member for assessment. Such assignment facilitates multiple opinions for the assessment results.

B.3 Evaluation and Interpretation of Assessment Results

At the beginning of the Spring 2011 semester, all collected student products were assessed. The assessment results were presented to BSCE program constituents during the Advisory Board long meeting on April 29, 2011.

In the following sections the assessment results are elaborated on, and the interpretation is included. Rubrics used for the assessment are included in D. Additional Information.

B.3.1 Outcome a

B.3.1.1 Course Exam Scores

Student exams from various courses are used for assessment of Outcome ***a***. For each course listed in Table 4-4, three student samples are assessed. The readers are reminded that, overall, **60% correct** is the expected attainment level for each performance criteria.

Table 4-4 shows that student exam scores exceed the 60% attainment level for performance in both ***a*1** and ***a*2**.

Table 4-4. Outcome *a* Assessment Based on Student Exams

Criteria Code	Semester	Courses	Questions Providing Data	Total Assigned Points	Correct Points	Percent Correct	Overall percent correct
a1	Fall 2008	ES209 Statics	Final exam part 1 all multiple choice problems	30	28	93%	**68%**
	Spring 2009	CE302 Intro. to Trans. Engr.	Final exam section1 problems 4 and15	18	12	67%	
	Fall 2009	ES209 Statics	Final exam part 1 all multiple choice problems	48	25	52%	
	Spring 2010	ESM422 Engr. Decisions	Final exam multiple choice problems 11, 13 and 15	36	25	69%	
a2	Fall 2008	ES209 Statics	Final exam all calculation problems 2-9	270	213	79%	**84%**
		ES341 Fluid Mechanics	Final exam problems 1 to 5	300	230	77%	
		CE334 Properties of Materials	Final exam short problem 3	60	60	100%	
	Spring 2009	CE331 Structural Analysis	Exam 1 all 5 problems	300	248	83%	
		CE302 Intro. to Trans. Engr.	Final Exam calculation problems 1,2, and 3	165	147	89%	
	Fall 2009	ES209 Statics	Final exam all calculation problems 2-9	252	223	88%	
		CE432 Steel Design	Final exam all 4 problems	300	280	93%	
	Spring 2010	ESM422 Engr. Decisions	Final exam calculation problems 1 and 2	120	84	70%	

B.3.1.2 FE Exam Scores

FE exam scores are assessed by the BSCE faculty every semester after the results are released by NCEES. The assessment of FE exam scores and the identification of improvement measures operate more frequently than assessment of other outcomes.

For FE exam assessment, the attainment level is the national average percent passing. Figure 4-4 shows how UAF BSCE students compare with the national average and other relevant groups taking the exams.

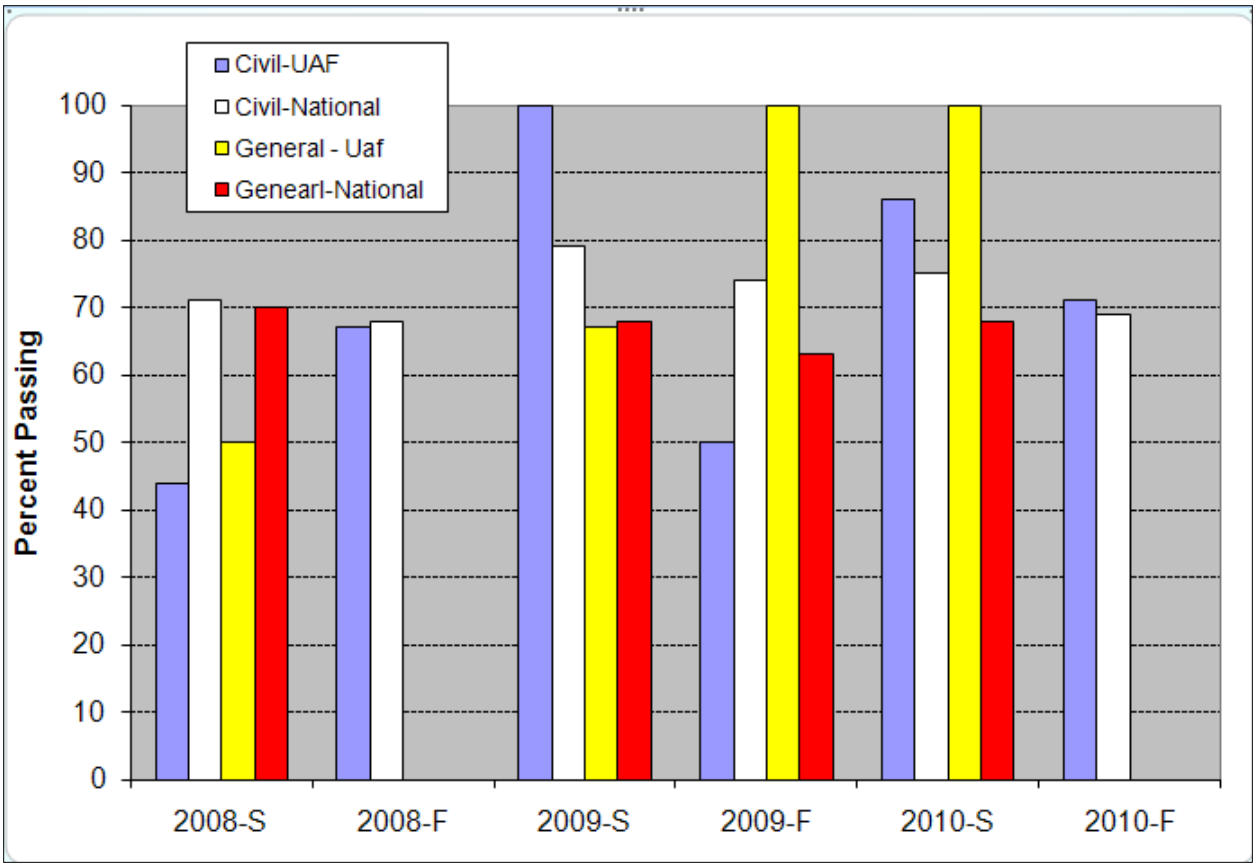

Figure 4-4 UAF BSCE Student FE Exam Results (2008–2010)

The FE exam has two sessions: the General Session in the morning and the Civil Specific session in the afternoon. Figure 4-4 shows that out of the six semesters, the UAF BSCE passing rates for the Civil Specific session were significantly lower than the national average in 2008-Spring and 2009-Fall. For the General Session, we have data for four valid semesters, and there is only one semester in which BSCE students fall below the national average.

Although the percent passing figures in Figure 4-4 do not appear to show a consistent trend, it is important to note that, in the 2009-Spring semester, the BSCE faculty began offering FE exam review sessions starting two months prior to the exam. When compared with the 2008-Spring result, the review sessions appear to generate good results in 2009-Spring and 2010-Fall. Also noteworthy is that the UAF BSCE curriculum requires all BSCE students to take the FE exam, though the students are not required to pass the exam prior to graduation. The BSCE faculty will continue to offer FE exam review and monitor the exam results for further improvement.

Table 4-5 shows the FE exam results by subjects. With the exception of 2009-Fall semester, it appears that the review session that began in 2009 may have generated higher passing percentages for the following semesters.

Table 4-5. FE Exam Results by Subjects (2008–2010)

AM Subjects	**2008-S**	**2008-F**	**2009-S**	**2009-F**	**2010-S**	**2010-F**
Mathematics	x	x	x	x	x	x
Eng Probability and Statistics	x	x	x	x	x	x
Chemistry	x					
Computers			x	x	x	
Ethics and Business Practices					x	
Engineering Economics	x	x			x	
Engineering Mechanics (statics+dynamics)	x	x				
Statics			x	x	x	
Dynamics			x		x	
Strength of Materials		x				
Material Properties			x		x	
Fluid Mechanics	x					
Electrics &Magnetism	x	x		x	x	x
Thermodyamics					x	
PM Subjects (Civil)						
Surveying	x	x				
Hydraulic & Hydrologic Systems	x	x		x		
Soil Mechanics & Foundations	x	x		x		
Environmental Engineering	x			x		
Transportation	x			x	x	
Structural Analysis		x			x	
Structural Design	x					x
Construction Management	x					
Materials				x		
Number of students passing/ Total students taking the exam	4/9	4/6	4/6	4/8	6/7	10/14
Percent Passing	44%	67%	67%	50%	86%	71%

"x" denotes UAF-BSCE score below national average

Italic text indicates below national average in 3 or more exam sessions

B.3.2 Outcome b

The data used for assessment of Outcome ***b*** are student lab reports from course ES 341 (Fluid Mechanics) of spring 2008 and 2009 semesters. Rubric ***b*** was developed for assessing the outcome. The rubric has four score levels: *Below expectation*, *Progressing to criteria*, *Meet criteria*, and *Exceed criteria*. We also assign points to each level (see Table 4-6). The points allow the evaluator to further differentiate attainment of the outcome within each score level.

Table 4-6 shows the results of Outcome ***b*** assessment. The level of attainment is 50%. All three samples meet all three performance criteria. The results show that students barely met criteria for performance criterion b3. The evaluator indicated that students' writing ability may have limited their score for this performance criterion.

Table 4-6. Assessment Result of Outcome *b*

Performance Criteria	Code	Sample 1 Score*	Sample 2 Score	Sample 3 Score	Percent Meeting Criteria (i.e., >50)
Is aware of proper ways of conducting and analyzing experiments	**b1**	70	55	55	100%
Use proper techniques while conducting and analyzing experiments	**b2**	60	60	65	100%
Interpret results with regards to the original hypothesis	**b3**	55	60	51	100%
*Score: Below expectation (0-25) Progressing to Criteria (26-50) Meet Criteria (51-75) Exceed Criteria (76-100)					

B.3.3 Outcome c

The data used for assessment of Outcome ***c*** are the final reports from the course CE 438 (Capstone Design) of spring 2009 and 2010 semesters. The reports were assessed with Rubric ***c*** by BSCE faculty members. Three evaluators were assigned to assess this outcome. Each evaluator examined two student samples. The results are shown in Table 4-7. Note that the faculty member assigned to assess Samples 5 and 6 missed the first outcome performance criterion.

Table 4-7 shows that the sampled students do not meet the performance criteria for ***c*21**. The assessed student reports show an insufficient amount of writing to properly cover necessary decisions in the design process. This weakness is related to Outcome ***g***, showing students' limited achievement in technical writing. The measures to improve this insufficiency are discussed in <u>C. Continuous Improvement</u>.

Table 4-7. Assessment Result of Outcome *c*

Outcome Component	Performance Criteria	Code	Sample 1 Score*	Sample 2 Score	Sample 3 Score	Sample 4 Score	Sample 5 Score	Sample 6 Score	Percent Meeting Criteria (i.e., >50)
Develop conceptual design alternatives	Produce problem definitions and design needs	**c11**	70	40	86	70	(missing)	(missing)	75%
	Identify and determine design standards and approaches	**c12**	75	45	80	70	40	60	66%
	Develop conceptual design alternatives satisfying the needs	**c13**	75	35	65	60	60	80	83%
Develop the final design and specifications	Define and describe the evaluation and selection process of design alternatives	**c21**	80	30	75	60	25	45	**50%**
	Apply appropriate evaluation and selection methods	**c22**	85	35	80	60	40	60	66%
	Produce a final design and specifications based on the selected alternative	**c23**	85	40	85	80	70	80	83%

B.3.4 Outcome d

An existing rubric on teamwork was adapted for Outcome ***d***. The rubric has 5 score levels, with 1 being the best and 5 being the worst. Level 3 is determined to be the satisfactory level of attainment.

The rubric was modified and used as a questionnaire to collect students' responses. Two project teams from the 2009 CE 438 (Capstone Design) course were randomly selected. Each student in a team was given as many copies of the rubric as the number of teammates. For example, each student in a three-person team was given two copies of the rubric. Each copy is for them to assess the teamwork ability of one of the teammates. A faculty member was present in the lab when the two teams of students were working in the lab. Seven valid rubrics were received. The results are presented in Table 4-8. Based on the faculty's observation, the responses from students' assessment of their teammates represent a fair depiction of how the student teams worked.

Table 4-8. Assessment Result of Outcome *d*

Performance Criteria	Code	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Percent Meeting Criteria (i.e., 3<=)
Interpersonal Communication and Collaboration	**d1**	1	5	1	4	4	1	1	5	**50%**
Understanding & communicating disciplinary tradeoffs and empathy for diverse perspectives	**d2**	1	5	1	3	4	1	1	1	75%
Planning/Organization & Accountability/Reliability	**d3**	2	5	1	4	4	1	2	4	**50%**
Common Goals/Shared Outcomes & Conflict Management and Resolution	**d4**	1	5	1	4	3	1	5	2	63%
Willingness to Learn and Inclusive Decision Making	**d5**		5	1	4	3	1	2	3	71%

Note that Samples 1 to 4 are from members of the same three-person team. It was confirmed by faculty observation that one of the members did not contribute to the teamwork, prompting the other two members to both give poor ratings to this person.

The results show that performance ***d*1** and ***d*3** have 50% meeting criteria. These two performances are related, in that collaboration can be improved by facilitating accountability in the teams.

B.3.5 Outcome e

Outcome ***e*** is assessed with the same Capstone Design reports as those used for Outcome ***c*** by the same three faculty evaluators. The instruction method of the Capstone Design course is to provide students with a project context that includes a description of the situations and problems to be solved. Each student group has to identify the design needs and, eventually, develop an engineering design to solve the problems. The Capstone Design products thus provide valid data for assessment of students' problem-solving abilities.

Table 4-9 shows the results of Outcome ***e*** assessment.

Table 4-9. Assessment Result of Outcome *e*

	Performance Criteria	code	Sample 1 Score*	Sample 2 Score	Sample 3 Score	Sample 4 Score	Sample 5 Score	Sample 6 Score	Percent Meeting Criteria (i.e., >50)
Identify Problems	Identify solution or experimentation techniques	**e11**	70	40	75	70	(missing)	(missing)	75%
	Generate solutions based on the problem statement using appropriate techniques	**e12**	75	25	70	60	40	45	**50%**
	Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	**e13**	70	25	70	80	50	60	66%
Solve problems	Describe solution techniques	**e21**	80	30	70	80	60	60	83%
	Generate solutions based on the problem statement using appropriate techniques	**e22**	80	40	70	80	50	80	66%
	Draw conclusions by assessing the solutions with respects to the effectiveness, feasibility, and how realistic is the solution to the original problem	**e23**	75	40	65	60	60	50	66%

B.3.6 Outcome f

The assessment of Outcome ***f*** is made by examining student products from the course ESM 450 (Engineering Economics/Operations), which covers various issues in engineering practice that are related to economical, social, and environmental issues. Exams, homework, and reports are all used to assess this outcome.

Table 4-10 shows the results. With the seven samples collected, both performance criteria show 57% meeting criteria, indicating outcome attainment.

Table 4-10. Assessment Result of Outcome *f*

Performance Criteria	**Code**	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Meeting Criteria (i.e., >50)**
Is aware of professional codes of conduct and can identify ethical issues concerning an engineering decision	**f1**	85	48	78	30	90	95	38	57%
Apply relevant aspects of professional codes and ethical thinking in a professional environmental setting	**f2**	85	52	75	30	90	95	38	57%

B.3.7 Outcome g

Outcome ***g*** is separated into two major performances: writing and presentation. To assess these two performances, we adopted existing rubrics on technical writing and presentation. For writing ability, two faculty members were assigned to assess students' Capstone Design reports using the rubrics. Each faculty member assessed three sample reports. Results of the assessment on writing are included in Table 4-11.

Table 4-11. Assessment Result of Outcome *g*: Writing

	Performance Criteria	**code**	**Sample 1 Score***	**Sample 2 Score**	**Sample 3 Score**	**Sample 4 Score**	**Sample 5 Score**	**Sample 6 Score**	**Percent Meeting Criteria (i.e., >50)**
Writing Material Selection and Organization	Content	**g11a**	25	25	25	60	56	70	50%
	Support	**g11b**	40	30	45	70	60	65	50%
	Organization	**g11c**	45	51	45	65	55	70	66%
	Focus (applies to theses, term papers and essays)	**g11d**	40	30	55	65	60	65	66%
Writing Mechanics	Sentences and paragraphs	**g12a**	40	50	50	70	60	55	50%
	Word choice	**g12b**	55	60	55	75	60	60	100%
	Spelling	**g12c**	70	75	60	70	55	75	100%
	Punctuation	**g12d**	70	70	70	65	60	60	100%

The assessment on presentation was done by assessing student project presentations from 2009 to 2011. Most of the 400-level courses in the BSCE curriculum use student presentation as part of a student's grade. Members of the faculty who attended the presentations were given the rubrics to fill out. The results are presented in Table 4-12.

Table 4-12. Assessment Result of Outcome *g*: Presentation

Outcome elements	Performance Criteria	Code	S1	S2	S3	S4	S5	S6	S7	S8	Percent Meeting Criteria (i.e., >50)
Effective Use of Visual Aids for Presentation	Clarity and readability of slides	**g21a**	4	3	4	3	4	2	3	3	88%
	Wording concise	**g21b**	4	4	3	2.5	4	3	3	2	75%
	Appropriate amount of information per slide	**g21c**	3	4	4	2.8	3	3	3	2	75%
	Use of tables and figures to facilitate understanding	**g21d**	4	4	4	2.2	3	3	3	2	75%
Presentation Materials and Organization	Logical order of topics	**g22a**	4	3	4	3	3	3	3	3	100%
	Introduction and overview: Problem stated	**g22b**	3	4	4	3	4	3	3	3	100%
	Methodology or approach: coverage appropriate (if applicable)	**g22c**	4	4	3	3	3	2	2	4	75%
	Problem solution	**g22d**	4	4	3	3.5	3	3	3	4	100%
	Conclusions/Recommendations: Significance explained	**g22e**	4	4	4	3.5	3	3	2	3	88%
Presentation Delivery	Voice volume, enunciation, speed	**g23a**	3	3	3	2.8	3	2	3	3	75%
	Maintaining eye contact	**g23b**	3	4	3	2	3	3	2	2	63%
	Coordinating oral and visual presentation	**g23c**	2	3	3	3	3	2	2	3	63%
	Response to questions	**g23d**	3	4		3.5	4	3	3	3	100%

B.3.8 Outcome h

The assessment of Outcome ***h*** is made with the same student products from the course ESM 450 (Engineering Economics/Operations), used for Outcome ***f***. The results are shown in Table 4-13.

Table 4-13. Assessment Result of Outcome *h*

	Code	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Meeting Criteria (i.e., >50)
Identify facets by which engineering impacts modern societies and the globe overall	**h1**	95	95	90	70	80	80	95	100%
Apply and integrate the acquired knowledge in course work	**h2**	92	92	88	65	82	75	92	100%

B.3.9 Outcome i

Outcome ***i*** is assessed with the same Capstone Design reports as those used for Outcome ***c*** by the same three faculty evaluators. The instruction method of the Capstone Design course is to provide students with a topic. Student groups then independently research for resources to fill in required design variables to complete the design under the guidance of the instructor. The final reports of Capstone Design projects thus provide valid data to assess students' independent learning ability, which is critical for lifelong learning.

The results of Outcome ***i*** assessment are included in Table 4-14.

Table 4-14. Assessment Result of Outcome *i*

Performance Criteria	code	Sample 1 Score*	Sample 2 Score	Sample 3 Score	Sample 4 Score	Sample 5 Score	Sample 6 Score	Percent Meeting Criteria (i.e., >50)
Identify the sources of information needed in order to conduct research and learn independently	**i1**	80	60	80	75	30	80	83%
Research of applicable information (engineering theories, principles, formulas, and/or design standards)	**i2**	80	55	80	75	40	60	83%
Integrate the newly learned information with existing knowledge for the accomplishment of project goals and objectives	**i3**	80	55	80	70	60	70	100%

B.3.10 Outcome j

The assessment of Outcome ***j*** is made with the same student products from the course ESM 450 (Engineering Economics/Operations), used for Outcome ***f***. The results are shown in Table 4-15.

Table 4-15. Assessment Result of Outcome *j*

Performance Criteria	**Code**	**Sample 1**	**Sample 2**	**Sample 3**	**Sample 4**	**Sample 5**	**Sample 6**	**Sample 7**	**Meeting Criteria (i.e., >50)**
List and describe contemporary issues of a specific civil engineering discipline	**j1**	95	95	95	70	80	80	63	100%
Apply and integrate relevant aspects of contemporary issues in course work	**j2**	95	80	95	65	82	75	63	100%

B.3.11 Outcome k

Student products used to assess Outcome ***k*** are CE 112 (Fundamental Surveying) exams and project reports for CE 405 (Highway Engineering) and CE 302 (Introduction to Transportation Engineering). The exams of surveying demonstrate students' understanding and ability to use surveying tools. The projects for the two transportation courses involved two modern software tools. AutoCAD and highway design software (i.e., Eagle Point) are required for the CE 405 project. For the CE 302 project, Synchro, a traffic level of service software, is required. Prior to taking the courses, students had never seen the software. The project reports thus showcase students' ability to learn and apply modern tools for engineering applications.

Results of the assessment are shown in Table 4-16. Sample 1 is the collective score of surveying exams, and Sample 2, the transportation projects.

Table 4-16. Assessment Result of Outcome *k*

Performance Criteria	**Code**	**Sample 1**	**Sample 2**	**Meeting Criteria (i.e., >50)**
Understand (be able to describe) the purpose of the tools and the engineering principles behind the tools	**k1**	63	63	100%
Use the tools to solve engineering problems and produce engineering design	**k2**	63	63	100%

B.3.12 Outcome l

Data used for Outcome ***l*** assessment are exams of the course CE 603 (Arctic Engineering). Although this is a graduate-level course, almost all undergraduate students take it, because the course is required for Alaska PE licensing. The exams for CE 603 contain two parts. A closed-book session tests students' understanding of theories and principles of arctic engineering, and an open-book session involves the application of theories and computations to solve for problems related to cold region engineering. Students' answers for the closed-book session are used for the assessment of performance in ***l*1;** students' answers for the open-book session are used for the assessment of performance in ***l*2**.

The results of the assessment are included in Table 4-17.

Table 4-17. Assessment Result of Outcome *l*

Performance Criteria	**Code**	**Sample 1 Percent Correct**	**Sample 2 Percent Correct**	**Sample 3 Percent Correct**	**Percent meet criteria (i.e., >60% correct)**
Recognize northern issues in engineering practice	**l1**				
Apply principles of arctic engineering to solve cold region engineering problems	**l2**				

B.4 Summary of Assessment Results

Table 4-18 summarizes assessment results for all outcomes.

Table 4-18. Summary of Assessment Results for All Outcomes

Code	Number of Samples	Expected Attainment Level	Assessment Results	Outcome Attained?
a1	3	60% Correct	68%	Yes
a2	3	60% Correct	84%	Yes
b1	3	50% Meet Criteria	100%	Yes
b2	3	50% Meet Criteria	100%	Yes
b3	3	50% Meet Criteria	100%	Yes
c11	6	50% Meet Criteria	75%	Yes
c12	6	50% Meet Criteria	66%	Yes
c13	6	50% Meet Criteria	83%	Yes
c21	6	50% Meet Criteria	50%	Requires Attention
c22	6	50% Meet Criteria	66%	Yes
c23	6	50% Meet Criteria	83%	Yes
d1	8	50% Meet Criteria	50%	Requires Attention
d2	8	50% Meet Criteria	75%	Yes
d3	8	50% Meet Criteria	50%	Requires Attention
d4	8	50% Meet Criteria	63%	Yes
d5	8	50% Meet Criteria	71%	Yes
e11	6	50% Meet Criteria	75%	Yes
e12	6	50% Meet Criteria	50%	Requires Attention
e13	6	50% Meet Criteria	66%	Yes
e21	6	50% Meet Criteria	83%	Yes
e22	6	50% Meet Criteria	66%	Yes
e23	6	50% Meet Criteria	66%	Yes
f1	7	50% Meet Criteria	57%	Yes
f2	7	50% Meet Criteria	57%	Yes
g11a	6	50% Meet Criteria	50%	Requires Attention
g11b	6	50% Meet Criteria	50%	Requires Attention
g11c	6	50% Meet Criteria	66%	Yes
g11d	6	50% Meet Criteria	66%	Yes
g12a	6	50% Meet Criteria	50%	Requires Attention
g12b	6	50% Meet Criteria	100%	Yes
g12c	6	50% Meet Criteria	100%	Yes
g12d	6	50% Meet Criteria	100%	Yes
g21a	8	50% Meet Criteria	88%	Yes
g21b	8	50% Meet Criteria	75%	Yes
g21c	8	50% Meet Criteria	75%	Yes
g21d	8	50% Meet Criteria	75%	Yes
g22a	8	50% Meet Criteria	100%	Yes
g22b	8	50% Meet Criteria	100%	Yes
g22c	8	50% Meet Criteria	75%	Yes
g22d	8	50% Meet Criteria	100%	Yes
g22e	8	50% Meet Criteria	88%	Yes
g23a	8	50% Meet Criteria	75%	Yes
g23b	8	50% Meet Criteria	63%	Yes
g23c	8	50% Meet Criteria	63%	Yes
g23d	8	50% Meet Criteria	100%	Yes
h1	7	50% Meet Criteria	100%	Yes
h2	7	50% Meet Criteria	100%	Yes
i1	6	50% Meet Criteria	83%	Yes
i2	6	50% Meet Criteria	83%	Yes
i3	6	50% Meet Criteria	100%	Yes
j1	7	50% Meet Criteria	100%	Yes
j2	7	50% Meet Criteria	100%	Yes
k1	2	50% Meet Criteria	100%	Yes
k2	2	50% Meet Criteria	100%	Yes
l1	3	60% Correct		Yes
l2	3	60% Correct		Yes

B.5 Senior Exit Survey

Every spring semester, graduating seniors are asked to fill out a survey that is designed to provide supplemental assessment for student outcomes.

Although the senior exist survey has been a mainstay in BSCE's assessment repertoire, the questionnaire was revised in 2010 to cover the most recent changes in the assessment program. There are twelve questions, with each question asking students their perception on how each outcome (i.e., ***a*** – ***l***) was covered in the BSCE curriculum. Each answer is expressed as a Likert scale of 5, with 1 being the worst and 5 being the best.

Results of the 2010 and 2011 senior surveys are presented in Table 4-19

Table 4-19. Senior Survey Results

Outcome	Percent Less than 3
a	3.33%
b	0.00%
c	3.33%
d	6.67%
e	0.00%
f	0.00%
g	6.67%
h	3.33%
i	6.67%
j	6.90%
k	16.67%
l	0.00%

C. Continuous Improvement

Since the implementation of the new assessment process in the 2008–2009 academic year, the BSCE program has implemented three important measures (i.e., C.1 to C.3) for the improvement of student outcomes attainment and the potential for graduates to attain the educational objectives. The improvement measures were results of either direct assessment of student outcomes by the BSCE faculty or suggestions received from program constituents via annual Advisory Board meetings and the employer survey conducted in 2009.

In addition, at the April 29, 2011, Advisory Board meeting, BSCE program constituents were presented with results of the student outcomes assessment. The focus of the assessment and discussions was on FE exam scores (i.e., Outcome ***a***) and technical writing (i.e., Outcome ***g***). In particular, Board members were given an opportunity to directly assess students' Capstone Design report. Suggestions for improving students' technical writing ability were made (see C.4)

C.1 FE Exam Review Session

As mentioned previously, FE exam results are assessed by BSCE faculty members every semester after the results are released by NCEES. Prior to 2008, the faculty noticed that the passing percentages of BSCE students were less than satisfactory for quite a few semesters. The faculty began discussing measures to improve the passing rates. Two decisions were made at faculty meetings. The first decision was for the department to provide each student who signed up to take the exam a copy of the FE exam review manual. The second decision was for the BSCE program to offer FE exam review sessions to students taking the exam.

The ASCE student chapter was asked by the faculty to take on the responsibility of organizing and advertising the sessions. Faculty members specializing in different disciplines of engineering volunteered to offer review sessions on different subjects on weekday evenings. The review sessions began in the 2009 Spring semester and have continued every semester since then.

As discussed in the Outcome ***a*** assessment, there have been two semesters, since spring 2009, in which BSCE students scored above national averages. However, there was one semester in which BSCE students scored below national averages. The BSCE faculty will continue to offer the review sessions and monitor the results.

The FE exam results were formally presented to BSCE program constituents during the Advisory Board meeting on April 29, 2011. The FE exam results were also compared with the assessment results, based on course exams (see B.3.1 Outcome ***a***) Program constituents agreed with the BSCE faculty's assessment, that students generally performed better when they took courses than when they took the FE exam. This tendency indicates issues with knowledge retention after finishing a course.

The final decision regarding FE exam improvement is for BSCE faculty to continue to offer FE review sessions and continue to monitor the FE exam results. More improvement measures will be made until the passing rates of BSCE students show consistent progress in the next few years.

C.2 Increased Presentation Opportunities

Prior to 2008, not many courses in the upper level of the BSCE curriculum adopted presentation performance as part of the student grades. With direct inputs received from program constituents during previous Advisory Board meetings, the BSCE program made the improvement of student presentation ability one of its priorities.

Beginning in Spring 2009, student presentations for the Capstone Design course were video-taped with digital camcorders. The taping event provided students incentives and motivation to improve their presentations. The video files also allowed faculty members to further examine the strength and weakness in student presentations.

Currently, many 400-level courses in the BSCE curriculum include student projects and presentation as part of the grades. The culmination point of this effort was at the Capstone Design presentation on May 2 and May 4, 2011. Invitation letters to the presentations were prepared and sent to local professionals. Faculty found that this effort made students better prepared for their presentations. The positive effects are further reflected in the assessment results of Outcome ***g***, presentation, which show over 70% of student samples meeting all performance criteria.

Student presentation video files are on file with the CEE Department and can be made available for ABET examination upon request.

C.3 Improved Capstone Design Projects

With information received from the 2009 employer survey, we learned that BSCE graduates need to strengthen their critical thinking and design abilities. This requirement is also reflected in the outcomes analysis (Table 4-18, Outcome ***c***-21) and from the senior survey (Table 4-19, Outcome ***c***). In academic year 2005–06, at the recommendation of the CE Advisory Board, the BSCE program added a two-series class (Civil Engineering Seminar, CE 490/491). These seminar classes are taught by design professionals from the community. These practicing engineers discuss with our students the elements of design by showing them in detail one of their design projects. For the most part, this class has been successful. We will explore with our advisory board ways to make this class even more successful so that we can improve our students' understanding of the design process. Since 2009, the BSCE program has continuously made improvement to the capstone design projects with the intention that carefully designed projects may help students develop the needed abilities. We have currently hired a new faculty member who previously owned his own structural engineering firm. The department chair has asked him to make improvements to this class in order to provide better instruction on the design process.

C.4 Improving Technical Writing

In addition to these three established measures, results of the student outcomes assessment, based on collected student products, were presented to program constituents at the Advisory Board meeting on April 29, 2011. The Advisory Board members were also provided with a copy of students' Capstone Design reports to review during the meeting. Members of the Advisory Board were asked to read the student report and to make suggestions as to how to improve students' technical writing.

The Advisory Board members noted that insufficient writing appears to be a major problem in student reports. The Board members also concluded that the style of technical writing required for engineering practice cannot be effectively taught by the UAF English Department, which currently offers writing courses for the BSCE curriculum. It was suggested that model documents be provided to students of Capstone Design as part of the initial assignment. Students need to emulate the style of the model documents in producing final reports for their projects. The idea received favorable comments from the

Board members. The BSCE faculty will discuss the idea prior to the Fall 2011 semester to determine the most effective measures to improve students' technical writing.

D. Additional Information

The table that follows is Rubric *b.*

			Below Expectation	**Progressing to Criteria**	**Meet Criteria**	**Exceeds Criteria**
	Performance Criteria	**Code**	**0-25**	**26-50**	**51-75**	**76-100**
b. Design and Conduct, Analyze Experiments	Is aware of proper ways of conducting and analyzing experiments (e.g., avoid measurement errors and bias, facilitate replicability, use appropriate graphs and tables for data analysis)	**b1**	Students' description of the experimental process contain significant amount of errors	Students' description of the experimental process is mostly correct but some errors exist	Students' description is correct	In addition to correct description, students manage to relate other previous knowledge (e.g., from physics or chemistry) in the description
	Use proper techniques while conducting and analyzing experiments	**b2**	Students' description of the techniques and the analysis method contain significant amount of errors	Students' description of the experimental techniques is mostly correct but some errors exist	Students' description is correct	In addition to correct description, students manage to relate other previous knowledge (e.g., from physics or chemistry) in the description
	Interpret results with regards to the original hypothesis	**b3**	Students' interpretation of the results contain significant amount of errors	Students' result interpretation was correct but do not relate the results to the original hypothesis	Students interpret the results correctly and relate the results to hypothesis properly	In addition to meet the criteria, students manage to bring in other previous knowledge (e.g., from physics or chemistry) in the result interpretation

CRITERION 5. CURRICULUM

Program Curriculum

Table 5-1 shows the complete 4-year study plan of the BSCE program. Table 5-2 shows the mapping of courses to student outcomes and educational objectives.

Table 5-1. BSCE Bachelor of Science 4-Year Curriculum (i.e., Table 5-1 in the original self-study questionnaire)

				Math & Basic Science	Engineering Topics	Design	General Education	Other	Second last offering	Last offering	Second last enrollment	Last enrollment
Year /Semester	**Dept/Course #**	**Title**	**Required**	**Credit Hours**	**Credit Hours**	(√)	**Credit Hours**	**Credit Hours**	**Year/Semester**	**Year/Semester**	**Students**	**Students**
First Fall	ENGL 111X	Methods of Communication	R				3		2010 Fall	2011 Spring		
	MATH 200X	Calculus I	R	4					2010 Fall	2011 Spring		
	ES 101	Intro to Engineering	R		3	(√)			2010 Fall	2011 Spring	96	34
	CHEM 105	General Chemistry	R	4					2010 Fall	2011 Spring		
	DRT 170	Beginning AutoCAD	R		3				2010 Fall	2011 Spring		
First Spring	COMM 131X or 141X	Fundamental of Oral Communication	R				3		2010 Fall	2011 Spring		
	MATH 201X	Calculus II	R	4					2010 Fall	2011 Spring		
	CE 112	Elementary Surveying	R		3				2010 Spring	2011 Spring	42	33
	CHEM 106	General Chemistry	R	4					2010 Fall	2011 Spring		
	ES 201	Computer Techniques	R		3				2010 Fall	2011 Spring	56	67
Second Fall	MATH 202X	Calculus III	R	4					2010 Fall	2011 Spring		
	PHYS 211	General Physics	R	4					2010 Fall	2011 Spring		
	ENGL 211X	Academic Writing	R				3		2010 Fall	2011 Spring		
	ES 209	Statics	R		3				2010 Fall	2011	40	25

										Spring		
		Perspective on Human Conditions	SE					3				
Second Spring	MATH 302	Differential Equations	R	3					2010 Fall	2011 Spring		
	PHYS 212	General Physics	R	4					2010 Fall	2011 Spring		
	ES 210	Dynamics	R		3				2010 Fall	2011 Spring	13	36
	GE 261	General Geology for Engineer	R	3					2010 Fall	2011 Spring		
	LS 101X	Library Info and Research	R				1		2010 Fall	2011 Spring		
		Perspective on Human Conditions	SE					3				
Third Fall	CE 334	Properties of materials	R		3				2009 Fall	2010 Fall	24	20
	ES 301	Engineering Analysis	R		3				2009 Fall	2010 Fall	46	40
	ES 331	Mechanics of Materials	R		3				2010 Fall	2011 Spring	47	24
	ES 341	Fluid Mechanics	R		4				2010 Fall	2011 Spring	43	41
		Perspective on Human Conditions	SE					3				
Third Spring	CE 326W	Geotechnical Engineering	R		4				2010 Spring	2011 Spring	27	22
	CE 331	Structural Analysis	R		4				2010 Spring	2011 Spring	28	23
	CE 341	Environmental Engineering	R		3				2010 Spring	2011 Spring	29	21
	CE 302	Introduction to Transportation Eng.	R		3				2010 Spring	2011 Spring	23	24
		Technical Elective	SE		3							
Fourth Fall	CE 344	Water Resources Engineering	R		3				2009 Fall	2010 Fall	18	29
	CE 432	Steel Design	R		3	(√)			2009 Fall	2010 Fall	14	30
	CE 490	Seminar	R		0.5				2009 Fall	2010 Fall	14	25

		Technical Elective	SE		3							
		Technical Elective	SE		3							
		Perspective on Human Conditions	SE					3				
		Perspective on Human Conditions	SE					3				
Fourth Spring	ESM 450	Eng Economics/Operations	R		3				2010 Spring	2011 Spring	19	30
	CE 438W,O	Design of Eng. Systems (Capstone)	R		3	(√)			2010 Spring	2011 Spring	15	24
	CE 491	Seminar	R		0.5				2010 Spring	2011 Spring	25	23
	CE 400	Fundamentals of Engineering Exam	R						2010 Fall	2011 Spring	16	16
	ESM 422	Engineering Decisions	R		3				2010 Spring	2011 Spring	6	19
		Technical Elective	SE		3							
		Perspective on Human Conditions	SE					3				
			Total	**34**	**73**		**10**	**18**				
			% Total	**25%**	**54%**		**8%**	**13%**				
Technical Electives	CE 405	Highway Engineering	SE		3	(√)			2007 Fall	2009 Fall	9	6
	CE 406	Traffic Engineering	SE		3	(√)			2008 Fall	2010 Fall	12	14
	CE 422	Foundation Engineering	SE		3				2007 Fall	2009 Fall	7	10
	CE 424	Intro to Permafrost	SE		3				2008 Fall	2010 Fall	8	13
	CE 433	Reinforced Concrete Design	SE		3				2010 Spring	2011 Spring	7	8
	CE 434	Timber Design	SE		3				2007 Fall	2009 Fall	21	12
z	CE 435	Design and Construction of Bridges	SE		3	(√)			2010 Spring	2011 Spring	5	9
	CE 442	Environmental	SE		3	(√)			2008 Fall	2010 Fall	9	9

		Engineering Design										
	CE 445	Hydrological Analysis and Design	SE		3				2009 Spring	2011 Spring	12	7
	CE 451	Construction Cost Estimation and Bid	SE		3				2009 Fall	2010 Fall	13	15
	CE 603	Arctic Engineering	SE		3				2010 Fall	2011 Spring	43	38

Table 5-2. Curriculum Mapping to Educational Objectives and Student Outcomes

Outcome Performance	Criteria Code	a1	a2	b1	b2	b3	b1	b2	b3	c1	c2	c3	c1	c2	c3	d1	d2	d3	e1	e2	e3	f1	f2	f3	g1	g2	g3	g1	g2	g3	h1	h2	h3	h1	h2	h3	i1	i2	i3	i1	i2	i3	j1	j2	j3	k1	k2	k3	i1	i2	i3
Dept/Course#	**Required**																																																		
ENGL 111X	R																								X			X																							
MATH 200X	R	X																																																	
ES 101	R	X	X													X	X	X	X	X	X	X	X	X																											
CHEM 105	R	X		X	X	X	X	X	X																																										
DRT 170	R																																													X					
COMM 131X or 141X	R																											X	X	X																					
MATH 201X	R	X																																																	
CE 112	R	X	X																																																
CHEM 106	R	X		X	X	X	X	X	X																																										
ES 201	R																																																		
MATH 202X	R	X																																																	
PHYS 211	R	X		X	X	X	X	X	X																																										
ENGL 211X	R																								X	X	X																								

Table 5-2 *(continued)*. Curriculum Mapping to Educational Objectives and Student Outcomes

Outcome Performance	Criteria Code	a11	a12	b11	b12	b13	b21	b22	b23	c11	c12	c13	c21	c22	c23	d1	d2	d3	e1	e2	e3	f1	f2	f3	g11	g12	g13	g21	g22	g23	h11	h12	h13	h21	h22	h23	i11	i12	i13	i21	i22	i23	j1	j2	j3	k1	k2	k3	i1	i2	i3
Dept/ Course#	**Required**																																																			
ES 209	R	X	X																																																	
MATH 302	R	X	X																																																	
PHYS 212	R	X		X	X	X	X	X	X																																											
ES 210	R	X	X																																																	
GE 261	R	X																																																		
LS 101X	R																																				X															
CE 334	R	X	X				X	X	X																																											
ES 301	R	X	X																																																	
ES 331	R	X	X																																																	
ES 341	R	X	X				X	X	X																																											
CE 326W	R	X	X				X	X	X																																											
CE 331	R	X	X																																																	
CE 341	R	X	X	X	X	X	X	X	X																																											
CE 302	R	X	X																X	X	X																									X	X	X			
CE 344	R	X	X																																																	
CE 432	R	X	X																																																	
CE 490	R																																																			

Table 5-2 *(continued)*. Curriculum Mapping to Educational Objectives and Student Outcomes

Outcome Performance	Criteria Code	a11	a12	b11	b12	b13	b21	b22	b23	c11	c12	c13	c21	c22	c23	d1	d2	d3	e1	e2	e3	f1	f2	f3	g11	g12	g13	g21	g22	g23	h11	h12	h13	h21	h22	h23	i11	i12	i13	i21	i22	i23	j1	j2	j3	k1	k2	k3	i1	i2	i3
Dept/Course#	**Required**																																																			
ESM 450	R																					X	X	X							X	X	X	X	X	X							X	X	X						
CE 438W,O	R									X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X							X	X	X	X	X	X				X	X	X			
CE 491	R																								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
ESM 422	R	X	X																																																
CE 405	SE									X	X	X	X	X	X	X	X	X	X	X	X																									X	X	X			
CE 406	SE									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																						X	X	X			
CE 422	SE	X	X																																																
CE 424	SE	X	X																																																
CE 433	SE	X	X																																																
CE 434	SE	X	X																																																
CE 435	SE									X	X	X	X	X	X																																				
CE 442	SE	X	X							X	X	X	X	X	X																																		X	X	X
CE 445	SE	X	X																																																
CE 451	SE	X	X																																																
CE 603	SE	X	X																																														X	X	X

Figure 5-1 shows the BSCE curriculum prerequisite structure, which culminates at the capstone design project.

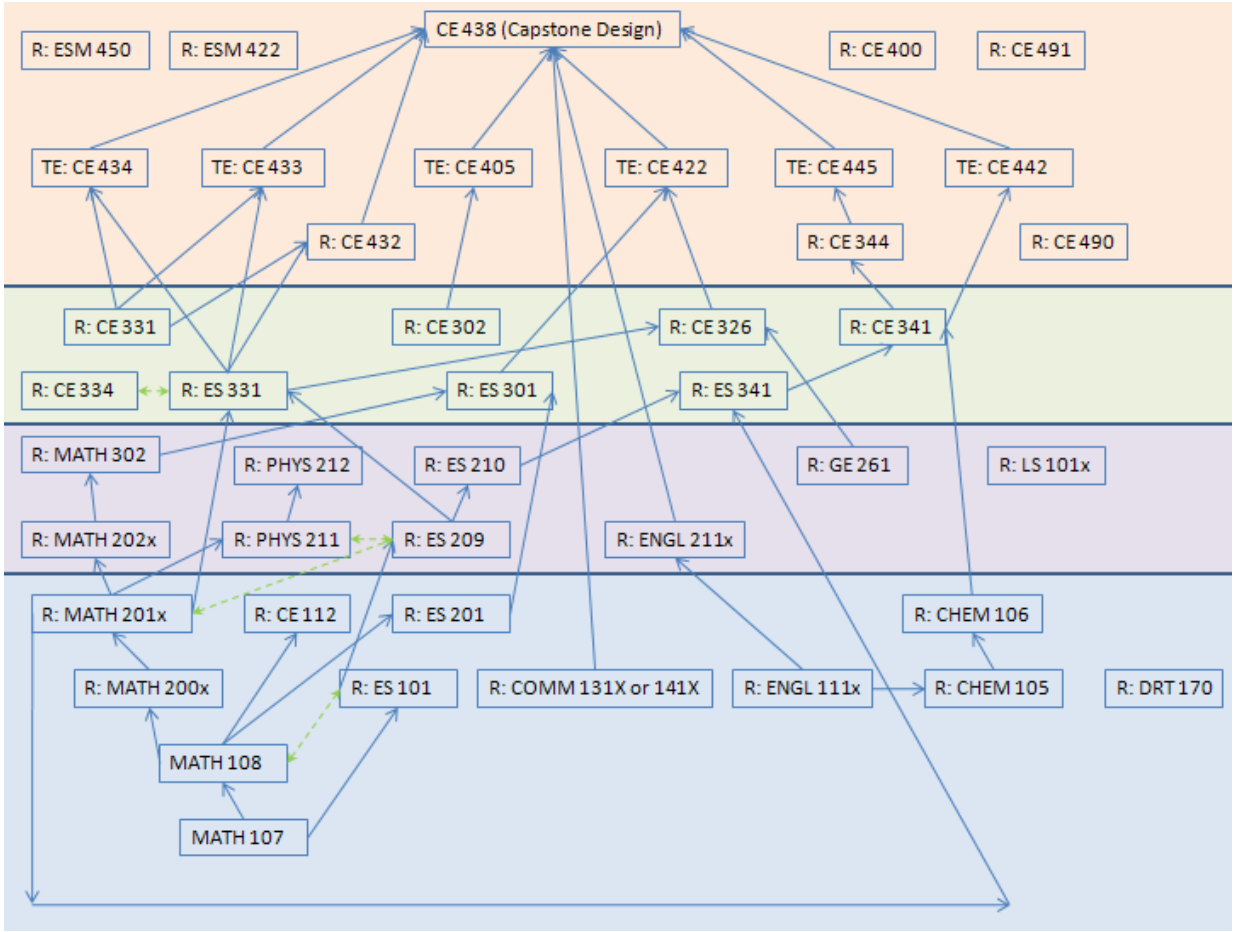

Figure 5-1 BSCE Curriculum Prerequisite Structure

With 34 credits in science courses and 73 credits in engineering courses, the BSCE program satisfies the general criteria for an engineering program (i.e., 32 credits in science and 48 credits in engineering). The requirement for the Civil Engineering program criteria will be discussed in the Program Criteria section.

Design activities are integrated into courses beginning with the first year in ES 101 (Introduction to Engineering) and DRT 170 (Beginning AutoCad), and culminating in the capstone course, CE 438 (Design of Engineering Systems). Table 5-2 shows the courses with significant design content. Many of the other courses have smaller design exercises included in lectures, homework, and/or exams. The design exercises provide the students with an ability to design complex systems, components, and processes in several sub-discipline areas. Students are taught how to analyze specific problems and how to synthesize appropriate data into a systematic approach for determining design solutions

CE 438 is designed to provide instruction on general topics and to have students work together in interrelated teams to solve a real-world design problem with multiple constraints.

The topics frequently covered in the lecture portion of the class (normally taught by local practicing experts) include:

- Project delivery
- Project management
- Constructability considerations in design
- Legal considerations in design
- Safety consideration in design
- Ethics in design
- Working with regulatory agencies
- Professional registration and the business of engineering
- Public presentation.

The project is obtained from an external client by the course instructor(s), who acts as the principle engineer(s). Students are split into separate firms and must submit proposals to conduct the work. Projects that are multi-disciplinary civil engineering are sought so that the students can be arranged into sub-discipline teams that must interact to complete the design. Typical groups include cost estimating and specifications, environmental/safety/ permitting, geotechnical, structural, etc. The class meets once a week in a staff meeting to discuss the progress of the project and to correlate efforts. Students normally submit weekly time and activity reports.

The typical project will require some scope definition by the students, with the client's input, as they identify and formulate the problem that needs to be solved. Often a rough order-of-magnitude feasibility study is conducted at the start of the semester to narrow down the design options. The results of the study are presented to the client, who gives direction for the final part of the project.

At the end of the semester, the class makes a public presentation of the results. The clients, mentors, local engineering community, AB, alumni, and public are invited to the presentation. Following the presentation, the client is presented with copies of the final reports produced by the sub groups.

Reactions to the format of the course have been very positive from both the students and the clients.

Course syllabi, textbooks, and samples of student work used for assessment of the program will be available for review during the visit to demonstrate achievement related to this criterion.

Course Syllabi

Course syllabi are included in Appendix A.

CRITERION 6. FACULTY

Faculty responsibilities, evaluation criteria, and workload are governed by three documents in order of increasing standing:

1. Faculty Senate policies (www.uaf.edu/uafgov/faculty-senate),
2. UAF Faculty Appointment and Evaluation Policies and UAF Regulations for the Appointment and Evaluation of Faculty (known as "Policies" and "Regulations," and collectively as the "Blue Book"), found at: www.uaf.edu/provost/promotion-tenure, and
3. United Academics Collective Bargaining Agreement (unitedacademics.net).

A. Faculty Qualifications

The CEE Department has fourteen full-time, tenure-track and tenured faculty members, and one part-time adjunct faculty. Table 6-1 shows the details of faculty information. All full-time faculty members hold Ph.D. degrees in their respective subject areas. Eight are registered professional engineers, and most have had two or more years of industrial experience.

The faculty are diverse in terms of age, experience, and (to a lesser extent) in terms of gender and cultural background, which makes it easy for students to find a mentor that meets their needs. While advising assignments are randomly chosen, students and faculty are free to negotiate a change in assignments to better meet student needs. Such changes occur several times a year as students become more familiar with the faculty while progressing through the BSCE program.

The number of faculty is adequate to cover all of the curricular areas in the BSCE program, as well as responsibilities to the students, the college, the university, and the profession. The faculty as a unit is competent in the six areas of civil engineering emphasized by the BSCE program:

- Transportation: Jenny Liu and Billy Connor
- Geotechnical: Xiong Zhang and Yuri Shur
- Hydraulic: Horacio Toniolo
- Environmental: David Barnes, Robert Perkins, and Silke Shiewer
- Structural: Leroy Hulsey, Andrew Metzger, and Yongtao Dong
- Construction/Project Management, Engineering/Science Management: Robert Perkins, and Keith Whitaker

B. Faculty Workload

A full-time faculty workload is 30 units for 9 months, as defined in the United Academics Collective Bargaining Agreement (UNAC CBA, unitedacademics.net). A typical tripartite faculty workload would consist of 60% teaching, 30% research, and 10% service (18, 9, and 3 workload units respectively). Teaching credit consists of formal instructional classes,

advising undergraduate students, mentoring graduate students, etc. Research activities include all professional activities leading to publication, performance, or formal presentation in the unit member's field, or leading to external funding recognizing the unit member's current or potential contribution to their field. Such activities include manuscript submission, grant proposal submission, supervision of externally funded research projects, development of patentable inventions, additions to a portfolio, and other contributions appropriate to the unit member's field. Service activities include professional service, public service and university service. Typically, a faculty member will serve on some committee within the department, college, or university. A 3-credit class is worth 3 workload units. A typical workload will consist of four 3-credit courses per year, graduate student supervision, undergraduate student advising, research activities and service activities in all three service categories.

The composition of professional duties and responsibilities of unit members will be determined by the appropriate administrator after consultation with the department head/chair and unit member. Faculty members consult the department chair in writing their proposed workload (www.uaf.edu/provost/faculty-reports-forms/faculty-workload-forms), who then submits workloads to the dean, who modifies the proposals if necessary to achieve the overall balance of required work of the college. It is possible to buy out of a course (3 units of workload for 6 weeks of salary) using research funding or internal competitive grants, provided the academic mission of the college can still be effectively delivered.

Table 6-2 shows the faculty workload summary.

C. Faculty Size

The BSCE faculty are extraordinarily productive given the many tasks that are expected of them. In past reviews, comments have been made about reducing workloads of the faculty so that they can be more effective. This has not been accomplished. Nevertheless, we continue to meet the needs of our constituent groups.

With the faculty identified earlier in this section, we have sufficient faculty to cover the undergraduate curriculum, provide advising and mentoring, and meet the research and service requirements of the BSCE program in accordance with ABET criteria.

D. Professional Development

The Office of Faculty Development located at 222 Bunnell Building provides professional development opportunities for all faculty members at UAF in the areas of teaching, learning, and scholarship. Assistance with travel, mentoring, promotion and tenure, teaching observations, and instructional technology (through Campus Technology Services) are some of the programs. The office also brings national speakers and trainers to campus, conducts training workshops, and maintains a collection of resource materials on these topics, both in the office and at the Rasmuson Library. Regular workshops, panel discussions, and seminars

will be held throughout the year for faculty. Although these are mainly designed for new faculty, they are open to all faculty members, and can be audio-conferenced to the rural campuses if requested. The limited travel funds are generally awarded competitively to new faculty.

Training in other areas such as safety and ethics are also provided through different UAF departments.

CEM provides limited funding on a competitive basis to faculty for professional development activities in academic areas, which includes attending short courses that are useful in enhancing the value of courses taught, attending professional conferences, accreditation workshops, and other areas. INE provides limited funding on a competitive basis for faculty professional development in research areas. Additionally, each year CEM has provided departments with about $10K of travel funding to be used for academic development, including ABET training and development.

Newer faculty in the BSCE Department have been able to take advantage of NSF EPSCoR funding to provide for travel to conferences. Additional support is made available from the Dean's office for travel related to assessment. UAF also has a number of venues available for faculty to get funded for small (e.g., ~$5K) grants to develop research proposals, or to develop innovations to the curriculum.

E. Authority and Responsibility of Faculty

All of the core full-time civil engineering faculty are assigned to be advisors to the program's undergraduate students. This assignment brings the faculty and students together in a non-class setting that allows the faculty to act as mentors as well as advisors. The faculty are expected to have posted office hours for at least six hours per week. Many faculty are available much more than this.

Three of the faculty are also acting as advisors to student organizations (ASCE: Dr. Filler, and Chi-Epson: Dr. Shur). These assignments bring the students closer to a mentor, and assist with their professional development.

The CEE faculty are active in the evaluation, assessment, and continuing improvement of the program, including educational objectives and student outcomes. This is manifest in department meetings, where sub-committees are often formed to address special areas. Results of the various assessment processes are discussed at faculty meetings. Issues may be elevated to the Dean via the CEE Chair or to the Faculty Senate, since a CEE faculty is often one of the CEM senators. We have access to the Provost, if a direct request to the Provost seems in order, although this is rarely needed.

In addition to teaching and advising, the faculty are involved in departmental, school, university, and professionally related service. Assignments are made to the various academic committees that are needed to keep the institution running. On a professional level, most of

the faculty are involved in national-level technical and educational committees, often in positions of leadership with those committees. This activity keeps the faculty current with the developments within their technical fields as well as within the engineering education profession. These activities are vital to producing an active and current educational experience for our students.

The program faculty has control over course content, including creation, modification, and evaluation of courses. However, course creations and modifications have to be approved by the department chair, CEM Curriculum Council, CEM Dean, Curriculum Council of the Faculty Senate, and the Provost. Every signatory technically has the same responsibility – ensuring that course proposals minimize content overlap, have resources for effective delivery, have a sound teaching and assessment plan, and are compliant with Faculty Senate guidelines. However, some signatories emphasize certain aspects more than the others. The department chair ensures that the course is consistent with the mission of the program and department, and that resources (faculty, lab, etc.) exist to deliver the course effectively. The CEM Curriculum Council ensures that there is no course duplication within the college and looks at the expected rigor of the course, including contact hours versus credit hours, level of material matching the course number, and that all required content is present and clear on the proposed syllabus, etc. The CEM Dean offers guidance in curriculum development to both the department and Curriculum Council regarding realistic constraints of course enrollment numbers, department faculty capacity, number of courses in the degree program, etc., and must agree with the proposal in order for it to go forward. The Curriculum Council of the Faculty Senate examines course proposals in the context of the entire university for duplication, and ensures compliance with Faculty Senate and university-wide guidelines on course content, syllabus content, and assessment.

College faculty also examine, modify and vote on approval of the CEM Unit Criteria, which are the published guidelines used in the evaluation of CEM faculty during the promotion and tenure process (http://www.uaf.edu/files/provost/CEM-unit-criteria-5-1-06.pdf). These Unit Criteria must be approved by CEM faculty at least every 5 years, and change can be initiated by the CEM faculty at any time, but changes are subject to a approval by vote of the faculty. The same Unit Criteria are used in pre-tenure (mandatory 4th year evaluations) and post-tenure evaluations of faculty. Unit Criteria are additional to the criteria outlined in the UAF "Blue Book" policies and regulations.

Table 6-1. Faculty Qualifications
BSCE Program

Faculty Name	Highest Degree Earned- Year and Field		Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[4]	Years of Experience			Professional Registration/ Certification	Level of Activity H, M, or L		
						Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/ summer work in industry
David Barnes	PhD, Colorado State University '97	Contaminant fate and transport	Professor	T	FT	5.5	12	12	P.E.	M	H	L
Billy Connor	M.S., University of Alaska Fairbanks	Transportation	Adjunct Professor							M	H=	L
Yongtao Dong	Ph.D., University of Illinois at Chicago, 2003	Structural Engineering	Assistant Professor	TT	FT	4	4	4	P.E.	M	H	L
Dennis Filler	PhD., University of Alaska Fairbanks '97	Cold Climate Research	Assistant Professor	TT	FT	13	14	5	P.E.	M	H	M
J. Leroy Hulsey	PhD., University of Missouri-Rolla '76	Structural engineering	Professor	T	FT	27	28	24	P.E.	M	H	M
Ming Lee	PhD., University of California Irvine '01	Traffic Engineering	Assistant Professor	TT	FT	6	6	5	E.I.T.	M	H	L
Juanyu (Jenny) Liu	Ph.D., Texas A&M University '06	Materials and Pavement Engineering	Assistant Professor	TT	FT	5	5	5	P.E.	M	H	L
Andrew T. Metzger	Ph.D., Case Western University 07'	Structural Engineering	Assistant Professor	TT	FT	9	4	4	P.E.	M	H	L
Robert Perkins	PhD., University of North Carolina '94	Project management	Professor	T	FT	26	12	12	P.E.	H	H	L
Silke Schiewer	PhD., McGill University '96	Bio-environmental engineering	Associate Professor	T	FT	4.5	10	10		H	H	L
Yuri Shur	PhD, Institute of Foundations and Underground Structure '68	Arctic Engineering	Professor	T	FT	7	31	10		M	H	L
Horacio Toniolo	PhD., University of Minnesota '02	Water Resources Engineering	Associate Professor	T	FT	0	9	9		H	H	L
Keith Whitaker	J.D.,	Construction Management	Assistant	TT	FT		1	1		H	H	M
Daqing Yang	PhD., Chinese Academy of Sciences '88 (resigned)	Cold Region Hydrology	Associate Professor	T	FT	10	4	4			H	
Xiong Zhang	PhD., Texas A&M University,'04	Geotechnical Engineering	Assistant Professor	TT	FT	6	5	5	P.E.	M	H	L
John P. Zarling	PhD., Michigan Technological University '71	Arctic Engineering	Adjunct Professor	Emeritus	PT					N	h	H

Table 6-2. Faculty Workload Summary

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
David Barnes	FT	ES 101 (2006 spring, fall; 2007 spring; 2009 fall; 2010 spring, fall), CE 341 (2008 spring), CE 442 (fall 2007, 2008, 2010), CE 490 (fall 2007, spring 2008), CE 663 (fall 2006, 2008, 2010), CE 648 (spring 2010), ENVE 642 (spring 2007, 2009, 2011)	60%	30%	10%	100%
Yongtao Dong	FT	CE 630, 3 credits, spring 2007, CE 631, 3 credits, fall 2007, ES 209, 3 credits, fall 2007, CE 640, 3 credits, spring 2008, ES 331, 3 credits, spring 2008, CE 633, 3 credits, fall 2008, ES 209, 3 credits, fall 2008, CE 646, 3 credits, spring 2009, ES 331, 3 credits, spring 2009, CE 432, 3 credits, fall 2009, ES 209, 3 credits, fall 2009, CE 331, 3 credits, spring 2010, ES 331, 3 credits, spring 2010, CE 633, 3 credits, fall 2010, ES 331, 3 credits, fall 2010, CE 646, 3 credits, spring 2011, ES 331, 3 credits, spring 2011	60%	30%	10%	100%
Dennis Filler	FT	CE 441 (4) Spring 2006 CE 603 (3) F ESM 450 (3) Fall 2006 CE 112 (3) CE 438 (3) Spring 2007 ESM 450 Fall 2007 CE 112(3) CE 438 (3), Spring 2008 ES 101 (3) ESM 450 (3) Fall 2008, CE 112 (3) ES 209 (3) Spring 2009 ES 101 (3) ESM 450 (3) Fall 2009 CE 112 (3) CE 341 (4) ESM 450 (3) Spring 2010 ES 209 (3) ESM 450 Fall 2010, CE 341(4) ES 341 (4) Spring 2011, ESM 450 (3) ES 209 Fall 2011	60%	30%	10%	100%

J. Leroy Hulsey	FT	Spr 2006: CE433(2+3); CE493(3); CE634(3) Fall 2006:CEE633 (3) Spr 2007:CE433(2+3); CE435(3) Fall 2007:CE432(3); CE635(3) Spr 2008:CE331(3); CE435(3) Fall 2008 CE432(2+3) Spr 2009:CE331(3) Fall 2009:CE650(3) Spr 2010:CE491(0.5); CE435(3); CE630(3) Fall 2010: CE490(0.5); CE432(2+3) Spr 2011: CE331(3);CE433(2+3); CE435(3);CE491(0.5)	30%	60%	10%	40%
Ming Lee*	FT	CE302 (3), Fall 2006; ESM422-622 (3), Spring 2007; CE405 (3), Fall 2007; ESM422-622 (3), Spring 2008; CE406 (3), Fall 2008; ESM422-622 (3), Spring 2009; CE405 (3), Fall 2009; ESM422-622 (3), Spring 2010; CE406 (3) and ES101 (3), Fall 2010; ESM422-622 (3) and CE493-693 (3), Spring 2011;	30%	60%	10%	67%
Juanyu (Jenny) Liu	FT	CE693 Pavement Design (3 credits, Fall 2006), ES331 Mechanics of Materials (3 credits, Spring 2007), CE334 Properties of Materials (3 credits, Fall 2007, 2008, 2009 and 2010), CE302 Introduction to Transportation Engineering (3 credits, Spring 2008, 2009, and 2011), CE693 Special Topics on Bituminous Materials (3 credits, Spring 2010)	30%	60%	10%	67%
Andrew T. Metzger	FT	CE 434 (3) Fall 2007 CE 433 (3) CE 634 (3) Spring 2008, CE 434 (3) Fall 2008 CE 433 (3) CE 438 (3) Spring 2009, CE 634 (3) Fall 2009, CE 438 (3) Spring 2010, CE 451 (3)Fall 2010 CE 637 (3) Spring 2011, CE 634 (3) CE 434 (3) Fall 2011	60%	30%	10%	100%

Robert Perkins	FT	ENVE 652, 3, ENVE 650, 3, Fall 10; ENVE 651, 3, ESM 684, 3, CE 693, 1, Spr 11; ENVE 649, 3, ENVE 697, 1, Fall 09; ESM 605, 3, ESM 684, 3, Spring 10; ENVE 652, 3, Fall 08; ESM 684, 3,ENVE 651, 3, Spring 09; ESM 684, 3, ENVE 649, 3, Fall 07; ESM 684, 3, ESM 605, 3, Spring 08; 06-07 sabbatical year.	60%	30%	10%	100%
Silke Schiewer	FT	ENVE 645(3) ENVE 650 (1) ENVE 653 (1) Spring 2006 ENVE 647 (3) Fall 2006, CE 341 (4) ENVE 650 (1) Spring 2007, ENVE 646 (3) Fall 2007 ENVE 645 (3) Spring 2008, ES 341 (4) Spring 2009, ENVE 646 (3) ENVE 650 (1) Fall 2009 ENVE 645 (3) Spring 2010, Fall 2010-Spring 2011 sabbatical, ENVE 645 (3) ENVE 650 (1) Fall 2011	60%	30%	10%	100%
Yuri Shur	FT	CE 326 (4) Spring 2006, CE 422 Fall 2006 (3) CE 493 (3) Spring 2007, CE 681 (3) Fall 2007 CE 684 (3) Spring 2008, CE 493 (3) Fall 2008, CE 681 (3) Fall 2209 CE 326 (4) Spring 2010 CE 424 (3) Spring 2010, CE 326 (3) Spring 2011, CE 681 (3) Fall 2011	60%	30%	10%	100%
Horacio Toniolo	FT	ES341 – 4 credits; CE344 – 3 credits; CE445 – 3 credits; CE662 – 3 credits; CE664 – 3 credits	60%	30%	10%	100%
Keith Whitaker	FT	Alt. Project Delivery Systems, (CE693/1) Fall 2010 Const. Related Law Topics (CE693/1) Spring 2011 Introduction to Engineering (ES101/3) Spring 2011 Design of Engineered Systems(CE438/3) Spring 2011				

Daqing Yang*	FT	Resigned Fall 2011	60%	30%	10%	100%
John P. Zarling	PT	CE 603 (3)Arctic Engineering (Fall 2010 and Spring 2011)				
Xiong Zhang	FT	ES 209 (3) Fall 2006, CE 326 (3) Spring 2007, CE 628 (3) Fall 2007 CE 326 (4) Spring 2008, CE 628 (3) Fall 2008, CE 326 (4) Spring 2009, ES 301 (3) Fall 2009, ES 201 (3) Spring 2010, CE 625 (3) ES 201 (3) Fall 2010, ES 201 Spring 2011, CE 422 (3) ES 201 Fall 2011	30%	60%	10%	67%

*Resign from the position in 2011

CRITERION 7. FACILITIES

A. Offices, Classrooms and Laboratories

The university provides basic infrastructure such as classrooms, office space, library facilities, common computer areas, and high-speed Internet connections within campus. The William Elmhirst Duckering Building on campus was completed in 1964, with a large addition constructed in the 1984. In early 2002, after more than a year of extensive renovations, the Duckering Building was rededicated and today it serves as home to the College of Engineering and Mines, including classrooms and lab space. The building is home to all seven engineering programs and four different research units under INE. Given the recent enrollment trends and growing research activities, space is becoming a big issue. Computer Science is currently housed on the second floor of the Sydney Chapman Building, with space for offices, labs, computational facilities, and classrooms.

A.1 Offices

All the Civil Engineering professors are currently located in the second and fourth floor office suites in the Duckering Building. Offices are arranged so that students have ready access to faculty. A small conference area with a whiteboard is available in the center of the main office suite. This conference area is frequently used by faculty to work with individuals and small groups of students. Several additional conference rooms are available in the building, and are available by scheduled reservation.

The office space of the BSCE is sufficient to accommodate all faculty members working on the BSCE program.

A.2 Classrooms

The lecture classrooms on campus (~69 rooms) are scheduled by UAF Enrollment Services. The campus has a wide variety of classrooms available on campus. Some have full audiovisual services (so called “smart” classrooms); many have televisions (with VCR/DVD capabilities) and ceiling-mounted projection systems. Almost all the rooms have at least one active network connection. Most of the rooms are also equipped with overhead projectors. Classroom sizes range from small (20 seats) to large (100+ seats). The rooms are assigned based on section size history and special needs indicated by the instructors. Classes are generally taught in the Duckering Building.

Classroom space is adequate in both availability and quality for instructional purposes. Efforts are made to work with Enrollment Services to make sure that classrooms meet the instructional needs of specific courses.

BSCE and ES courses are scheduled so than none of the courses fall on the Tuesday/Thursday 11:30–12:45 time block. This leaves all students and faculty free to attend student organization meetings that are scheduled in an engineering laboratory during the Thursday time slot. The Tuesday time block is when most off-campus professional organizations hold their monthly meetings. This scheduling arrangement promotes professional development and professional activities.

In the past two years, the enrollment for programs in the College of Engineering and Mines has increased significantly. The existing classrooms are reaching limits for the ES courses. However, for most of the BSCE courses, the classroom space does not present problems. Most of the classrooms have built-in projectors. The BSCE program also has portable projectors. There are no issues related to teaching equipment in most classrooms.

To meet the BSCE program's educational objectives, several computer experimental laboratories (as given below) are used by undergraduate civil engineering students to fulfill course requirements. CEM also maintains laboratories for cold regions and environmental research.

CEM employs several technicians that maintain teaching and research laboratories and two information technicians who maintain the college's computer laboratories and computational infrastructure (hardware and software). Below is a list of the laboratories and the available equipment.

Room # DU 124 Structural laboratory. Major equipment and instrumentation includes:

U.T.M. - Tinius-Olsen (300 kip machine)
M.T.S. 55 kip with a good set of accessories and instrumentation
Forney concrete compression tester
Soittest automated Marshall press
Hardness tester
Charpy impact tester
Water baths

All the equipment is modern (except the Tinius-Olsen, but it is very usable) and in very good condition. The MTS is a satisfactory instructional facility for advanced students. There is a need for a simple-to-use instructional testing machine and technical support.

Room # DU 129 Asphalt and metal specimen preparation. Equipment includes:

Metal preparation system for metallurgical specimens
Degreaser
Viscometers
Penetration apparatus
Sulfur pot
Flash point apparatus
Fume hood system

The equipment is in good condition. Space is limited for instruction.

Room # DU 142 Construction material preparation laboratory. New, well-equipped laboratory for aggregate, concrete, and asphalt specimen preparation. Contains scales, sieves, sieve shakers, ovens, compactors, mixers, vibrators, and other equipment. Although small, this is a very good instructional facility.

Room # DU 146 Laboratory assignment room. Used for explaining laboratory assignments, performing pre- and post-laboratory calculations. This room is a very good instructional facility.

Room # DU 144 Undergraduate soils laboratory, equipped with:

K. triaxial cell
Stress path triaxial
3 hand-operated direct shear apparatus
2 odometers
2 pinhole test apparatuses
2 unconfined compressive machines
3 electronic balances
4 compaction periameters
This is a new, well-equipped laboratory, and a very good instructional facility.

Room # DU 343 and 345 Environmental Engineering Laboratory

These labs are shared jointly by the BSCE and BSCE graduate programs in environmental quality engineering and science.

These labs are general-purpose rooms for environmental chemistry experiments. Room 343 is generally used as a wet chemistry lab when students perform basic chemical experiments. Room 345 is generally used as a unit-process lab to demonstrate pilot-scale processes. These labs are minimally equipped but suitable. More sophisticated equipment is available in the research labs, which are frequently used for demonstrations.

Room # DU 245 Hydraulics Laboratory

Large, open multipurpose space used for some fluid mechanics labs in the fall and spring semesters, and for several laboratory demonstrations in water resource engineering, hydraulic engineering, and engineering hydrology. It was originally designed exclusively as a hydraulics lab and includes a Plexiglas 4" x 12" x 20' flow channel, a new 24" x 24" x 35' flow channel, a pipe network experiment, a pump turbine test setup, a wind tunnel, and miscellaneous equipment. Additional bench space and a wave tank are planned.

Since the last general visit in 1999, there has been a limited amount of money available for equipment purchases. In most years, the BSCE Department has had approximately $5,000 for equipment repair and maintenance. Occasionally, additional special funds are available, with amounts of about $20–30k. Some equipment has been replaced or modernized. In nearly every year, most equipment requests have been honored, and several testing machines have been calibrated and repaired. In Spring 2005, $80k was made available to BSCE to repair old equipment and purchase new equipment. Those funds are currently being spent.

While new, modern equipment is always appreciated, our present laboratories are well equipped for the undergraduate instructional program. We have a modest but adequate replacement and repair budget (about $5,000 per year). We also make use of a large and well-equipped machine shop and an excellent technician staff to build many repairs and new equipment.

One consequence of our growing research program has been crowding of instructional laboratory space. The undergraduate laboratory program has not been compromised to date, but this crowding could be a future problem. We have requested a large-bay research facility that would accommodate many of our projects and alleviate some of the crowding.

We believe our present laboratory equipment setup is very good for the BSCE program. As mentioned earlier, an equipment repair and replacement fund allows us to keep up with most requests. If the BSCE program grows, we will add more sections and maintain the present section size. We do not see the need for greatly expanded undergraduate laboratory facilities at this time.

An ongoing concern is the continual updating and maintenance of computer hardware and software. The technicians group of CEM handles the maintenance and servicing of laboratory equipment. They are very capable, and their well-equipped shops are able to make most repairs and rebuilds. We occasionally contract out some testing, maintenance, and repair.

B. Computing Resources

BSCE design computer laboratory

The BSCE Department maintains a computer laboratory, referred to as the Design Laboratory. This lab is used by faculty and undergraduate students for teaching sessions for small groups, student groups working on team-oriented design projects, students using special purpose programs (structures, geotech, water resources, etc.) for a class throughout a semester, some general purpose use of the MS Office Suite and AutoCad for report preparation, and assignment completion. The room is equipped with six work stations, each with the following equipment (new in summer, 2005): Dell Optiplex GX280 SMT with Intel 4 Processor 530 (3.00 GHz, 1M, 800 MZ Int Broadcom GbNIC FSB); 1GB memory, 19-inch flat panel monitor, DVD R/W drives, 80 GB hard drive. All computers are linked to the campus network, the high speed Internet, and the following shared printer: Zerox Laser Printer, B/W, Model 5500.

The program has access to the CEM Engineering Computer Lab (Duckering 530 and 532). These labs used to be known as SOECAL (Students of Engineering Computer Applications Lab). Duckering 530 is configured in a teaching configuration with an instructor computer station, an LCD projector, whiteboard, and 26 student computer stations. Some engineering courses are scheduled in Duckering 530, including the sophomore level Computer Techniques course, and other courses use the computing lab for special lectures, such as when a particular software package is demonstrated. When the computing lab is not used for

a class, it is open to all engineering students. Duckering 532 is an open computer lab with 18 student computer stations. All stations in both labs are well equipped with engineering software including Matlab, Cadence, Advanced Design System, CAMWorks, SolidWorks, LabVIEW, as well as standard word processing and graphing software. Both rooms have 24-hour key card access. Security for the lab is provided by the key card activated door lock and a video surveillance system.

Computational resources in terms of hardware, software, and licenses are adequate. In addition to this lab, students and faculty have access to several campus wide laboratories and technologies such as:

- Assistive technology lab for disabled students in Whitaker Building Room 206. The lab has numerous specially equipped computers. Lab staff also helps students and faculty create websites accessible to the disabled.
- The Blackboard system that hosts online content for courses that is suitable for both synchronous and asynchronous teaching. Features of the system include ability to post teaching material in a variety of formats, testing, discussion boards, live whiteboard and chatroom, and course management tools.
- Three general computing labs, including the Bunnell Student Access Lab, the MBS Student Access Lab (24-hour, in a student dorm), and the Rasmuson Library Student Access Lab (24-hour).
- An instructional computing lab in the Rasmuson Library.
- Campus wide wireless access for laptops.
- Arctic Region Supercomputing Center (www.arsc.edu), though it is rarely used for teaching. Program faculty use it more for research; the required government security checks prior to getting an account make it very difficult to utilize in class.

C. Guidance

The College of Engineering and Mines provides computers and software to all faculty and staff. All of the faculty are adept at using computer-based tools to solve engineering problems within their disciplines. Faculty, in turn, pass this knowledge on to their students in class and through assignments.

UAF also has training and resources available through the Office of Information Technology.

D. Maintenance and Upgrading of Facilities

The laboratory needs of the program are regularly discussed in department faculty meetings. UAF annually accepts proposals for teaching facilities and equipment upgrade. If proposals are accepted, funds for the upgrade will be available from UAF. In addition, CEM and the BSCE program make funds available for teaching facility upgrade.

E. Library Services

The Rasmuson Library website, www.uaf.edu/library, provides detailed information about departments, services and collections within the Rasmuson Library, and also provides access to information through its online catalog (Goldmine). The entire system catalog can be searched by author, title, subject or other search method using library.uaf.edu/goldmine. This site can be accessed by students, faculty, and the public. Current journal subscriptions and e-journals licensed for UAF use are available through the Journal List web page, also accessed through the Library website.

Goldmine can be used to locate not only what is owned by the Rasmuson Library but also what is owned by all the sites in the University of Alaska statewide system. For example, the Interlibrary Loan page provides information on how to obtain books, photocopies, or audiovisual materials that are not available on campus from other library locations, how long it takes, renewals, general policies, Web Document Delivery, how to access an online request form and more. In addition, a wide variety of subject-specific databases is available in the Library via the Elmernet local area network (only searchable in the library), and via the Internet to UAF students, faculty, and staff. On-campus users may access all resources listed on the Library website from any campus public, office, or dorm room computer. Off-Campus use of licensed e-resources (with the exception of the "Databases for Alaskans" collection) is restricted to UAF faculty, students, and staff, and requires that UAF users login using their UAF computer ID and password.

The library currently subscribes to more than 130 electronic databases including online indexes, full-text journal article collections, e-books and encyclopedias. Some of the database searches available to UAF students, faculty, and staff are listed in the table at the end of this section. Additional resources are frequently added to the library website, including article indexes and collections, alphabetical or subject lists for the most current listings, as well as access to information resources available online.

As part of UAF's core curriculum, undergraduate students must demonstrate their library proficiency either by completing LS 101 (Library Information and Research) or by passing a competency exam. In LS 101, students learn about library research using the Internet, and about finding information in a variety of subject areas.

Additionally, librarians and library staff are available to assist students in using library resources and can give guidance on how to best locate research and information resources both in the library and beyond, regardless of format. Assistance can be provided by phone, email, and live chat with a librarian or library staff member.

The Rasmuson Library is the largest in the state, with more than 1.1 million volumes. Special collections include the world-class Alaska and Polar Regions collections, covering books, periodicals, archives, manuscripts, historical photographs, oral histories, and maps. A branch of the Rasmuson Library, the Biosciences Library on West Ridge, contains a substantial collection of books and journals. The Geophysical Institute operates the Mather Library to

support student, staff, and faculty research needs in the geophysical area. Services provided by the Rasmuson Library include:

- Carrels – Available for graduate students on a first-come/first-served basis.
- Circulation – Information about borrowing books and videos, overdue policies, and your library account.
- Conference and Meeting Rooms – Reserve rooms within the library.
- Digital Photographic Services – Professional digital imaging services available to the university community and to the public. Offers digital printing and high resolution scanning.
- Document Delivery – Request book chapters and paper journal articles be scanned and emailed to you as a .pdf file.
- Interlibrary Loan – Borrow material from other libraries.
- Instruction – Whether your student, faculty, or staff, we can show you how to use our resources.
- Media Services – Borrow media equipment such as digital cameras, camcorders, laptops, and more. Popular and reference DVDs and CDs are available for check out.
- Off-Campus Services – A unit set up to serve rural UAF students and faculty who do not have access to appropriate information resources in their town or village.
- Reference Services – Help with research.
- Reserves – Reading materials for specified classes.
- Room Scheduling – Reserve rooms for study sessions, group meetings, conferences, and teaching.

The Rasmuson Collection Development Officer periodically polls all faculty on campus on program needs for books and/or subscriptions. Here is her most recent email specifically to CEM:

Dear College of Engineering faculty and graduate students:

With Spring Semester almost over, I know most of you won't be thinking about library collections, but since we remain open and work through the summer months, it's a perfect time for us to acquire whatever books you might need for Fall Semester. We do have funds available for book purchases, and we are right now prioritizing our journal subscription requests as well, so if you have suggestions, please send them to me before you leave campus, if possible. I also welcome any assistance from faculty in weeding the older material out of our collections; we rely on your subject expertise to help us make these decisions.

I also wanted to fill you in on one of our latest acquisitions: the Earth and Environmental Sciences set of ebooks from Springer. These will be added to our Goldmine catalog shortly so that you can link directly, and will be hosted on the Springer platform which allows downloading to almost any device, as well as printing and simultaneous user access. This set has more than 1000 books, including multiple disciplines. If you want to glance through the title list here is the URL, choose Earth and Environmental:

http://www.springer.com/librarians/e-content/ebooks?SGWID=0-40791-12-377411-0

This book deal is good for all UA campuses; we hope to do more of these types of UA-

statewide purchases in the future, so that faculty and students at all campuses can benefit.

Finally, it has been a banner year for use of the EBL or electronic books system. Use has more than tripled since we began this project several years ago. If you haven't tried EBL books yet, or you'd like me to demonstrate it for a group or individually, I'm happy to do so.

Please let me know if you have any questions, and feel free to stop by any time to share suggestions or concerns. Have a great summer!

Karen Jensen
Collection Development Officer
Rasmuson Library
University of Alaska Fairbanks

The electronic UAF library catalog is called Goldmine (library.uaf.edu/goldmine), and is an easy-to-use resource for searches. Electronic Books Online (EBL) provides both short-term loans and auto-purchasing options for e-books, on all topics. Readers may view material online, download to a computer for a limited time, and copy or print a small amount of material from these e-books. A log-in is required from both on and off campus. The library director noted the incredibly fast transition to electronic materials from traditional print materials: *"We circulated 34,572 physical books in 2010 while EBL in its first full year of use circulated 33,411 book titles. When combined with the library's other [electronic] book collections – Safari, Psycbooks, Netlibrary, Springer, Elsevier, etc. – we expect to see that the use of digital titles now substantially surpasses the circulation of more typical library materials."*

Available databases include:

Table of Database Searches

Applied Science and Technology Abstracts FirstSearch Database	Engineering, mathematics, physics and computer technology.
ABI/INFORM Global ABI/INFORM Global Database	Indexing for articles in over 1,200 international business, management, and marketing journals, including many computer science representative trade journals. Beginning in 1970 with some full-text. Current search of "Computer Science" as subject yields 2,506 documents.
ACM Digital Library Core Package ACM Digital Library	Full text collection of every article published by ACM, including over 50 years of archives.
Computer Source EBSCOhost Database	Includes full-text and citations for current trends in high technology, covering topics such as computer science, programming, artificial intelligence, cybernetics, information systems, robotics, and software. Dates back to 1985.
Compendex® Engineering Village 2	Most comprehensive interdisciplinary engineering database in the world. Compendex contains over 8 million records and references over 5,000 international engineering sources including journal, conference, and trade publications. Coverage is from 1969 to present and the database is updated weekly.

IEEE All Societies Package IEEE Xplore	Includes access to abstracts and full-text of IEEE journals, transactions, and magazines published since 1998.
IEEE Core Proceedings IEEE Core Proceedings	Contains core collection of IEEE conferences from 1998 to present.
INSPEC ISI Web of Knowledge	Provides bibliographic information and some full-text from the world's leading scientific and technical literature, covering subjects such as physics, engineering, electronics, computers, and information technology. From 1969 to the present.
Institute of Physics (IOP) Online Journals IOP Journals Online	Access to a variety of full text journals in the area of physics, math, and engineering.
Kluwer Online springeronline.com	Full text journals, primarily in the sciences and social sciences, published by Kluwer Academic Publishers. Currently includes 96 Computer Science journals.
MathSciNet MathSciNet Database	Mathematical reviews on the Web. MathSciNet is a comprehensive database covering the world's mathematical literature since 1940.
NTIS CSA Internet Database Service	Produced by the National Technical Information Service, the NTIS database is the preeminent resource for accessing the latest U.S. government-sponsored research and worldwide scientific, technical, engineering, and business-related information.
Safari Tech Books Online safaribooksonline.com	An online library that provides full-text access to a current collection of 2,622 information technology books.
Science Citation Index Expanded and Web of Science Rasmuson Library-Article Indexes and Collections	Provides access to current and retrospective bibliographic information, author abstracts, and cited references found in the world's leading scholarly science and technical journals.
Science Direct Web Editions Sciencedirect.com	A current awareness service from Elsevier Publishing that provides full-text access to the current year journals in science, technology, and medicine that match UAF's print subscriptions.
Wiley Interscience Enhanced Access Wiley Interscience Home	Access to full text journals. Multidisciplinary coverage.

Overall, the library capabilities are quite adequate for the program.

F. Overall Comments on Facilities

Faculty and staff monitor the safety of facilities, tools, and equipment used to deliver the program. Additionally, the UAF Office of Environmental Health Safety and Risk Management and the Provost's Office have safety standards that must be followed for all university facilities and processes. One of the CEM technicians, Paul Brown, is the college safety officer; he examines CEM labs, facilities, and processes to ensure safety compliance. Egress placards are placed throughout the Duckering Building.

CEE has a full-time technician (a retired professional engineer) who oversees the laboratories. He is funded partly by the research institutes. The technician attends most faculty meetings and updates the faculty on the laboratories. The technician attends to any urgent safety matters immediately, and works with the faculty and teaching assistants on training and other long-term laboratory and safety issues.

UAF needs to identify means to add classrooms and offices for the College of Engineering and Mines. If the growth in enrollment continues for a few years, difficulty in the continuous improvement of all engineering education programs will certainly arise.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

The BSCE department is currently chaired by Professor David Barnes, who has been with the program for over 12 years.

The BSCE department chair is an elected 2-year position. Faculty Senate policy (www.uaf.edu/uafgov/faculty-senate/policies-procedures/department-chair-policy) defines the role of the department chair as follows:

a. The department chair is the administrative and academic officer of the department and as such has the primary responsibility and authority for: (1) leadership in developing high quality academic programs which fulfill department, college, and university objectives; (2) leadership in the implementation of college and university policies and programs at the department level; (3) leadership in developing resource requests and an appropriate departmental budget; and (4) service on the college/school executive committee.
b. The department chair is first a faculty member. The department chair is primarily a teacher-scholar serving as a leader of his/her department colleagues. The department chair is a role model for faculty responsibility.
c. The department chair is responsible for providing mechanisms and processes for members' participation in discussion and decision making within the department. All members of the department should be informed of these mechanisms and processes. Regular meetings should be held for purposes of communicating information, discussing issues, and making decisions on department matters.
d. The department chair is expected to communicate faculty perspectives and concerns to the administration and other segments of the community as appropriate. The department chair is the primary spokesperson the faculty of the department. The department chair will also convey administration views and concerns to the faculty.

The department chair is responsible, either directly or by delegation, for performance of at least the specific duties enumerated below (the duties are not prioritized) which shall be performed in accordance with the extant collective bargaining agreements on the role and status of department chairs.

A. Academic Programs

1. Initiate, plan, oversee implementation of, and review the preparation and offering of the academic program, after appropriate involvement of members of the department and consultation with the dean.
2. Ensure interdepartmental coordination and cooperation.
3. Take leading role in ensuring academic program quality.
4. Ensure reports are prepared as needed. Ensure that course schedule is prepared in a timely manner.
5. Ensure catalog is current.
6. Supervise departmental office and ensure that files and records are maintained.

7. Keep the dean informed of departmental and faculty activities. Act as a liaison with the University community.

B. Personnel

1. Coordinate and evaluate professional activities of all members of the department, to include providing guidance to faculty concerning expectations regarding promotion and tenure. Request and obtain faculty activity reports as appropriate to this process.
2. Provide recommendations for appointments, promotion, sabbatical leaves, tenure, and release of faculty after consultation with members of the department.
3. Review and recommend to dean/director workloads as proposed by faculty members.
4. Take lead role in departmental faculty and staff recruitment and retention.
5. Provide for the management and supervision of support staff.
6. Appoint appropriate committees within the department.
7. Facilitate support for faculty teaching, research and service activities.
8. Function as spokesperson and advocate for the department, both within and outside the University community.

C. Students

1. Administer the departmental student advisement program and counsel students.
2. Recruit students in cooperation with other members of the department and the dean.
3. Act on student petitions.
4. Provide for the management of student assistants.
5. Address student concerns as appropriate.

D. Budget, Inventory, Facilities, etc.

1. Initiate resource and budget requests with justifications.
2. Maintain fiscal control of departmental budgets.
3. Ensure upkeep of equipment and facilities assigned to the department

B. Program Budget and Financial Support

The dean determines the budget for the departments, given the funding allocated to the college. Starting with historical data, continuation budgets are developed for each department by adding budget increments, if applicable, to the budget levels from the previous fiscal year. Travel and equipment categories are not initially funded. Central funding for travel is distributed later to departments and awarded competitively to faculty from the CEM and INE travel programs. The equipment budget is funded centrally through a number of sources. These funds are distributed to departments toward the end of the fiscal year. Any equipment costing less than $5K is classified as a commodity. Student fees in computer labs and other labs are directed to the appropriate department and reinvested in the laboratories.

Table 8.B-1 details direct program expenditures over the past five years (not including expenditures from central college funds). It should be noted that additional equipment funding of approximately $130K was made available from central sources to the department during AY10-11 to upgrade the department's flume facility.

Table 8.B-1. Program Academic Year Expenditures

Budget Category	AY06-07	AY07-08	AY08-09	AY09-10	AY10-11	Total
Commodities	33,396	80,173	103,443	60,039	35,624	312,675
Contractual Services	38,246	31,873	60,989	55,133	53,410	239,649
Equipment	0	6,827	0	0	4,318	11,144
Salaries & Benefits	1,031,037	1,136,554	1,228,339	1,306,965	1,345,122	6,048,016
Travel	38,095	28,082	22,247	32,558	20,541	141,522

AY10-11 figures are to-date through of 6/13/2011

Base budget allocations for CEM are typically derived from the college's pro-rated share of the state allocation to UAF. The level of institutional support has been adequate to maintain current staffing levels.

The BSCE Department's budget has allowed for support of a limited amount of travel and faculty development activities. Newer faculty in the BSCE Department have been able to take advantage of NSF EPSCoR funding to provide for travel to conferences. Additional support is made available from the Dean's office for travel related to assessment. UAF also has a number of venues available for faculty to get funded for small (e.g., ~$5K) grants to develop research proposals, or to develop innovations to the curriculum.

Because of its location in Fairbanks, faculty do not normally get support from large industries that are largely absent from the area.

Institutional Support and Financial Resources: Engineering education and research are priorities of UAF. The UAF Academic Development Plan lists engineering as an "area of emphasis." Other areas of emphasis includes economic and workforce development and natural resources. Both of these areas are directly impacted by CEM programs and activities. In the first year of CEM's existence (AY04-05), the institution provided an increment for administrative support and a significant amount ($350,000) of one-time funding for equipment as well as an increment to meet increased costs of ABET visit preparation. Unrestricted funding for the entire college exceeds $11 million. A critically important aspect of the reorganization that created CEM is combining the Institute of Northern Engineering (INE) with the academic programs. INE was previously a research institute with no direct affiliation with instructional units on campus. INE is now the research arm of the college and

includes the Water and Environmental Resource Center, the Petroleum Development Laboratory, the Mineral Industry Research Laboratory, the Transportation Research Center, and the Alaska Center for Energy and Power. This year research expenditures will total about $24 million. A robust research component helps provide start-up funding for new faculty and travel funding and other support to promote faculty professional development. INE provides research related business office support for the entire college. This includes purchasing, human resource functions, recruitment assistance, personnel office functions, payroll, travel reimbursement, proposal writing and editing, budget preparation for proposals and academic programs, and fiscal monitoring. The Dean's office staff works closely with the business office to help provide some of these functions and to mutually support academic programs and program administrative assistants.

Budget priorities within the college are set by the college executive committee, which includes department chairs, the chief fiscal officer, the academic manager, the Dean, and representation from the research component of the college. The Dean makes final budget decisions, acting on advice from the executive committee. The Dean, academic manager, and executive officer meet with individual department chairs and administrative assistants to work out program budget details.

C. Staffing

Support Personnel: CEE has one full-time administrative assistant. This is consistent with other programs in the college. CEM support personnel consists of administrative assistants for each program/department (Geological Engineering and Mining Engineering share an administrative assistant), 1.5 Dean's office personnel, 6 business office personnel, and 3 engineering technicians. In addition, INE and WERC have 5 engineering technicians for research support. This is a very efficient group of individuals with a strong work ethic, and faculty have commented very favorably about the high level of support from and the responsiveness of the support personnel. These numbers do not include the Dean or the INE Director.

Institutional Services: Institutional services include the Faculty Development Office, Admissions Office, Registrar's Office, campus-wide and statewide Financial Services, the Human Resources office, statewide Labor Relations office, the Office of Sponsored Programs, the Division of Computing and Communications, the Rasmuson Library, the Center for Academic Technology, and Facilities Services, and the Advising Center to name a few. The Provost's office provides considerable assistance to instructional programs in many ways.

D. Faculty Hiring and Retention

The CEE faculty discuss needs for new faculty and reassignment of current faculty as part of the continuous improvement of the program or in the case of losses due to retirement or attrition. From 2006 to 2010, nine new faculty members were hired during the period. Six of

them were hired in 2006. With the exception of one departure, eight new faculty members remain with the program, demonstrating an excellent faculty retention rate.

The process of hiring a new faculty starts with a memo from the department chair requesting permission from the Provost (through the Dean) to hire. Once the permission is received, a committee is set up by the program faculty in consultation with the department chair and Dean. The committee develops the job description and follows university guidelines in the hiring process. Faculty searches, an integral part of the hiring process, are typically international.

As soon as the formalities are completed, the job is posted on UAKJobs, and formal ads are posted in ASCE Journal, and related ASCE publications and websites. The search committee may specify other journals as well. After achieving a certain pool of applicants or after a specified date (determined by the search committee) the candidates go through multiple screening stages such as a review of the resume and qualifications, a telephone interview, and on campus visits and reference checks. Near the end of the process, the committee makes a recommendation to the Dean in the form of a ranked list. Once the Dean's selection is made and approved by the Provost, an offer is made. Offered salaries typically conform with the Oklahoma State University salary survey.

Retention strategies for new faculty include targeted start up funds to enable the new faculty to develop a successful research program early in their UAF career. Additionally, lower teaching loads are offered in the first two years, along with reduced service workload. All new faculty are assigned, or may choose, a faculty mentor, typically in their department, to help assist with the transition to a demanding academic career. Faculty development opportunities, through CEM and INE travel grants and through the UAF Office of Faculty Development, are intended to help with retention. If a current faculty member has a formal or informal job offer from another employer, the Dean has the option of increasing the salary for the faculty member in the form of a "retention raise."

E. Support of Faculty Professional Development

Sabbaticals are governed by the Collective Bargaining Agreement between UAF and the faculty union. Tenured or tenure track unit members who have completed at least 5 consecutive years of service within the unit are eligible for consideration to take sabbatical leave during the 6th or subsequent year of service. However, faculty consult with the department chair prior to applying for sabbatical leave in order to help the department and the program plan for the absence. An application for sabbatical leave is ranked by the department chair, the CEM Peer Review Committee, the CEM Dean and awarded by the UAF Provost. Sabbatical leaves are granted for periods of one academic year at the rate of six months' salary or one semester at the rate of one semester's salary.

Professional development of faculty has been discussed in Criterion 6-D. As mentioned, faculty sponsor their professional development activities through a combination of competitively awarded CEM academic travel grants, external research grants, and sometimes through non-university sponsors. The college provides additional travel funding to the

departments, and faculty course buyouts have allowed the department to fund travel internally. Faculty have been able to undertake professional development activities, and have remained current, however there is no guaranteed funding to the college for this purpose.

PROGRAM CRITERIA

According to PROGRAM CRITERIA FOR CIVIL AND SIMILARLY NAMED ENGINEERING PROGRAMS found in ABET's *2011–2012 CRITERIA FOR ACCREDITING ENGINEERING PROGRAMS*, the UAF BSCE program needs to establish compliance with two criteria: Curriculum and Faculty.

Civil Program Curriculum Requirement

The criteria for the civil engineering program curriculum reads:

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

UAF BSCE Curriculum Content

Basic Science

The UAF BSCE program curriculum contains the following courses to satisfy the basic science requirement:

- Math 200X – Calculus I
- Math 201X – Calculus II
- Math 202X – Calculus III
- Math 302 – Differential Equations
- PHYS 211 – General Physics I (calculus-based)
- PHYS 212 – General Physics II (calculus-based)
- CHEM 105 – General Chemistry I
- CHEM 106 – General Chemistry II
- GE 261 – General Geology for Engineers

The choice of GE 261 as the additional basic science course in the curriculum is consistent with the program educational objectives in preparing graduates to develop careers in civil engineering, of which geology is an important subject.

Multi-Discipline Coverage

The UAF BSCE program curriculum contains courses in five specific areas of civil engineering:

- Structural Engineering
- Geotechnical Engineering

- Water Resource Engineering
- Environmental Engineering
- Transportation Engineering

In order to prepare students to work in any of the sub-disciplines of civil engineering, all students are required to take courses in each of five discipline areas: structures (CE 334, CE 431, and CE 432), geotechnical (CE 326), hydraulics (ES 341, CE 344), transportation (CE 302), and environmental (CE 341). Once students have completed these courses, they may then choose from a list of approved upper-division and graduate-level technical electives.

Experiment and Data analysis

The UAF BSCE courses applied to civil engineering experiments and data analysis include:

- ES101 – Introduction to Engineering
- ES 341 – Fluid Mechanics
- CE 334 – Properties of Materials
- CE 326 – Geotechnical Engineering
- CE341 – Environmental Engineering
- CE302 – Introduction to Transportation Engineering (i.e., field traffic counts and traffic software analysis)

These courses require students to perform experiments, design aspects of experiments, interpret data, and report results. Students are taught how to collect data, analyze data, and interpret data in order to draw conclusions and communicate their results through oral and written presentations. Reviewing course materials allows for an assessment of this component.

Design System, Component, and Process

Design activities/assignments are integrated into an introductory course (ES 101: Introduction to Engineering) and in five upper-division courses (CE 405: Highway Engineering, CE 422: Foundation Engineering, CE 432: Steel Design, CE 438: Design of Engineering Systems, and CE 341: Environmental Engineering), and into all approved BSCE technical elective courses. The culmination of the design experience is provided by CE 438, the capstone design course. This course involves a semester-long design project, which is obtained from clients outside the university. The content and format of the course is listed below.

CE 438: Design of Engineering Systems: The Capstone Design Course

CE 438 is designed to provide instruction on general topics and to have the students work together in interrelated teams to solve a real-world design problem with multiple constraints.

The topics frequently covered in the lecture portion of the class (normally taught by local practicing experts) include:

- Project delivery
- Project management

- Constructability considerations in design
- Legal considerations in design
- Safety consideration in design
- Ethics in design
- Working with regulatory agencies
- Professional registration and the business of engineering
- Public presentation.

The project is obtained from an external client by the course instructor(s), who acts as the principle engineer(s). Students are split into separate firms and must submit proposals to conduct the work. Projects that are multi-disciplinary civil engineering are sought so that the students can be arranged into sub-discipline teams that must interact to complete the design. Typical groups include cost estimating and specifications, environmental/safety/permitting, geotechnical, structural, etc. The class meets once a week in a staff meeting to discuss the progress of the project and to correlate efforts. Students normally submit weekly time and activity reports.

The typical project will require some scope definition by the students, with the client's input, as they identify and formulate the problem that needs to be solved. Often a rough order-of-magnitude feasibility study is conducted at the start of the semester to narrow down the design options. The results of the study are presented to the client who gives direction for the final part of the project.

At the end of the semester, the class makes a public presentation of the results. The clients, mentors, local engineering community, AB, alumni, and the general public are all invited to the presentation. Following the presentation, the client is presented with copies of the final reports produced by the sub-groups. Reactions to the format of the course have been very positive from both the students and the clients.

Management, Business, Public Policy, Leadership and Professional Licensure

Contemporary issues are discussed in many courses in the BSCE program, and students also attend seminars through the professional societies and student organizations. In addition, the course ESM 450 (Engineering Economics and Operations) is most directly related to all the required knowledge. The Catalog description of ESM 450 states:

> *Fundamentals of engineering economy, project scheduling, estimating, legal principles, professional ethnics and human relations.*

Civil Program Faculty Requirement

The criteria for civil engineering program faculty reads:

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

The qualification of BSCE faculty has been properly demonstrated in Criterion 6, which also establishes that multiple faculty members cover each specific sub-discipline:

- Transportation: Jenny Liu and Billy Connor
- Geotechnical: Xiong Zhang and Yuri Shur
- Hydraulic: Horacio Toniolo
- Environmental: David Barnes, Robert Perkins, and Silke Shiewer
- Structural: Leroy Hulsey, Andrew Metzger, and Yongtao Dong
- Construction/Project Management, Engineering/Science Management: Robert Perkins, and Keith Whitaker

APPENDICES

Appendix A – Course Syllabi

Part I, CEE Courses

1. **Course number and name**

   CE 112 – Elementary Surveying

2. **Credits and contact hours**

   3 credits with 2 contact hours plus a 3-hour lab per week

3. **Instructor's name**
   Dennis M. Filler

4. **Textbook title, author, and year**
   Elementary Surveying (2008) by Paul R. Wolf and Charles D. Ghilani, *12th Edition*, Pearson/Prentice Hall publishers, ISBN: 0-13-603100-5.

5. **Specific course information**
   a. **brief description of course content (catalog description)**
      Basic plane surveying: use of transit, level and total station. Traverses, public land system, horizontal and vertical curves, cross-sectioning and earthwork.

   b. **prerequisites or co-requisites**
      MATH F108 Trigonometry

   c. **required, elective, or selected elective course**
      Required

6. **Specific goals for the course**
   a. **specific outcomes of instruction**
      - Provide an overview of basic surveying for common engineering/construction projects.
      - Understand basic principles of plane surveying.
      - Identify and apply the basic parameters for the design of roadway circular curves and earthwork projects.
      - Hands-on experience with basic and modern surveying equipment.
      - Surveying proficiency exam.

   b. **specific ABET program outcomes addressed**
      Outcomes (a) (e), (g) and (k)

7. **Brief list of topics covered**
   a. Angles, azimuths and bearings
   b. Leveling and traversing
   c. Total station instrument, EDM, and angle measurements
   d. Areas and volumes
   e. Boundary surveys and public lands
   f. Mapping surveys

g. Horizontal and vertical curves
h. Construction surveys
i. Survey competition (proficiency exam)

1. **Course number and name**
   CE302 Introduction to Transportation Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Jenny Liu

4. **Text book, title, author, and year**
   F. Mannering, S. Washburn, and W. Kilareski. Principles of Highway Engineering and Traffic Analysis. 4th Edition. John Wiley & Sons, Inc.

   a. **other supplemental materials**
      Highway Capacity Manual (HCM2000) Transportation Research Board, National Research Council, Washington, D.C.
      Manual on Uniform Traffic Control Devices (MUTCD), Millennium Edition, Federal Highway Administration, U.S. Department of Transportation, Washington DC.

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      Introduction to multimodal transportation systems and the factors that influence the planning, design, and operation of the systems.
   b. **prerequisites or co-requisites**
      CE junior standing or permission of instructor
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Required

6. **Specific goals for the course**
   a. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - Understand the functions and properties of a multimodal transportation system
      - Understand the elements and actual tasks involved in transportation engineering
      - Understand the basic tools and methods for the planning, design, and operational analyses of transportation systems
      - Develop the ability to apply various tools and methods to solve problems related to the planning, design, and operation of transportation systems
      - Understand the principles and develop the ability to estimate costs and benefits of various transportation engineering projects
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (e), (g), (h), (i), and (j)

7. Brief list of topics to be covered

- Road vehicle performance
- Geometric design of highways
- Fundamentals of traffic flow
- Level of service concept
- Intersection and signal control characteristics
- Travel demand and traffic forecasting
- Pavement design

- **Course number and name**
  CE 326 Introduction to Geotechnical Engineering

- **Credits and contact hours**
  3 Credits with 5 contact hours per week

- **Instructor's or course coordinator's name**
  Xiong Zhang

- **Text book, title, author, and year**
  Braja Das. "Principle of Geotechnical Engineering," ISBN: 0534551440 (This is a required textbook)

  a. **other supplemental materials**

- **Specific course information**
  a. **brief description of the content of the course (catalog description)**
     This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; soil classification systems, basic soil properties, soil behavior when subjected to stresses and pore water pressures, and applications of basic principles to common practical problems of design and construction. Students will also learn basic soil laboratory testing techniques.
  b. **prerequisites or co-requisites**
     CE F334; ENGL F111X; ENGL F211X or F213X; ES F331; ES F341.
  c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
     Required course

- **Specific goals for the course**
  a. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
- The objectives of this course are to provide each student with a thorough understanding of main principles of Geotechnical Engineering. You are expected to understand and able to solve problems in following areas of the Geotechnical Engineering:
- Mechanical analysis of soil
- Physical, index, and engineering properties of soils and some methods of their measurement
- Classification of soil
- Soil compaction
- Soil permeability
- Movement of water through soil
- Stresses in soil

- Soil compressibility
- Shear strength of soil
- Examples of application of main principles to foundation design and evaluation of slope stability
- Frozen ground engineering (short overview).

    a. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
    b. (a) an ability to apply knowledge of mathematics, science, and engineering
    c. (b) an ability to design and conduct experiments, as well as to analyze and interpret dat
    d. (e) an ability to identify, formulate, and solve engineering problems
    e. (g) an ability to communicate effectively
    f. (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
    g. (i) a recognition of the need for, and an ability to engage in life-long learning
    h. (j) a knowledge of contemporary issues
    i. (k) an ability to use the techniques, skills, and modern engineering tools necessary for
    j. engineering practice.
    k. (l) knowledge of northern issues.

- **Brief list of topics to be covered**

    Lecture

    Introduction, Site Investigation
    Phase Relationships
    Compaction, Soil Improvement
    Grain Size, Grain Composition, and Atterberg Limits
    Soil Classification
    Total and effective stress concepts
    Hydraulic Conductivity
    Seepage
    Compression, Stress due to Load
    Consolidation
    Mohr Circle
    Shear Strength
    Slope stability
    Limit equilibrium and lateral earth pressure
    Laboratory Safety issues
    Sieve Analysis and Hydrometer Analysis
    Moisture content, Unit weight, and Compaction
    Atterberg Limits and Specific Gravity
    Visual Classification
    Hydraulic Conductivity
    Flow net
    Consolidation Test

1. **Course number and name**
   CE 334 Properties of Materials

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Jenny Liu

4. **Text book, title, author, and year**
   Materials for Civil and Construction Engineers, Mamlouk and Zaniewski, 3rd edition, 2009, Prentice Hall

   a. **other supplemental materials**
      The Science and Technology of Civil Engineering Materials, Young, Mindess, Gray, and Bentur, 1998, Prentice Hall
      Hot Mix Asphalt Materials, Mixture Design, and Construction, 3rd Edition, Roberts, Kandhal, Brown, Lee, and Kennedy, 2009, NAPA Education Foundation
      Concrete, Mindess, Young, and Darwin, 2003, Prentice Hall

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      General introduction of civil engineering materials. Material properties, mix design, engineering characterization and testing, and relation between microstructure and engineering properties. Aggregate, cement concrete, asphalt cement and mix, wood, and sustainable materials.
   b. **prerequisites or co-requisites**
      ES331 Mechanics of Materials
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Required

6. **Specific goals for the course**
   a. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      a. To develop a basic understanding of primary engineering material properties, performance requirements, and related test characteristics from analysis of laboratory test data, homework exercises, and classroom discussions
      b. To become familiar with selected material applications and associated materials specifications
      c. To gain confidence in testing program planning and execution through participation in the laboratory testing exercises
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (a), (b), (g), and (i)

7. **Brief list of topics to be covered**
    - Aggregate
    - Cement and concrete
    - Asphalt cement and concrete
    - Wood

1. **Course number and name**
   CE 341 Environmental Engineering

2. **Credits and contact hours**
   4 Credits with 3 contact hours per week and 3 hours laboratory

3. **Instructor's or course coordinator's name**
   Dennis Filler (most recent), Silke Schiewer and David L. Barnes (on a rotating schedule)

4. **Text book, title, author, and year**
   Nazaroff, W.M. and L. Alvarez-Cohen. 2001. *Environmental Engineering Science*. John Wiley and Sons, Inc: 690p

   b. **other supplemental materials**
   Varies handouts

5. **Specific course information**
   d. **brief description of the content of the course (catalog description)**
   Fundamentals of environmental engineering including theory and application of water and wastewater, solid waste and air quality engineering practice; emphasis on natural processes that influence pollutant fate and use of these processes are used in engineered systems for pollution control.
   e. **prerequisites**
   Prerequisite: CHEM 106 General Chemistry II, ES 341 Fluid Mechanics
   f. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**

Required

6. **Specific goals for the course**

- **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
  - To understand the fundamental principles of environmental engineering.
  - To apply fundamental principles to solve environmental engineering problems.
  - To understand select fundamental principles through laboratory experimentation.

- **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

Outcomes (a), (b), (e), (f), (g), (l)

7. **Brief list of topics to be covered**
   - Water, Air, and Their Impurities
   - Transformation Processes
   - Transport
   - Reactor Models

- Water Quality Engineering
- Air Quality Engineering
- Solid and Hazardous Waste Management

1. **Course number and name**
   CE 344 Water Resources Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Horacio Toniolo

4. **Text book, title, author, and year**
   Wurbs, R.A. and James, W.P. 2002. *Water Resources Engineering.* Prentice Hall
   b. **other supplemental materials**
      Varies handouts

5. **Specific course information**
   d. **brief description of the content of the course (catalog description)**
      Fundamentals of engineering hydrology and hydraulic engineering. Water cycle and water balance, precipitation, evaporation, runoff, statistical methods, flood control, open channels and groundwater.
   e. **prerequisites**
      ES 341.
   a. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Required

6. **Specific goals for the course**
   c. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      d. a) Understand the hydrologic cycle and each of its primary components.
      e. b) Develop the ability to estimate the magnitude of the hydrological processes.
      f. c) Acquire a basic understanding of open channel hydraulics, uniform flow, critical depth and gradually varied flow.
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      (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
      (e) an ability to identify, formulate, and solve engineering problems
      (g) an ability to communicate effectively
      (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

7. **Brief list of topics to be covered**

- Hydrologic cycle
- Review of Fluid Mechanics
- Hydraulics of pipelines and pipe networks
- Open channel hydraulics

- Open channel hydraulics
- Flood routing
- Hydrologic frequency analysis
- Watershed hydrology
- Groundwater

1. **Course number and name**
   CE 406 Traffic Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Ming S. Lee

4. **Text book, title, author, and year**
   Garber, N.J. and Hoel, L.A., *Traffic and Highway Engineering*, 4th edition, Cengage Learning

   a. **other supplemental materials**
      Highway Capacity Manual (HCM2000) Transportation Research Board, National Research Council, Washington, D.C.
      Manual on Uniform Traffic Control Devices (MUTCD), Millennium Edition, Federal Highway Administration, U.S. Department of Transportation, Washington DC.

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      Operation and control of transportation systems with emphasis on traffic on highways and streets. Traffic control devices, data collection, capacity and level of service analysis, intersection signalization, traffic impact analysis, accident analysis and other safety considerations.
   b. **prerequisites or co-requisites**
      Co-requisite: CE 302 Introduction to Transportation Engineering
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Technical elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - To understand the role of traffic engineering in the planning, design, and maintenance of roadway networks and traffic control devices
      - To learn the basic principles of traffic engineering and operations
      - To learn and use capacity analysis procedures and software
      - Understand the basics of highway engineering and transportation planning.

   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (a), (b), (d), (e), (f), (g), (i), (j), and (k)

7. **Brief list of topics to be covered**
    - Highway Functional Classes
    - Traffic Flow
    - Highway Capacity Manual
    - Manual of Uniform Traffic Control Devices
    - Intersection Traffic Controls

1. **Course number and name**
   CE 405 Highway Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Ming Lee

4. **Text book, title, author, and year**
   A Policy on Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, 2004, Washington, DC
   c. **other supplemental materials**
      Recommended: Schoon, J.G., *Geometric Design Projects for Highways: An Introduction*, 2nd Edition, ASCE Press, and *Roadside Design Guide*, 3rd Edition, 2006, Association of State Highway and Transportation Officials, 2004, Washington, DC
5. **Specific course information**
   f. **brief description of the content of the course (catalog description)**
   g. Design of geometric elements of highways and streets with emphasis on safety and efficiency. Roadway functional classification, design controls, vertical and horizontal alignments, cross sections, interchanges and intersections.
   h. **Prerequisites**
      CE 302
   i. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Selected elective

6. **Specific goals for the course**
   g. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - Identify and characterize the key attributes of the vehicles, drivers and roadway systems that affect roadway geometric design.
      - Describe highway design objectives, constraints, control factors and criteria.
      - Identify the basic parameters and constraints for the design of rural and urban alignment, cross section and intersections and apply them in an actual design project.
      - Explore how design decisions affect roadway safety.
      - Develop basic skills for using computer-aided design software.
   h. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

(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 constrains such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability,
(d) an ability to function on multi-disciplinary 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 social context,
(i) a recognition of the need for, and an ability to engage in, life-long learning,
(j) a knowledge of contemporary issues, and
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice, and
(l) northern issues

In order to complete this course, students are required to learn, develop, and ultimately demonstrate these knowledge, skills and abilities within the context of this course.

7. Brief list of topics to be covered

Highway functions
Design controls and criteria
Elements of design – Sight distance
Elements of design – Horizontal alignment
Elements of design – Vertical alignment
Elements of design – Other elements affecting design
Cross section elements
Drainage
Intersections

1. **Course number and name**
   CE 433 Reinforced Concrete Design

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Andrew T. Metzger

4. **Text book, title, author, and year**

   Reinforced Concrete: A Fundamental Approach. Nawy, Edward G. Pearson Prentice Hall. Upper Saddle River, NJ. 5th ed. 2005

   Building Code Requirements for Structural Concrete and Commentary; ACI 318-08. American Concrete Institute, Farmington Hill, MI. 2008

   b. **other supplemental materials**
   none

5. **Specific course information**

   d. **brief description of the content of the course (catalog description)**
   Behavior of reinforced concrete members. Design philosophies and current practices. Flexural members, to include: rectangular, T-beams and one-way slabs. Crack control, anchorage, development lengths and deflections. Axially loaded members. Current ACI 318 Code used. Special fees apply.

   e. **prerequisites or co-requisites**
   Prerequisite: CE F331; ES F331

   f. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
   Technical elective

6. **Specific goals for the course**

   c. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
   - The student will understand the LRFD design philosophy
   - The student will have a basic understanding of concrete, as a building material
   - The student will be able to specify concrete mix design
   - The student will understand, and be able to explain, reinforced concrete design theory based on strain compatibility
   - The student will understand how to design flexural (beams) and compression (columns) elements of a reinforced concrete structure.

   d. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
   Outcomes (a), (c), (e)

7. Brief list of topics to be covered

- Concrete
  - What is concrete?
  - Concrete constituents
  - Concrete testing standards
  - Concrete mix design
- Design Criteria/ Building Codes
- Loads and Load Combinations
- Reinforcing Steel
  - Types of Reinforcing Steel
  - Reinforcing Details
  - Min reinforcement for Temperature, Shrinkage and Crack Control
  - Development Length
  - Splices
- Beam Design – bending
- Beam Design – shear
- Beam Design – torsion
- Beam Design – serviceability
- Beam Design – deep beams
- Concrete Slab Design
- Designing for Combined Compression and Bending
- Reinforcement detailing
- Seismic Design
- Design of Concrete Footings
- AASHTO Concrete Bridge Design (time permitting)

1. **Course number and name**
   CE 438Design of Engineered Systems

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Keith P. Whitaker

4. **Text book, title, author, and year**
   No course textbook
   a. **other supplemental materials**
      - In class handouts
      - Online Materials, www.graduate-certificate.com, select class in lower right corner, Username: senior Password: design.

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      System of design principles for large-scale constructed facilities.
      Application of ethics, liability and legal principles to professional practice.
      Emphasis on teamwork and leadership.
   b. **prerequisites or co-requisites**
      Prerequisites: COMM 131 or COMM141; ENGL111; ENGL 211; or ENGL 213; CE 405 or CE 422 or CE 432 or CE 433 or CE434 or CE 405; last year of civil engineering B.S. program
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Required

6. **Specific goals for the course**
   a. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - Students will have the experience of designing a system of engineered components to solve a particular engineering problem with multiple real world constraints.
      - Students will be able to identify the engineering problem to solve.
      - Students will be able to identify steps required to design a project including data gathering, working with owners and others, and budgeting and scheduling.
      - Students will be able to communicate the design via drawings and specifications

   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (c), (d), (e), (g), (i), and (k)

7. **Brief list of topics to be covered**
    a. Working in Team Environments
    b. Obtaining and Defining Projects
    c. Design Cost Estimates
    d. Determination of Design Criteria
    e. Identification of Applicable Codes and Standards
    f. Concept or Schematic Design
    g. Construction Cost Estimating
    h. Preliminary and Final Design
    i. Specifications

1. **Course number and name**
   CE 442 Environmental Engineering Design

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   David L. Barnes

4. **Text book, title, author, and year**
   Davis, M.L. 2011. *Water and Wastewater Engineering: Design Principals and Practice*. McGraw Hill Book Company: 928p

   c. **other supplemental materials**
      Water Treatment Plant Design, Third Edition, American Water Works Association and American Society of Civil Engineers,
      Cold Regions Utilities Monograph, Third Edition, American Society of Civil Engineers

5. **Specific course information**
   g. **brief description of the content of the course (catalog description)**
      Design of pollution control and remediation systems. Theories and principles for the design of engineering systems for environmental protection, management and control. Water and wastewater treatment and solid waste management.
   h. **prerequisites**
      Prerequisite: CE 341 Environmental Engineering
   i. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Technical elective

6. **Specific goals for the course**
   e. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - To understand the fundamental principles that govern the design of unit operations in water and wastewater treatment facilities and municipal solid waste landfills.
      - To use the fundamental principles to size select unit operations used in water and wastewater treatment.
      - To understand how select water and wastewater treatment unit operations are designed for cold regions.

   f. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (a), (c), (e), (g), (i), (g), (i), (k), and (l)

7. **Brief list of topics to be covered**
    - General water supply design considerations
    - Water supply considerations in cold regons
    - Coagulation and flocculation
    - Sedimentation
    - Granular Filtration
    - General wastewater collection and treatment design considerations
    - Biological treatment processes
    - Small flows wastewater treatment in cold regions
    - Introduction to landfill design

1. **Course number and name**
   CE 445 Hydrologic Analysis and Design

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Horacio Toniolo

4. **Text book, title, author, and year**
   Haestad Methods, (Seventh Edition). *Computer Applications in Hydraulic Engineering*
   - **d. other supplemental materials**
     Varies handouts

5. **Specific course information**
   - **j. brief description of the content of the course (catalog description)**
     Precipitation, snow cover and evaporation analysis; groundwater hydraulics; runoff analysis and prediction; statistical hydrology; application of simulation models. Design of structures such as culverts, reservoirs, wells, pumps and pipe networks.
   - **k. prerequisites**
     CE 344.
   - **c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
     Elective

6. **Specific goals for the course**
   - **g. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
     Introduce the students to a suite of available computer programs for use in the solution of water resource problems. Understand basic concepts involved in designing:
     a) culverts
     b) pipes and pipe networks
     c) spillways
     d) reservoirs
   - **d. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
     (a) an ability to apply knowledge of mathematics, science, and engineering
     (e) an ability to identify, formulate, and solve engineering problems
     (g) an ability to communicate effectively
     (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

7. Brief list of topics to be covered

Introduction
Open channel flow
Open Channel flow – Flowmaster
Flowmaster - Stormcad
Culvert design - Culvertmaster
Culvertmaster
Pondpack
Spillway
Spillway - Pipe system design
Pipe system design
River engineering
Reservoir sedimentation

1. **Course number and name**
   CE331 Structural Engineering 1

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   J. Leroy Hulsey, and others.

4. **Text book, title, author, and year**
   Structural Analysis 4th Edition, Jack McCormac; John Wiley & Sons, Inc.; ISBN 13 978-0470-03608-2; 2007.

   e. **other supplemental materials**
      Varies handouts

5. **Specific course information**
   l. **brief description of the content of the course (catalog description)**
      Analysis of statically determinate and indeterminate structures to include beams, trusses and frames. Internal force resultants, shear and moment diagrams, deflections, internal stresses. Influence lines and criteria for moving loads. Indeterminate analysis to include methods of consistent deflections, slope deflection and moment distribution. Introduction to matrix methods. Special fees apply.
   m. **Prerequisites**
      ES 331
   e. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Required

6. **Specific goals for the course**
   h. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      The objective of this course is to provide each student with a thorough understanding of the theory and application of structural analysis. Emphasis will be placed on developing the ability to analyze problems. At the conclusion of this course, students are expected to understand the following:
      - equilibrium
      - reactions
      - shear and moment diagrams for beams and frames
      - truss analysis
      - deflections of trusses, beams and frames
      - influence lines
      - indeterminate structures
   a. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

Outcome (a)

7. Brief list of topics to be covered

Stability & Determinacy
Reactions
Beams, Trusses, & Frames
Truss Analysis
Shear & Moment Diagrams
    Beams, & Frames
Influence Lines & Maximum Loadings-
    Beams, & Trusses
Beam Deflections-
    Differential Equation Methods.
    Moment Area & conjugate beam methods
    Virtual Work Method
Frame Deflections-
    Moment Area Method
    Virtual Work Method
Truss Deflections-
    Virtual Work Method
Flexibility-
    Superposition for beams, frames, & trusses-
    Moment Area, Conjugate beam, Virtual Work
Stiffness-
    Slope deflection method
    Moment Distribution Method
Matrix Methods

1. **Course number and name**
   CE435 Bridge Design & Construction

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   J. Leroy Hulsey

4. **Text book, title, author, and year**
   None.
   f. **other supplemental materials**
      Notes are prepared and distributed to the students
5. **Specific course information**
   n. **brief description of the content of the course (catalog description)**
      Design-build technology for bridge structures is introduced. A bridge system is developed for a given crossing with predetermined specifications. Alternate designs are developed. These alternatives are based on design calculations, prepared drawings and suitability. Design ideas are developed and tested to verify if the idea meets the design assumptions. Techniques in design, fabrication, fund raising, project management, fiscal responsibility, safety, public speaking and teamwork are learned and used during the semester. The final structure will be load tested and graded based on meeting the goals of the specification.
      Prerequisites
      CE 431 and CE 432
   f. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Selected elective

6. **Specific goals for the course**
   i. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      It will be the purpose of this course to acquaint students with design-build technology for bridge structures. Also, students are expected to provide design calculations, prepare drawings, and build a bridge in accordance with pre-determined specifications. This structure will be load tested and graded based on meeting the goals of the specifications. After completion of the course, the student should be able to design structural steel members to prevent failure; and to conduct laboratory experiments and to critically analyze and interpret data
   j. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      (a) an ability to apply knowledge of mathematics, science, and engineering
      (b) an ability to design and conduct experiments, as well as analyze and interpret data
      (c) an ability to design a system, component, or process to meet desired needs
      (e) an ability to identify, formulate, and solve engineering problems
      (f) an ability to communicate effectively

(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.

7. Brief list of topics to be covered

I. Introduction into bridge design

° Basic Principles
° Categories of Bridges
° Types of Bridges

II. Bridge Design loads for:

° Highway bridges
° Railroads
° Pedestrian

III. Sample bridge design for a highway structure (static analysis)-

° superstructure
a) beams and slab
° substructure
a) piers and abutments

IV. Construction

° Time, management and contracts

V. Fabrication & suppliers

1. **Course number and name**
   CE432 - STRUCTURAL STEEL DESIGN

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   J. Leroy Hulsey

4. **Text book, title, author, and year**
   Steel Structures: Behavior & LRFD by S. Vinnaklota by McGraw Hill
   Steel Construction Manual LRFD; AISC
   g. **other supplemental materials**
5. **Specific course information**
   o. **brief description of the content of the course (catalog description)**
   Design philosophies and current practice related to steel design are covered. Describes how the understanding modes of failure are used to design structural members with an appropriate factor of safety to satisfy strength and serviceability (performance). Tension members, fasteners, welds, column buckling, beam behavior and beam-columns will be discussed. The current AISC specifications are used. Special fees apply. Prerequisites: CE.
   p. **Prerequisites**
   CE 331; ES F331
   q. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
   Required

6. **Specific goals for the course**
   k. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
   Become familiar with the LRFD version of the Manual for Steel Construction (3rd edition)
   Understand how tension members might fail under load.
   Understand failure types and factors of safety
   Analyze and/or design tension members.
   Understand fasteners and how they are sized.
   Understand welds and how they are sized
   Column Buckling
   Beam behavior
   Beam-columns
   l. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
   (a) an ability to apply knowledge of mathematics, science, and engineering

7. Brief list of topics to be covered

AISC-LRFD Method

- Tension Members
  - Investigation
  - Design
- Fasteners
  - Bolts, rivets
- Fasteners
- Rivets, Welded
- Columns (Axial compression)
- Flexural Members(inv, design)
- Beam-columns
- Miscellaneous

1. **Course number and name**
   CE 451 Construction Cost Estimating and Bid Preparation

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Andrew T. Metzger

4. **Text book, title, author, and year**
   Estimating in Building Construction, 6th ed. (2003). Frank R. Dagostino, Leslie Feigenbaum. Prentice Hall.

   a. **other supplemental materials**
      Successful Estimating Methods…from Concept to Bid. (1992). Bledsoe, John D.. RS Means Construction Consultants and Publishers, 100 Construction Plaza, Kingston, MA 02364-0800

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      Compilation and analysis of the many items that influence and contribute to the cost of projects to be constructed. Preparation of cost proposals and study of bidding procedures.
   b. **prerequisites or co-requisites**
      Prerequisite: College math
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Technical elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - The student will be familiar with construction cost estimating procedures
      - The student will be able to explain the various construction costs and demonstrate how to estimate them
      - The student will be able to explain the role of Sub-contractors and their relationships to the General Contractor
      - The student will be familiar with a procedure for developing a bid proposal
      - The student will be able to explain the function of each type of bid document and its role in the construction bid and/or construction contract
      - The student will be able to explain and compare/contrast ethics in proposal development for Federal/ State vs. Private construction projects
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
      Outcomes (d), (f), (h)

7. Brief list of topics to be covered

- Contracts
- Construction Documents
- Planning the Estimate
- Overhead, Labor, Equipment
- Cost Data Sources/ Methods
- Ballpark Estimates
- Square foot Estimates
- Detailed Estimates
    - Excavation
    - Concrete
    - Masonry
    - Metals
    - Wood
    - Electrical
    - HVAC, Plumbing
- Estimating for Public Works and Heavy Construction
- Uncertainty in Estimating
- Estimating for Change Orders, Claims and Litigation
- Legal and Ethical aspects of Federal/ State projects vs. privately funded projects

1. **Course number and name**
   CE 422 Foundation Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Varies

4. **Text book, title, author, and year**
   Coduto, Donald P. (2001). *Foundation Design: Principles and Practices*, 2nd Edition, Prentice Hall (ISBN: 0-13-589706-8)**other supplemental materials**

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
   Bearing capacity of soils and effects of settlements on structure. Design of footings and rafts, pile and pier foundations, retaining walls and anchored bulkheads. Foundations on frozen soils and construction problems in foundation engineering. An introduction to slope stability analysis.
   b. **Prerequisites**
   ES 301, CE 326
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
   Selected elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
   In this course, we will apply the basic principles of soil mechanics to analyze and design foundations for supporting structural loads. The design of shallow and deep foundations will be studied in terms of both ultimate load capacity and movements under load.
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
   (a) an ability to apply knowledge of mathematics, science, and engineering, and
   - Be able to design foundations that are technically feasible and economically viable.
   - Be able to synthesize engineering analyses into a sound design solution.
   - Be able to serve as a constructive, cooperative and productive member of a multidisciplinary project team.
   - Be able to articulate and justify technical analyses through oral, written and graphical means.

- Be familiar with professional and ethical codes of conduct for civil engineers.
- Appreciate the constantly evolving nature of civil engineering design and practice.

7. Brief list of topics to be covered

- Geotechnical site investigations.
- Bearing capacity of shallow foundations.
- Settlement of shallow foundations.
- Deep foundations.
- Foundations on difficult soils.

1. **Course number and name**
   CE- 493 Introduction To Permafrost Engineering

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Yuri Shur

4. **Text book, title, author, and year**
   Instructor's notes
   a. **other supplemental materials**
   Recommended: Johnson, GH (edit), 1981 Permafrost engineering design and construction. French, HM. Periglacial environment, and Pewe, TL Geologic hazards of the Fairbanks area.

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
      The objectives of this course are to provide students with a thorough understanding of permafrost properties, permafrost related hazards, and permafrost engineering design and construction.
   b. **Prerequisites**
      CCE 326, CE 422 recommended
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
      Selected elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
   The objectives of this course are to provide students with a thorough understanding of permafrost properties, permafrost related hazards, and permafrost engineering design and construction.
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
   This course helps students meet outcomes:
   (a) an ability to apply knowledge of mathematics, science, and engineering
   (e) an ability to identify, formulate, and solve engineering problems
   (g) an ability to communicate effectively
   (h) the broad education necessary to understand the impact of engineering solutions in a global 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.
   (l) an appreciation of significant engineering issues in the North

7. Brief list of topics to be covered

- Frozen ground
- Permafrost
- Active layer
- Types of permafrost, permafrost distribution
- Permafrost origin
- Terrain characteristics
- Ground ice
- Site and route studies
- Elements of thermal analysis
- Permafrost related hazards
- Thermal and mechanical properties of frozen and thawing soils
- Foundations
- Pipelines
- Roads and airfields

1. **Course number and name**
   CE 434 Timber Design

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Varies, usually an adjunct.

4. **Text book, title, author, and year**

- Breyer, D.; Fridley, K.; Cobeen, K.; & Pollock, D. *Design of Wood Structures ASD/LRFD, Sixth Edition*, 2007, McGraw Hill, New York, NY. ISBN-13:978-0-07-145539-8.
- American Forest and Paper Association, 2006. *2005 NDS & Wood Design Package*. American Wood Council, 4-Volume Set ISBN-0-9625985-8-5 is available from http://www.awc.org/Standards/nds.html

(a) **other supplemental materials**
Recommended download. ASCE Standard ASCE/SEI 7-05, 2006. Minimum Design Loads for Buildings and Other Structures. American Society of Civil Engineers. ISBN-0-7844-0809-2: available from http://pubs.asce.org/books/standards/

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**
   Design loads. Building systems and loading path. Physical and mechanical properties of wood. Design values and adjustment factors. Design of axial members, beams and columns. Connection details. Design of wood frame structures. Current National Design Specifications (NDS) for Wood Construction used.
   b. **Prerequisites**
   CE 331, ES 331
   c. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
   Selected elective

6. **Specific goals for the course**
   a. **Specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
   This class is designed to be a first-course in the design of timber structural components and assemblies as used in building construction. General design philosophy as well as building components and load paths will be discussed. Concepts surrounding wood as a building material will be explored. The design of elementary building components using dimensioned and engineered lumber will be studied. Means of connecting timber elements and assemblies will also be studied.
   b. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**

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

7. Brief list of topics to be covered

LRFD Design Criteria/ Building Codes
Loads and Load Combinations
Parts of a load-bearing-wall building; Load paths
Wood
- What is wood?
- Species of Wood/ Availability
- Properties of wood
- Wood as a building material
- Dimensioned Lumber (Sawn Lumber)

Beam Design
Column/ Beam-Column Design
Connections
Built-up members
Engineered Lumber
Glued-Laminated-Beams (GLB)
Engineered wood products
- Plywood
- Assemblies
  - Diaphragms

Shear walls
Connections
Dynamic Loading
Wind & Seismic loads

1. **Course number and name**
   CE 603 ARCTIC ENGINEERING

2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   John P. Zarling

4. **Text book, title, author, and year**
   Building in the North, 3d ed., Eb Rice, 1984
   b. other supplemental materials
   Handouts from guest instructors.
5. **Specific course information**
   d. brief description of the content of the course (catalog description)
   Application of engineering fundamentals to problems of advancing civilization to Polar Regions. Logistics, foundations on frozen ground, snow and ice, thermal aspects of structures, materials, transportation and communications, and heating and ventilating.
   e. Prerequisites
   Senior standing or B.S. degree in engineering
   f. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program
   Selected elective

6. **Specific goals for the course**
   c. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.
   Student will understand scientific and technical principles of northern engineering so be able to apply them in the design and construction of facilities in cold regions.
   d. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
   (a) an ability to apply knowledge of mathematics, science, and engineering
   (i) Northern engineering

7. **Brief list of topics to be covered**

   Permafrost
   Siting and foundations
   Walls, windows, doors, and floors
   Heating
   Vapor barriers
   Water supply
   Waste management

Part II, Required Courses Taught in CEM

1. **ES 101 – Introduction to Engineering**

2. 3 credits, Lecture: MW 10:30am – 11:30am; Lab: W, R, or F: 2:15pm – 4:15pm

3. Instructor: Charlie Mayer (ECE), Jonah Lee (ME), Keith Whitaker (CE)

4. Raymond B. Landis. Studying Engineering: A Road Map to a Rewarding Career, 3rd edition, Discovery Press, 2007.
    a. Other handouts will be provided.

5. Specific course information
    a. Catalog description: Overview of the engineering profession and introduction to the fields of engineering. Basic concepts from engineering, physics and mathematics applied to engineering problem solving. Basic skills required of engineers, including an introduction to engineering communications: word processing, descriptive geometry, orthographic and isometric drawings, graphs, computer graphics and use of spreadsheets.
    b. Prerequisite: MATH 107X; Co-requisite: MATH 108 or calculus placement.
    c. Required course

6. Specific goals for the course
    a. The goals of this course include introducing the field of engineering to the students, including engineering concepts, language, problem solving, reporting, laboratory work, etc. Additionally, students will form 3-4 person teams to design, build and launch water rockets. They will learn about design concepts such as scoping (or brainstorming), alternative and final selection, building (or constructing), competition, lessons learned, and reporting. They will have opportunity to launch their water rockets at a contest in early April. This project is designed to enhance the introductory engineering experience, learn about teamwork, and for students to have fun.
    b. This course helps students meet student outcomes:
        (a) an ability to apply knowledge of mathematics, science, and engineering
        (d) an ability to function on multi-disciplinary teams
        (f) an understanding of professional and ethical responsibility
        (g) an ability to communicate effectively
        (i) a recognition of the need for, and an ability to engage in life-long learning
        (j) a knowledge of contemporary issues
        (l) an appreciation of significant engineering issues in the North

7. Brief list of topics to be covered

    a. Electrical Engineering
        1. Circuits: voltage, current, resistance, power, voltage divider, current divider, Kirchoff's current law

2. Computers: architecture, Boolean logic, gates, combinational logic, number systems, add and multiply
3. Power: efficiency, battery capacity, energy
4. Communications: analog and digital, internet

b. Mechanical Engineering
   i. Aerodynamics
   ii. Power cycles
   iii. Stress/Strain analysis
   iv. Vibrations

c. Civil Engineering
   i. Overview
   ii. Geotechnical
   iii. Structures
   iv. Environmental and water resources
   v. Arctic

1) **ES 201 – Computer Techniques**

2) 3 Credits, Lecture: MW 10:30 – 11:30 am, Lab: M 2:15 – 5:15 pm

3) Instructor: H. Ed Bargar

4) No text.
   a) Class Web site located at: http://medept.engr.uaf.edu

5) Specific course information
   a) Catalog Description: Basic computer programming, in C/C++, with applications from all fields of engineering. Introduction to MATLAB.
   b) Prerequisite: MATH 107X & MATH 108 or Co-requisite: MATH 200X.
   c) Required Course.

6) Specific Goals for the course:
   a) Develop a basic understanding of how computers work with and store information. Concepts of structured programming, which can be applied in many programming languages, are taught using the C++ language. These concepts and more advanced constructs are further developed using the Matlab programming/user environment. Upon completion of this course, the student should be: familiar with how computers utilize memory and file storage and the difference between an interpreted and compiled computer language; able to properly implement the three primary programming structures: sequential, selective, and repetitive; understand how to organize programs into functions for efficient use/re-use and be able to write functions that call other functions; able to design and write computer programs to solve engineering problems.
   b) This course helps students meet outcomes:
      a An ability to apply knowledge of mathematics, science, and engineering.
      e An ability to identify, formulate, and solve engineering problems.
      i A recognition of the need for, and an ability to engage in life-long learning.
      k An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

7) Brief list of topics covered.
   a) Basics of computer memory and file organizations and workings.
   b) The C++ computer programming language and the basics of all structured computer programming languages.
   c) The Sequential Structure in C++ programming.
   d) Selective Structures in C++ programming.
   e) Repetitive Structures in C++ programming.
   f) Task-specific functions and program organization in C++ programs.
   g) File I/O (input/output) using C++.
   h) The Matlab computer operating/programming environment.
   i) Interactive operations using the Matlab environment.
   j) Programming functions in Matlab.
   k) Selective Structures in Matlab.

l) Repetitive Structures in Matlab.
m) File I/O in Matlab programs and interactively from the User Interface.

1. **ES 301 –Engineering Analysis**

2. 3 credits, Lecture: MWF 9:15am – 10:15am, no lab hour.

4. Instructor: Cheng-fu Chen (ME)

8. Numerical Methods for Engineers, Steven C. Chapra & Raymond P. Canale, 6th.edition, McGraw Hill, 2010.
   b. Lecture slides are posted on Blackboard. 20+ numerical functions implemented by the instructor are also uploaded online for students learning.

9. Specific course information
   a. Catalog description: Application of mathematical tools to typical engineering design problems. Selected topics from all fields of engineering.
   b. Prerequisite: ES 201 and MATH 302.
   c. Required course

10. Specific goals for the course
    a. To introduce fundamental numerical methods and numerical skills of using Matlab (which is not required in this class) to process, analyze, and solve engineering problems of the topics listed in Item 7 below.
    b. This course helps students meet student outcomes:
       (a) an ability to apply knowledge of mathematics, science, and engineering.
       (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

11. Brief list of topics to be covered

    Introduction to error analysis, modeling, and precision.
    Searching methods for finding roots
    Numerical linear algebra
    Optimization
    Curve fitting
    Numerical differentiation
    Numerical integration
    Numerical solutions of differential equations
    Boundary-value problems and eigenvalue problems

1. **ES209 – STATICS**
2. 3.0 credits, Lecture: Monday, Wednesday, Friday, 1:00-2:00 pm
3. Instructor: Dr. Margaret Darrow
4. Hibbler, R. C. (2009). *Statics*, 12th ed.: Prentice Hall, Upper Saddle River, New Jersey.
5. Specific course information:
   a) 2010-2011 Catalog Description: Force systems in two and three dimensions. Composition and resolution of forces and force systems; principles of equilibrium applied to various bodies, simple structures, friction, centroids, moments of inertia. Vector algebra used where appropriate.
   b) Prerequisites: ES201. Co-requisites: MATH201, PHYS211
   c) Required course
6. Specific goals for the course
   a) The goal for this course is to introduce the theory and application of engineering statics. To achieve this goal, students will be asked to demonstrate understanding of several topics, such as forces and vectors, rigid-body equilibrium, specific equilibrium applications such as trusses, frames and machines, frictional forces, and center of gravity and centroids.
   b) This course helps students meet outcomes:
      (a) an ability to apply knowledge of mathematics, science and engineering;
      (e) an ability to identify, formulate, and solve engineering problems;
      (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
7. Brief list of topics to be covered:
   Forces and Vectors
   Equilibrium
   Force Systems
   Moment
   Free-Body Diagrams
   Equilibrium in 2D and 3D
   Trusses, Frames, and Machines
   Internal Forces
   Friction
   Center of Mass
   Moments of Inertia

1. **ES 210 – DYNAMICS**

2. 3 Credits, Lecture MWF (1:00 – 2.00)

3. Instructor: Debasmita Misra

4. Textbook: Hibbeler, R.C. – "Engineering Mechanics – Dynamics", Twelfth Edition, Prentice Hall.

5. Specific Course Information
    a. Catalog Description: The course will cover motion of particles, kinematics, and kinetics of plane motion of rigid bodies, and principles of work and energy, impulse and momentum. Vector methods will be used where appropriate.
    b. Prerequisite: ES 209
    c. Required course

6. Specific goals for the course
    a. The goal of this course is to introduce to the students the kinematics and kinetics of engineering problems and to help them identify, formulate and solve problems using the approaches learnt in this course. The students are also offered group assignments in order to learn working in a group environment.
    b. This course helps students meet student outcomes:
        (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
        (e) An ability to identify, formulate, and solve engineering problems

7. Brief list of topics to be covered
    a. Kinematics of Particles
        i. Rectilinear Kinematics: Continuous Motion
        ii. Rectilinear Kinematics: Erratic Motion
        iii. Curvilinear Motion: Rectangular Components; Projectile Motion
        iv. Curvilinear Motion: Normal and Tangential Components
        v. Curvilinear Motion: Cylindrical Components
        vi. Absolute Dependant Motion Analysis
        vii. Relative Motion Analysis
    b. Kinetics of Particles
        i. Equations of Motion: Rectangular Coordinates
        ii. Equations of Motion: Normal and Tangential Coordinates
        iii. Equations of Motion: Cylindrical Coordinates
        iv. Principles of Work and Energy
        v. Power and Efficiency
        vi. Potential Energy and Conservation of Energy
        vii. Principle of Linear Impulse and Momentum
        viii. Conservation of Linear Momentum for a System of Particles
        ix. Impact
        x. Principle of Angular Impulse and Momentum
    c. Planar Kinematics of a Rigid Body
        i. Translation and Rotation
        ii. Absolute Motion Analysis

iii. Relative Motion Analysis: Velocity
iv. Instantaneous Center of Zero Velocity
v. Relative Motion Analysis: Acceleration

d. Planar Kinetics of a Rigid Body
i. Mass Moment of Inertia; Planar Kinetic Equations of Motion: Translation
ii. Equations of Motion: Rotation about a Fixed Axis
iii. Equations of Motion: General Plane Motion
iv. Planar Kinetics of Rigid Body: Work and Energy
v. Planar Kinetics of Rigid Body: Conservation of Energy
vi. Planar Kinetics: Impulse and Momentum and Conservation of Momentum

1) **ES 307 – Elements of Electrical Engineering**

2) 3 Credits. Lecture: TR 8:00 – 9:30 am.

3) Instructor: H. Ed Bargar

4) "Essentials of Electrical and Computer Engineering" by David V. Kerns, Jr. & J. David Irwin
   a) Class Web site located at: http://medept.engr.uaf.edu

5) Specific course information.
   a) Catalog description: Elementary circuits and theorems; nodal and mesh analysis; transient analysis; ac steady state and power analysis, power compensation; basic electronics; electromechanical systems: magnetic circuits, DC/AC machines and transformers.
   b) Prerequisite: MATH 202X.
   c) Required course.

6) Specific goals for the course.
   a) Electrical Engineering concepts and principles are presented directed primarily to engineering students in other engineering disciplines. Electricity is commonly used to transport energy from one location to another. Electrical machinery is used to transform energy. Electrical circuits are used to control equipment and govern its operation. An understanding of the principles of electrical circuits and electrical machinery is important to all fields of engineering since electrical equipment will be encountered in every field of modern engineering practice. Upon completion of this course, the student shall be familiar with: basic circuit laws including Ohm's Law and Kirchhoff's Law; analyses of AC & DC circuits to determine voltage, current, impedance, and power characteristics. Included is single-phase and three-phase circuit/power analysis; the design and operation of rotating equipment such as generators and motors; control circuits and solid state logic.
   b) This course helps students meet outcomes:
      (a) An ability to apply knowledge of mathematics, science, and engineering.
      (c) An ability to design a system, component, or process to meet desired needs.
      (e) An ability to identify, formulate, and solve engineering problems.
      (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

7) Brief list of topics covered:
   a) DC steady-state circuit analysis and basic laws.
   b) DC transient circuit analysis.
   c) AC steady-state circuit analysis.
   d) AC power analysis.
   e) Magnetic coupling and transformers.
   f) Basic diode and rectifier circuits.
   g) DC generators and motors.
   h) AC generators and motors.

i) Synchronous machines.
j) Control circuits and ladder diagrams.

Course Syllabus

1. **ES 331 - Mechanics of Materials**

2. 3 credits, Lecture: MWF 1:00pm – 2:00pm

3. Instructor: Yongtao Dong (CEE)

4. *Mechanics of Materials*, 5th Ed., F. Beer, E. Johnston, and J. Dewolf, McGraw Hill,
   ISBN 978-0-07-722140-9

c. Other handouts will be provided.

4. Specific course information

a. Catalog description: Analysis of internal forces in members subjected to axial, torsional, and flexural loads, or load combinations. Stress-strain relationships and material property definitions; shear and moment diagrams, Mohr's Circle. Applications include beams, columns, connections, indeterminate cases.

b. Prerequisite: ES F208 (Mechanics) or ES F209 (Statics) and MATH F201X (Calculus II).

c. Required course

5. Specific goals for the course

   a. The goals of this course include:
      (a) to develop ability to analyze a given problem in a simple and logical manner;
      (b) to apply a few fundamental and well-understood principles to problem solving;
      (c) to learn analytical techniques for stress and strain under different types of loading;
      (d) to understand how to perform stress/strain transformation and to find the principal stress/strain,
      (e) to develop capability of calculating beam deflection and learn how to draw bending and shearing diagrams to complement the calculation; and
      (f) to introduce students to the concepts of structural stability.

   b. This course helps students meet student outcomes:
      (a) an ability to apply knowledge of mathematics, science, and engineering
      (e) an ability to identify, formulate, and solve engineering problems
      (g) an ability to communicate effectively
      (i) a recognition of the need for, and an ability to engage in life-long learning
      (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

6. Brief list of topics to be covered

   Chapter 1. Introduction
      1.1 Concept of stresses – normal stress

1.2 Shearing stress and bearing stress
1.3 Stress on an oblique plane, stress components
Chapter 2. Stress and strain- axial loading
2.1 Normal strain, stress-strain relation, Hooke's Law
2.2 Elastic vs. plastic behavior, fatigue
2.3 deformation under axial loading
2.4 Indeterminate problems, Thermal stress
2.5 Poisson's Ratio, generalized Hooke's Law
2.6 Shearing strain, relation among E, ν and G,
2.7 Saint-Venant's Principle, stress concentration, plastic deformation
Chapter 3. Torsion
3.1 Stress and deformation of shaft under torsion
3.2 Indeterminate shaft
3.3 Noncircular, thin-walled hollow shafts
Chapter 4. Pure Bending
4.1 Pure bending, stress
4.2 Deformation
4.3 Composite members, stress concentrations
4.4 Eccentric loading in a plane of symmetry
4.5 General eccentric loading
Chapter 5. Beams for Bending
5.1 Shear and bending moment diagrams
5.2 Relations among load, shear and moment
5.3 Design of beam for bending
Chapter 6. Shearing Stresses in Beams
6.1 Shearing stress in beams
6.2 Longitudinal shear
6.3 Shearing in thin-walled members
Chapter 7. Transformation of Plane Stress
7.1 Transformation of plane stress
7.2 Principal stresses, max. shearing stress
7.3 Mohr's Circle for plane stress
7.4 Mohr's Circle, examples
7.5 Stress in thin-walled pressure vessels
Chapter 9. Deflection of Beams
9.1 Deformation of beams
9.2 Statically indeterminate beams
9.3 Method of superposition
Chapter 10. Columns
10.1 Stability of columns
10.2 Columns with different end conditions
10.3 Design of columns
Chapter 11. Energy Methods
11.1 Strain energy & strain-energy density
11.2 Elastic strain energy for different stresses
11.3 Impact loading

11.4 Work-energy method and its application

1. **ES 341 – Fluid Mechanics**

2. 4 credits, Lecture: MWF 10:30am – 11:30am; Lab: M,T,W, R: 2:15pm – 5:15pm

3. Instructor: Dennis Filler

4. Crowe, C. T., Elger, D. F. and Roberson, J.A. 9th Edition. Engineering Fluid Mechanics. John Wiley & Sons, Inc.

5. Specific course information
6. Catalog description: Statics and dynamics of fluids; energy and momentum principles. Dimensional analysis; flow in open channels, closed conduits and around submerged bodies. Special fees apply.
7. Prerequisites: MATH F201X (Calc II) and ES F208 (Mechanics) or ES F210 (Dynamics).
8. Required course

9. Specific goals for the course

a. 1) Understand basic properties of fluids (extensive, intensive properties).
   2) Understand basic concepts of fluid dynamics (velocity, acceleration, control-volume approach).
   3) Develop the ability to solve problems involving momentum, energy, and similitude principles (continuity, Bernoulli, momentum, Froude, Reynolds, Darcy-Weisbach, etc.).
b. This course helps students meet student outcomes:
   (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
   (d) an ability to function on multi-disciplinary teams
   (e) an ability to identify, formulate, and solve engineering problems
   (g) an ability to communicate effectively
   (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

4. Brief list of topics to be covered

   a. Fluid properties
   b. Fluid statics
   c. Flowing fluids
   d. Control volume and continuity
   e. Momentum and energy
   f. Dimensional analysis and similitude
   g. Surface resistance
   h. Flow in conduits

i. Drag
j. Flow measurements
k. Open channel flow

1) **ES 346 – Basic Thermodynamics**

2) 3 credits, Lecture: TR 9:45 – 11:15 am.

3) Instructor: H. Ed Bargar.

4) "Thermodynamics – An Engineering Approach, 7th Edition"* by Yunus A. Cengel & Michael A. Boles
   a) *The 6th edition may be used in place of the 7th edition.
   b) Class Web site located at: http://medept.engr.uaf.edu.

5) Specific course information
   a) Catalog Description: Thermodynamic systems, properties, processes, and cycles. Fundamental principles of thermodynamics (first and second laws) and elementary applications.
   b) Prerequisites: MATH 201X, PHYS 211X.
   c) Required course.

6) Specific Goals for the course:
   a) Basic principles of thermodynamics are covered. These include: properties of pure substances; heat, work, and other forms of energy and energy transfer; and the 1st & 2nd Laws of Thermodynamics. The student will learn: basic engineering problem solving techniques; the concepts of processes, cycles, control volumes, and system boundaries; how to utilize conservation of mass, conservation of energy, and material properties to analyze thermodynamic systems; an understanding of energy efficiency based on the analyses of heat engines and heat, work, & energy systems.
   b) This course helps students meet outcomes:
      An ability to apply knowledge of mathematics, science, and engineering.
      An ability to identify, formulate, and solve engineering problems.
      An ability to communicate effectively.
      The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
      An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

7) Brief list of topics covered.
   a) Units and dimensional analysis.
   b) Systems, control volumes and states.
   c) Types of energy.
   d) The 1st Law of Thermodynamics and its relation to energy and energy transfer.
   e) Properties of substances. Property tables and equations of state.
   f) 1st Law analyses of closed systems.
   g) 1st Law analyses of open systems.
   h) The 2nd Law of Thermodynamics.
   i) Sources and sinks.

j) Reversible and irreversible process and the Carnot Cycle.
k) Entropy.

1. **Course number and name**
   ESM 422 Engineering Decisions
2. **Credits and contact hours**
   3 Credits with 3 contact hours per week

3. **Instructor's or course coordinator's name**
   Ming Lee

4. **Text book, title, author, and year**
   Data Analysis and Decision Making with Microsoft Excel, 3rd Edition, Albright, Winston, and Zappe, Thompson Southwestern
   c. **other supplemental materials**
   Readings: *An Introduction to Management Science Quantitative Approaches to Decision Making*, 11th ed, Anderson, Sweeney, and Williams, Thompson Southwestern

5. **Specific course information**
   g. **brief description of the content of the course (catalog description)**
   Risk and uncertainty in engineering decisions. Basic applied probabilities and statistics, data analysis, regression analysis and time series. Practical applications of decision tools: linear programming, inventory analysis, queuing, network models, utility theory. Engineering judgment and uncertainty. Public safety and ethics.
   h. **Prerequisites**
   MATH 301 recomended
   i. **indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program**
   Required

6. **Specific goals for the course**
   e. **specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.**
      - Understand risk and uncertainty in engineering and management decisions
      - Understand basic probability and statistics theories
      - Understand regression and time series and be able to apply them with data.
      - Understand quantitative decision models and be able to apply them to solve real-world problems
      - Develop spreadsheet skills
   f. **explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.**
   This course will focus on outcomes: (a), (b), (d), (e), (f), (g), (i), and (k).

7. **Brief list of topics to be covered**

- Describing data: Tables and graphs
- Describing data: Summary measures
- Probability and probability distribution

- Probability and probability distribution
- Normal, binomial, Poisson, and exponential distributions
- Decision making under uncertainty
- Sampling and sampling distributions
- Confidence interval estimation
- Hypothesis testing
- Regression analysis: Estimating relationships
- Regression analysis: Statistical inference
- Time series analysis and forecasting
- Introduction to optimization modeling
- Optimization modeling: Applications
- Introduction to simulation modeling
- Simulation models

Course Syllabus

1. ESM 450W Economic Analysis and Operations

2. 3 credits

3. Billy Connor

4. Engineering Your Future, Second Edition, Stuart G. Walesh, ASCE Press 2000
    b. Course Notes provided by the instructor
    c. Supplemental reading of court cases
    d. Canons of Ethics for each engineering discipline

5. Specific course information
    d. Fundamentals of engineering economy, project scheduling, estimation, legal principles, profession ethics and human relations.
    e. Prerequisites: ENGL F111X; ENGL F211X or ENGL F213X; ES F210 or CS F201; senior standing in engineering; or permission of instructor.
    f. Required for graduation

6. Specific goals for the course
    a. specific outcomes of instruction,
        1) Provide an overview of the engineering profession, including the importance of profession registration, professional development, and good communication.
        1) Understand basic principles of project and quality management.
        2) Understand basic principles of engineering economics.
        4) Understand basic principles of engineering law, with emphasis on contracts and liability; and
        5) Understand the importance of engineering ethics.

explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

1) an ability to apply knowledge of mathematics, science, and engineering;
2) an ability to design and conduct experiments, as well as analyze and interpret data;
3) an ability to function on multi-disciplinary teams;
4) an ability to identify, formulate, and solve engineering problems;
5) an understanding of professional and ethical responsibility;
6 an ability to communicate effectively;
7) a recognition of the need for, and an ability to engage in life-long learning;
8) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

7. Brief list of topics to be covered

a. Engineering as a Profession
b. Management of Self
c. Communications
d. Decision Economics
e. Project Management
f. Engineering and the Law
g. Professional Ethics
h. Working with the Press
i. Negotiations
j. Leadership

1. **GE261 – GENERAL GEOLOGY FOR ENGINEERS**

2. 3.0 credits, Lecture: Monday, Wednesday 9:15-10:15 am; Labs Wednesday, Friday 2:15-5:25 pm, Thursday 2:00-5:10 pm

3. Instructor: Dr. Margaret Darrow

4. Kehew, A. E. (2006). *Geology for Engineers and Environmental Scientists*: Prentice Hall, Upper Saddle River, New Jersey.

5. Specific course information:

   a) 2010-2011 Catalog Description: Study of common rocks and minerals, landforms and erosion. Geologic materials and engineering application of geology.

   b) Prerequisites: MATH107, MATH108 or equivalent; Geology, science, or engineering majors, or permission of the instructor

   c) Required course

6. Specific goals for the course

   a) 1) To understand the fundamental principles of geology and geologic processes; 2) To understand the basic engineering properties of soil and rock; 3) To identify major geohazards and possible mitigation techniques in both an Alaskan context and a global context; 4) To develop the ability to function on multi-disciplinary teams.

   b) This course helps students meet outcomes:

      (d) an ability to function on multi-disciplinary teams;

      (h) an ability to understand the impact of engineering solutions in a global context

7. Brief list of topics to be covered:

   Plate Tectonics
   Minerals
   Igneous Rocks
   Sedimentary Rocks
   Metamorphic Rocks
   Geologic Time
   Structural Geology
   Rock Mechanics
   Earthquakes
   Soil Mechanics
   Mass Movement
   Rivers
   Groundwater
   Glaciers
   Permafrost

Part III, Required Courses from Outside CEM

Basic Sciences syllabi

Course Schedule and Overview
General Chemistry 1 (Chem F105X), 4.0 credits, Spring 2011

Lecturer: Professor Thomas Clausen (Reichardt 188, 474-5512; tpclausen@alaska.edu)
Office Hours: MWF 1:00-2:00
Lecture: MWF 2:15-3:15 pm in NSF 201
Text: "Chemistry and Chemical Reactivity", 7th Ed. by Kotz; Volume 1
Lab Material: Treichel; Townsend "Experiments in General Chemistry" (distributed via Blackboard)

Required Materials: Text, OWL access card, Turning Technologies radio frequency clicker; Non-Graphing Scientific Calculator

Course Overview: Chem 105X is the first semester of a two semester series in general chemistry. It meets the American Chemical Society requirements for a introductory course in Chemistry for Science and Engineering majors as well as UAF's core science laboratory requirement (That is what the X implies). In Chem 105X, we will cover chapters 1-11 of the Kotz text. The topics covered include 1) making scientific measurements, 2) atomic theory and atomic structure, 3) stoichiometry, 4) aqueous chemistry, 5) thermodynamics, 6) valence bond theory and molecular orbital theory, 7) introduction to organic chemistry, 8) gas laws.

Course Prerequisites: Placement in ENGL F111X or higher; placement in MATH F107X or higher; or a B or better in CHEM F103X; or permission of instructor and department chair. Students not meeting these prerequisites will be dropped from the course.

Note: A grade of "C" or better in Chem 105 is required for enrollment in Chem 106.

Additional Course Resources: See the course web page at: www.uaf.edu/chem/courses

Important Dates:
Last day to withdraw with 100% tuition refund.....Jan. 28
Last day to drop the course (without a "W" appearing on transcript; 50% tuition only refund) .....Feb. 4
Last day to withdraw from the course (a "W" will appear on transcript) ..... Mar. 25

Chemistry Department Policy on Cheating: Any student caught cheating will be assigned a course grade of "F". The students academic advisor will be notified of this failing grade and the student will not be allowed to drop the course.

Honor Code:
As a UAF student, you are subject to the Honor Code. The university assumes that the integrity of each student and of the student body as a whole will be upheld. Honesty is a primary responsibility of you and every other UAF student. It is your responsibility to help maintain the integrity of the student community. UAF's Honor Code is as follows:

1) Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.
2) Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses and other reports.
3) No work submitted for one course may be submitted for credit in another course without the

explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion.

Instructor's Expectations: Your attendance and attention (no sleeping!!!) at lecture are expected. Please be respectful of other students. Arrive on time and conduct yourself in a business-like and professional manner. If you arrive late, please enter at the back of the auditorium. Have cell phones turned off unless you are expecting an emergency phone call.

Homework (Active Learning): Homework assignments will be executed using a computerized system called OWL (On-line Web-based Learning). OWL will post assignment deadlines and store homework grades automatically. Students are responsible for keeping track of assignment deadlines. Success in Chem 105 requires practice doing problems. Higher achievement on exams is usually a direct result of time spent doing homework assignments in their entirety.

Each OWL homework set will have a list of "optional" and "required" problems. The optional problems will not be used in calculating your final grade. You need only "master" four (4) required units per chapter to obtain 100% credit; doing more than the four required units is strongly encouraged but will not be used in your grade calculation. The following rules apply:

- Units must be mastered before the due date for credit; there will be no extensions granted
- You have two (2) attempts to master a unit. Note that once you open a unit, that will be considered an attempt regardless of whether you proceed with the problem.
- OWL will provide excellent feedback on how to solve the problem. Be sure to fully understand the feedback on any missed unit before you proceed with your second and final attempt.
- You may make up an unmastered unit by either:
  - mastering another "required" unit in the same homework set on time
  - mastering three additional units from any chapter. There is no restriction on the number of attempts or due dates in doing these additional units other than they must be done by the last day of classes.

Clickers: We will use classroom response systems (clickers) to take attendance and to ask questions periodically throughout lectures. On days I may opt for a graded quiz using clickers rather than collect notes (see below). ALWAYS BRING YOUR CLICKER TO CLASS.

To register your clicker, send me an email (tpclausen@alaska.edu) with your name and the 6-digit code that is under the bar code on the back of your clicker. **Students failing to register for OWL or failing to register their clicker by Jan. 31st will be dropped from the course for failure to participate in the course.**

Calculators: Always bring your **non-graphing** calculator to class.

Notes from reading assignments: Lectures are much more valuable when you arrive prepared. One good way to do so is to study the text material prior to the lectures. I will expect to find evidence that you have done this by collecting notes prior to each lecture for the reading assignments. The following rules apply:

- Notes are to be turned in at the start of lecture
- Clearly state at the start of your notes your name and what sections of the text are being covered.
- Notes are to be original hand written. No Xerox or electronic versions will be accepted
- Notes will be graded on
  - neatness (3pts for very good; 2 pts for adequate; 1 pt for subpar)

    - penmanship
    - organization (no clutter)
    - standard paper (8.5 x 11 inch) and not torn from a spiral notebook
- Content (9pts. I will randomly choose three items from the following categories and give up to 3 points per item)
    - key definitions
    - important concepts
    - key mathematical relationships in which each term is defined as well as the numerical value of constants with their units
    - Balanced chemical reactions that have clearly important implications for society or the environment (Haber process; acid rain, sulfuric acid production…). Be sure to briefly state why the reaction is important.
    - Worked in-chapter problems
    - In-chapter stories (" a closer look"; "chemical perspectives", "case-studies"…).

I will strive to have your notes returned to you in the following class period.

In some cases I may choose to have a graded clicker quiz instead of collecting notes. In these instances, the quiz will be open note but closed book.

Exams: There are three scheduled in-class hour exams during the semester plus a cumulative final. All exams count toward your grade; **there are no dropped or make-up exams**. If you can anticipate an absence, talk to me before the exam to make arrangements. If the absence is unexpected (illness, transportation problems, jail time…), contact me *ASAP* by phone or email to see if anything can be done. **Do <u>not</u> wait until the next class to speak with me about a missed exam**.

Laboratory: An important component of Chem 105 is a weekly three-hour laboratory session. The purpose of the lab is to reinforce lecture concepts through hands-on investigation. Lab sessions help students to learn about the safe handling of chemicals and the use of common lab equipment. In addition, students are introduced to the concepts of scientific reasoning and experimental design. The labs will be supervised by graduate and upper-division undergraduate teaching assistants. Teaching assistants will have specific office hours during which they will be available to answer questions related to the lab assignments. More than 10 experiments are scheduled during the semester. The laboratory portion of your grade will be based on the average of your best 10 lab reports (Note that the first two lab sessions are required for all students). All students enrolled in Chem 105 must attend laboratory. **Students completing (including turning in reports) fewer than 8 lab exercises will fail the entire course.** Lab reports will be handed in each week, to be graded and returned by the teaching assistants. Lab reports are due one week after a lab is completed. Late lab reports will not receive full credit. Your lab TA will explain the penalties for late lab reports.

American Chemical Society Standardized Placement Exam: During the first week of laboratory (Jan. 24 – 28), a multiple choice placement examination will be given. This exam does NOT count toward your grade, but taking this exam is mandatory. **Any student who does not take this exam will be dropped from the enrollment.** You will be given 45 minutes to answer 44 questions.

Note: <u>The first scheduled lab exercise (Safety Lab) is scheduled for the week of Jan 31 – Feb 4</u>. **Attendance at the safety lab is mandatory**. **You may not continue in the course unless you have attended and turned in the write-up for the safety lab.**

Grading: Your knowledge of the course content will be assessed via a combination of exams, homework, laboratory and in-class exercises. Points for the various exercises will be assigned as shown below.

3 Hour exams @ 100 points each	300 pts
Final exam	100 pts
OWL (homework)	100 pts
Laboratory Total	100 pts
Notes (or quizzes)	100 pts
	700 pts

Total point percentages of 90, 80, 70 and 60 correspond to the lower cutoff boundaries for the grades of A, B, C and D respectively. Plus / minus grades will not be assigned. Percentages less than 60 constitute a failing grade ("F").

Note: Students completing (including turning in reports) fewer than 8 lab exercises will receive an "F" for the entire course regardless of how they are doing in the rest of the course. If absenteeism is due to a documented illness or other accepted reasons, an incomplete may be considered.

Student Responsibilities:
Students are responsible for all material covered in class lecture. If you miss class for any reason, you will need to find out what you missed (generally, this is best accomplished by asking another student in the course for class notes). Students are responsible for reading the assigned material in the text ***before*** coming to class. Clicker questions will be based on reading assignments. Check your email regularly for updates and regularly check and adhere to the due dates for new OWL assignments. Students should keep all returned, graded assignments until after final course grades have been posted on UAonline.

Be sure to come to labs on time, prepared (having completed the prelab) and properly attired. There will be a host of safety rules (eye protection is required, no eating / drinking in lab, no unauthorized visitors…) that will be strictly enforced by the laboratory coordinator, Emily Reiter (e.reiter@alaska.edu; 474-6748). In addition, make sure all lab reports are in your own words; plagiarism is a serious offense!

Course Goals
Students should exit the course with the following skills:

- quantitative dilution problems
- an introductory level of understanding of the scientific method
- an introductory level of understanding of chemical nomenclature
- an introductory level of understanding of atomic structure
- an introductory level of understanding of chemical bonding and reactions (redox, acid/base, precipitation, gas formation & combustion)
- an introductory level of understanding of chemical energetics
- an introductory level of understanding of gas laws

Student Learning Outcomes
Student learning outcomes will be assessed via an assessment exam given at the beginning and end of the semester and a standardized final exam.

Disability Services (http://www.uaf.edu/disability/index.html) Students with a physical or learning disability, who may need academic accommodations, should contact the Disability Services office, located in the Center for Health and Counseling (474-5655, TTY 474-1827, fax: 474-5688.) You will

need to provide documentation of your disability. Disability Services will then notify the instructor of any special accommodations required for students with documented learning disabilities.

Chemistry 105 Lab Schedule Spring 2011

Week	Dates	Laboratory Experiments
1	Jan 24-28	American Chemical Society Standardized Placement Exam (**Mandatory Attendance)**
2	Jan 31- Feb 4	Safety Lab (**Mandatory Attendance)**
3	Feb 7-11	Intro to Lab Techniques
4	Feb 14-18	Reactions in Aqueous Solution
5	Feb 21-25	ID of an Unknown Substance
6	Feb 28-Mar 4	Cycle of Copper Reactions
7	Mar 7-11	Enthalpy of Neutralization
8	Mar 14-18	**No Lab** (Spring Break)
9	Mar 21-25	Intro to Spectroscopy
10	Mar 28-Apr 1	Spectroscopy & Water Hardness
11	Apr 4-8	Isotopes and GC/MS
12	Apr 11-15	Computational Chemistry
13	Apr 18-22	Synthetic Chemistry (Aspirin)
14	Apr 25-29	Standardized post-test **Mandatory Attendance** (Extra Credit will be awarded for this exercise)

Chemistry 105 Tentative Class Schedule Spring 2011

Week	Date	Day	Chapter	General Topics
0	Jan 21	F		Course Overview
1	Jan 24 Jan 26 Jan 28	M W F	1	Compounds, molecules, Chemical/Physical Properties Review of Math, Precision, Accuracy Graphs, Atomic Structure, isotopes
2	Jan 31 Feb 2 Feb 4	M W F	1	Let's Review: The Tools of Quantitative Chemistry (pp 24-42)
3	Feb 7 Feb 9 Feb 11	M W F	2	Periodic Table, Naming of Compounds, Moles Moles, % composition, hydrated compounds
4	Feb 14 Feb 16 Feb 18	M W F	3	Chemical equations, Balancing chemical equations, Equilibrium Reactions in Aqueous Solutions,Types of Chemical Reactions, Review
5	Feb 21 Feb 23 Feb 25	M W F	4	**EXAM 1** (Chapter 1, 2, & 3) Stoichiometry, Calculations
6	Feb 28 Mar 2 Mar 4	M W F	4 5	Concentration, pH, Spectrophotometry Intro to Chemical Energetics, Specific Heat, Phase Changes, Enthalpy
7	Mar 7 Mar 9 Mar 11	M W F	5	Calculations and Thermodynamic of Reactions
8	Mar 14-18	M – F		**Spring Break**
9	Mar 21 Mar 23 Mar 25	M W F	6 7	EM Radiation, Quantization, Line Spectra Quantum Mechanics, orbitals, electron spin Pauli Exclusion Principle, Exam Review
10	Mar 28 Mar 30 Apr 1	M W F	7	**EXAM 2** (Chapters 4-6) Electron Configurations, Ions, Periodic trends
11	Apr 4 Apr 6 Apr 8	M W F	7/8 8	Finish up Ch. 7, Covalent Bonds, Lewis Structures, Formal Charges, Molecular Shape, bond polarity
12	Apr 11 Apr 13 Apr 15	M W F	9	Bond Properties, Bonding Theory, Valence Bond Valence Bonding, Molecular Orbitals, Exam Review
13	Apr 18 Apr 20 Apr 22	M W F	11	**EXAM 3** (Chapters 7-9) Gases & Gas Laws
14	Apr 25 Apr 27 Apr 29	M W F	11 10	Chemical Reactions, Partial Pressures, Kinetic molecular theory Intro to Organic Chemistry
15	May 2 May 4 May 6	M W F	10	Functional Groups, Polymers Exam Review
16	May 9	M		**COMPREHENSIVE FINAL EXAM** (1:00 – 3:00 pm)

Chemistry 106X General Chemistry II Spring Semester 2011

Instructor:	Dr. John Keller (Office: 161 NSF; Tel 474-6042, email jwkeller@alaska.edu)
Laboratory Director and Teaching Assistant Supervisor:	Emily Reiter (Office 194A NSF; Tel 474-6748; email e.reiter@alaska.edu)
Administrative Assistant:	Mist D'June-Gussak .Office 194 NSF; Tel 474-5510; email mist@alaska.edu)
Class Meeting:	TR, 6:30-8:00 PM 201 Reichardt JK
Office Hours:	TR 8-9 PM; others by appointment

Resources

Required Materials:

1) *Chemistry and Chemical Reactivity 7th Ed.*; Kotz, Treichel, and Townsend, Brooks/Cole; 2009 Volume 2 (ISBN 978-0-495-38712-6) or Complete text 7th Ed. (ISBN 978-0-495-38703-9) or e-Book
2) Access to Chapter 10 (Organic Chemistry), Kotz et al 7th Ed. Either in Vol. 1, or via e-Chapter from
3) http://www.cengagebrain.com/shop/ISBN/9780495387039?cid=APL1 ($8.49)
4) OWL access card for *Chemistry and Chemical Reactivity 7th Ed* (1-semester or 2-semester)
5) A Turning Technologies ResponseCard RF radio frequency clicker. (new or used OK)
6) *Experiments in General Chemistry 106X: A Laboratory Manual* (Free! available on Blackboard website.)
7) American Chemical Society (ACS) General Chemistry Study Guide
8) A non-programmable non-graphing scientific calculator is required for **each exam**. N.B. The Department of Chemistry and Biochemistry does not provide calculators in exams. You must provide your own. Please do **not** bring a graphing and/or programmable calculator such as a TI-83 to Chem 106X exams.

Optional Texts:
Chemistry & Chemical Reactivity - Student Solutions Manual. Kotz *Chemistry & Chemical Reactivity - Study Guide*. Kotz *Essential Algebra for Chemistry Students, 2nd Ed*. David W. Ball.

Email communication. All messages will be sent to student UAF email address (like alincoln44@alaska.edu). According to UAF policy, it is the student's responsibility to read or monitor this email account.

Course Overview: Chemistry 106X is the 2nd semester of a two-semester series in general chemistry, which deals with a variety of microscopic and macroscopic chemical phenomena. These courses emphasize the quantitative, mathematical (but mostly non-calculus based) chemistry. Chem 106X covers chapters 10, 12-20, 2223 of the text. A schedule of lecture topics and assignments is provided on another sheet. Chem 106X satisfies UAF's Core Curriculum in science (that is what the "X" refers to).

Course Goals and Student Learning Outcomes: The goals for this course are to enhance your skills in critical reading, problem-solving, laboratory experimentation, communication of information, self-confidence, and self-reliance.

Chem 106X Homepage: http://chem.uaf.edu/keller/Courses/106Sp11/ The homepage includes links to the syllabus, lecture schedule, practice exams and solutions, copy of lecture notes, and others. There may also be materials, information, and grades available at the Blackboard site for this course (http://classes.uaf.edu/)

Online Web Learning (OWL): Homework problems will be done using the OWL system. The link to the OWL registration page is shown below or can be found on the course homepage. You must obtain an OWL card at the bookstore or online. 1/7 of your grade is based on OWL homework.

OWL: Make sure you register for "Chem106X Spr 2011 EVE" . More instructions in the use of OWL will be given in class. OWL questions will be due 1-to-3 days after the chapter has been discussed in class, generally twice weekly. Students will have **6 chances** to solve assignment questions. At the end of the semester, your total OWL points on required questions will be scaled to 80 points and added to the semester total.

"**Active learning**" means DOING something with your **hands and brain** to put into practice a concept you have just read or heard about. Do a problem related to the reading you have just done. You will learn a lot more, a lot faster, if you DO something after you read or think about it. In class, TAKE NOTES! During the weekly lectures, we will do occasional "clicker questions", which are multiple-choice questions that you answer with your clicker. If you have been following the lecture, and doing some pre-study, these should not be too hard. Some will be easy, and some will be challenging. Other avenues for active learning are doing OWL, in-chapter Exercises, or end-of-chapter Study Questions. The *answers* to the odd-numbered end-of-the-chapter questions may be found in Appendix O of the text. The *stepwise solutions* to the odd-numbered questions are in the *Student Solutions Manual*.

Policies

Prerequisites: (UAF Catalogue): "C grade or better in Chem 105X; placement in Eng 111X or higher; placement in Math 107X or higher; or permission of instructor and department chair."

Classroom Expectations of Students: JK expects you to attend class, and will check your attendance using clicker scores (see below). Each day BEFORE class, the student should read the portion of the textbook that is assigned on the schedule, and begin to work with the assigned OWL questions (see assignment sheet). With this preparation, you will better be able to understand the discussion, ask questions, and answer "clicker questions" (see below). Please conduct yourself in a business-like and professional manner. Be respectful of the rights other students to a quiet and uninterrupted learning experience. If you arrive late, please enter at the *back* of the auditorium (2nd floor level). **Turn off your cell phone ringer**. **Put away your laptop. Be quiet. Listen**.

"Clickers": Student clicker responses are recorded electronically by the TurningPoint receiver and software on JK's laptop. Questions will be graded 1 point for an answer, 0 points for no answer. The percent maximum score at the end of the semester will be multiplied by 70 pts and included in the semester total. **About 50 questions will be asked this semester. You will be allowed 5 to 10 zero clicker scores without penalty, to take into account the (hopefully few) days you miss class due to travel on University business, sickness, or your clicker batteries ran down, or other legitimate causes.** No "makeup clicker questions" will be given. No answers on paper can be accepted.

It is the student's responsibility to bring the clicker to each class, take care of it, replace it if lost, and keep it supplied with fresh batteries (they should last the whole semester with normal usage).
"Clicker by proxy" is a no-no. **Click only you own clicker!**
Register your clicker ID on the OWL website. Go "Clicker Registration" in the Support & Miscellaneous panel on the left had side. **To gain credit on the very first clicker question, your clicker ID must be registered by MONDAY, Jan. 31, 6:00 PM. If you miss that deadline, then send your clicker ID to JK as soon as possible.**

Laboratory: The purpose of the lab is to do hands-on investigation. We expect you to gain skills in scientific reasoning, experimental design, and use of chemicals and laboratory apparatus. The labs are conducted by graduate and upper-division undergraduate teaching assistants. Lab reports will be handed in each week, to be graded and returned by the teaching assistant. 11 experiments are scheduled

for the semester. The laboratory portion of your grade (100 points) will be based upon the average of your best 10 out of 11 lab grades. You can miss one lab with no impact on your lab grade. If you miss 2 or 3 labs, then 1 or 2 zeros respectively will be included in the average. **Do not miss 4 labs: this results in a COURSE F!**

All students enrolled in Chem 106X (even those who have taken the course before) must attend laboratory.

Students must hand in <u>8 or more</u> reports to earn a passing grade in this course. In other words, if you hand in only 7 (or fewer) lab reports, an F grade in the course is assigned, even if all your other grades are passing. This stiff requirement is based on the American Chemical Society stipulation that students must spend a certain number of hours in lab for courses such as Chem 106X (and of course you must attend lab in order to write a lab report!) There are no make-up labs scheduled during the semester. If you have special scheduling problems or if you miss more than one lab for an acceptable reason, please discuss alternative plans with Emily Reiter, Laboratory Director. Laboratory reports are due one week after a lab is completed. Late reports will be accepted, but the score will be reduced significantly. The last report of the semester cannot be accepted late.

Exams: The student is responsible for all information from text, lecture, OWL, and assigned study questions. Questions from any of these sources may appear on exams. Three 90-minute exams and a cumulative final exam will be given; see the weekly schedule for dates and coverage. Each exam will include a table containing all necessary constants, and a simple periodic table.

Final Exam. The final exam will be a 120-min, 70-item multiple choice exam provided by the American Chemical Society Examinations Institute. This covers the 2nd half of the text plus organic chemistry. The required review text is an excellent source of information and will help you practice and prepare for this exam, which should be no more difficult than the other exams during the semester. **The time (Tues, May 10, 8-10 PM) and place (201 Reichardt) of the final exam have been set by the UAF Registrar, not your professor. No early or late exams can be scheduled. If you miss the scheduled exam due to travel, then the University policy on Incomplete (I) grades will be invoked.**

Make-up exams will be allowed for good reasons, which you MUST DISCUSS with the professor. "I slept in" is not a good reason. (But: if you are late, or even *very* late, to the exam, make the effort to come in: we can accommodate you.) An unexplained absence from an exam results in a zero. If you anticipate an absence (intercollegiate sports, travel on military or University business), talk to your professor ***<u>before</u>*** the exam to make arrangements. If the absence is unexpected (illness, family or personal calamity, cold weather transportation difficulty), talk with the professor at the earliest possible opportunity. Come prepared to **document** your particular calamity. In any case, you must take the makeup exam within 1 week of your return to health. **If you are to take a makeup exam, we expect that you have no knowledge of the original exam**.

Ethical Considerations: As a UAF student, you are subject to the UA Honor Code, which says in part:

"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations.

Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, theses, and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."

Other banned activities: Using another student's clicker; copying answers on lab reports or exams.

The Chemistry "Department Policy on Cheating" is the following: "Any student caught cheating will be assigned a course grade of F. The student's academic advisor will be notified of this failing grade and the student will not be allowed to drop the course."

During hour and final exams programmable and/or graphing calculators, cell phones, beepers, PDAs, and other electronic devices are NOT allowed on your person. Power-off any such item, and place it inside your closed briefcase, purse, or pack at the back of the room, or on the floor.

Grading Estimated Grade Scale (as % of 650 pts). (Subject to change):

Item	Maximum Pts
Exam 1	100
Exam 2	100
Exam 3	100
Final Exam	100
OWL Homework	80
Clicker score	70
Lab	100
Total	**650**

%	Letter Grade
88-99%	A
77-88%	B
66-77%	C
55-66%	D
Less than 55%	F

Grades. Letter grades (A-F, no +/- grades) are assigned based on the total out of 650 points accrued in the semester. The approximate cut-offs for letter grades are shown above. These are *estimates only* based on prior semester results, and are subject to change up or down at the time final grades are assigned. The final cut-offs may differ from other C 106 sections because the exams, OWL and clicker questions are different.

Instructor-Initiated Withdrawals: Any time up to and including Friday, March 28, the professor has the right to withdraw a student from Chem 106X for any of the following reasons: (1) Exam I and II are missed without an excused absence, or (2) two or more labs are missed, or (3) the student shows poor class attendance, or (4) is missing a lot of OWL homework. This is our definition of "...has not participated substantially in the course. (See p. 44 in the Catalog.)

Disabilities: Students with physical or learning disabilities are required to identify themselves to Mary Matthews in the Disability Services office, located in the Center for Health and Counseling (474-7043). The student must provide documentation of the disability. Disability Services will then notify Prof. Keller of special arrangements for taking tests, working homework assignments, and doing lab work.

Incomplete (I) grade: A grade of "I" is assigned only when a student misses the final exam or multiple laboratory classes for a documentable reason, such as a medical problem, a death in the family, etc.

Important Dates: Please keep the following dates in mind.

Last day to drop class and get 100% refund Friday, ...Jan. 28
Last day to drop class w 50% refund (course not on academic record) .....Friday,Feb. 4
Freshmen progress reports due Friday, ... Feb. 25
Last day for student- or instructor- withdrawal ("W" on academic record)..... Friday, Mar. 25
UAF SpringFest (no classes) ..... Friday, April 29
Last of instruction: ..... Friday, May 6

Physics 211

General Physics
Fall 2010

This syllabus is located at: http://ffden-2.phys.uaf.edu/211_fall_2010.html

Instructor: David Newman
Office: 112 NSCI
Office Phone: 474-7858
Home Phone: 458-8576 (if all else fails!! But please not after 11 PM)
Email: denewman@alaska.edu

Office Hours: Monday 3:30-5:30pm in 112 NSCI

Wednesday 11:30-1:30pm in 112 NSCI

Additionally, a help room will be staffed to answer homework related questions. This will be in the Physics conference room (122NSF) and will be staffed at various times each day (the schedule is posted on the Rm122 door).

Course Syllabus

In approaching this (and all) classes, please note the following ancient chinese proverb:

Teachers can open the door,
but you must enter by yourself.

Course Content: In the first part of the course you will learn the basic language of physics including measurement and how we discuss and quantify motion. We will then move on to calculating the motion of bodies which will lead us into the wonder of Newton's 3 laws of motion. You will learn to love them (or at least learn them) and their applications to such a wide range of problems such as fair rides, space ships, skidding cars and even hanging signs. Then the course will explore energy and momentum, two of the most important and powerful concepts in the physics of motion. This will be followed by an introduction into Gravitation followed by fluid mechanics. This will then lead into a discussion of waves including sound wave and such cool things as noise canceling headphones. Most importantly, you will learn to impress your friends and relatives with your knowledge of the universe (or bore them to tears), so be prepared for being introduced to "*The Power of Physics*".

Prerequisites: Calculus and high school physics. Algebra, trigonometry and calculus will be used extensively.

Materials Needed:

Required Text:	*University Physics*, Bauer and Westfall
Calculators:	No calculators may be used during exams or quizzes. Otherwise, buy yourself a nice one. A basic, simple scientific calculator with trigonometric, exponential, and logarithmic functions is all that you need.

Lectures: 10:30am MWF in 201A NSCI. *The lectures supplement but do not substitute for the reading.* Lectures will cover the major topics, emphasizing and discussing the important points. They are not sessions to regurgitate material already written in the text. Your personal participation is important, and it is critical that you read the assigned material before lecture. Time permitting, several Friday lectures will cover special topics beyond the scope of the text. These will be announced before hand.

Homework: There will be approximately one homework assignment per week. The assignment will be given out (and posted on the web and in the hall in front of my office) on Wednesdays and will be due in on the following Thursday by 5:00PM. Place your homework in the appropriate box in the Physics Department Office. You are encouraged to work with others on the homework, but make sure the paper you turn in is not simply copied from someone else. These assignments help me assess your understanding of the material, and will count toward your final grade.
Late problem sets will not be accepted.
Only a selection of problems will be graded each week, totaling about 25-30 points each.

Quizzes: 6 short quizzes will be given in class during the semester. They will be closed book and no calculators allowed (or needed). All difficult formulas needed will be given and the quiz will be similar to some of the recent homework or topics covered in class. The quizzes will be announced in class and on the schedule page at least one week in advance.

Project: There will be a project due worth a maximum of approximately 10% of the course grade. The project will be in the form of a web page on a topic in physics that you find interesting and we agree on together. These topics could include biographies of important scientists, scientific projects and scientific ideas. The topic must be agreed to by Oct 6th and must be competed by Nov 24th. They will be graded both for presentation and content. More details will be discussed in class and on the web project link above.

Labs: There is a lab associated with this course. **ALL** labs and reports must be completed to get a passing grade for the lab.
A PASSING GRADE IN THE LAB IS NECESSARY TO PASS THE COURSE.
Labs may only be made up if excused and with permission of the course instructor. Questions about the lab should be directed to the teaching assistant in charge of your lab or as a last resort me.

Hour Exams: Exams will be given during the Friday(or monday) lecture as follows:

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        Oct. 8, approx. Chapters 1-5
        Nov 12, approx. Chapters 6-11
The exams will be closed-book, but you will be given one side of
an 8 1/2 x 11-inch sheet with most of the needed equations. No
calculators are allowed. The exams will be graded and handed back as
soon as possible. Solutions will be discussed.
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Final Exam: The final exam will be at 10:15 a.m. - 12:15 p.m., Friday, Dec. 17. It will cover the entire course (Chapters 1-16), with some emphasis on the more recent material. The final will be closed-book, but you will be given two sides of an 8 1/2 x 11-inch sheet with most of the needed equations.

Grading: The course grade will consist of the following components (though I reserve the right to make grade adjustments based on performance trends):

2 hour exams	30 %
Final exam	25 %
Homework	10 %
Quizzes	10 %
Project	10 %
Lab	15 %

I grade on a curve however to satisfy university requirments, above 95% will be at least an A, above 85% will be at least a B above 75% will be at least a C, above 65% will be at least a D (in most cases the actual curve is significently lower!).

Contacting Me: I have office hours as listed above. You can drop by at other times if I'm not busy, or make an appointment. I am (almost) *never* available before class.

Special Needs: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Plagiarism etc: Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic)

Complaints and Concerns: You are always welcome to talk to me about anything, however, if you have a non-subject matter question or concern that cannot be resolved by me, contact the department chair, Dr. Chowdury, Physics Department Office, room 102 NSCI.

Alternate References: To see the same topics explained differently, try the following:

Physics for Scientists and Engineers, Serway and Jewett.

Fundementals of Physics, 8th edition, Halliday Renick and Walker.
The Feynman Lectures on Physics, Richard Feynman (a great set of books...but rather deep)

Here is a good web site on how to study physics which might be of interest and use: How to study physics

General Advice: Physics is not something you read and memorize, rather it is something you learn how to do. Try the following study procedure:

1. Read the chapter prior to lecture, so that you will know what it's about.
2. Listen carefully to the lecture and take notes.
3. This is crucial: *Do not go back and read and re-read* the chapter until you "understand it." Rather, start working problems, going back through the chapter to clarify points as they come up. I suggest you try to answer all "Checkpoint" problems in the text and the questions at the end of the chapter. If you understand these, you've probably understood the salient points of the chapter.
4. Think! Don't simply try to fit the problems into the form of another problem, think through the problem first.
5. Interesting Physics computer demos

Physics 212

General Physics
Fall 2009

This syllabus is located at: http://ffden-2.phys.uaf.edu/212_fall_2009.html

Instructor: David Newman
Office: 112 NSCI
Office Phone: 474-7858
Home Phone: 458-8576 (if all else fails!! But please not after 11 PM)
Email: ffden@uaf.edu

Office Hours:

Monday 3:30-5:00pm in 112 NSCI

Wednesday 11:30-1:30pm in 112 NSCI

Additionally, a help room will be staffed to answer homework related questions. This will be in the Physics conference room (122NSF) and will be staffed at various times each day (the schedule is posted on the Rm122 door).

Course Syllabus

Course Content: In the first part of the course you will learn basic thermodynamics including the 3 laws of thermodynamics and applications to such diverse problems as temperature, the efficiency of engines and the ultimate fate of the universe. Then the course will explore electricity and magnetism. We will start by discussing electrostatics followed by DC circuits and magnetostatics. Then we will talk about the interactions between electric fields and magnetic fields which will lead to AC circuits. We will then end the semester with an introduction to Electromagnetic waves. Most importantly, you are also very likely to learn to impress your friends with your knowledge of the universe (or bore them to tears), so be prepared for being introduced to "*The Power of Physics*".

Prerequisites: Calculus, high school physics and Physics 211. Algebra, trigonometry and calculus will be used extensively.

Materials Needed:

Required Text:	*Fundementals of Physics*, 8th edition, Halliday Renick and Walker.
Calculators:	No calculators may be used during exams or quizzes. Otherwise, buy yourself a nice one. A basic, simple scientific calculator with trigonometric, exponential, and logarithmic functions is all that you need.

Lectures: 5:50pm MWF in 201A NSCI. *The lectures supplement but do not substitute for the reading.* Lectures will cover the major topics, emphasizing and discussing the important points. They are not sessions to regurgitate material already written in the text. Your personal participation is important, and it is critical that you read the assigned material before lecture. Time permitting, several Friday lectures will cover special topics beyond the scope of the text. These will be announced before hand.

Homework: There will be approximately one homework assignment per week. The assignment will be given out (and posted on the web and in the hall in front of my office) on Wednesdays and will be due in on the following Thursday by 5:00PM. Place your homework in the appropriate box in the Physics Department Office. You are encouraged to work with others on the homework, but make sure the paper you turn in is not simply copied from someone else. These assignments help me assess your understanding of the material, and will count toward your final grade.
Late problem sets will not be accepted.
Only a selection of problems will be graded each week, totaling about 25-30 points each.

Quizzes: 6 short quizzes will be given in class during the semester. They will be closed book and no calculators allowed (or needed). All difficult formulas needed will be given and the quiz will be similar to some of the recent homework or topics covered in class. The quizzes will be announced in class and on the schedule page at least one week in advance.

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Labs: There is a lab associated with this course. **ALL** labs and reports must be completed to get a passing grade for the lab.
A PASSING GRADE IN THE LAB IS NECESSARY TO PASS THE COURSE.
Labs may only be made up if excused and with permission of the course instructor. Questions about the lab should be directed to the teaching assistant in charge of your lab or as a last resort me.

Hour Exams: Exams will be given during the Friday(or monday) lecture as follows:

Oct. 9, approx. Chapters 18-22
Nov 13, approx. Chapters 23-28

The exams will be closed-book, but you will be given one side of an 8 1/2 x 11-inch sheet with most of the needed equations. No calculators are allowed. The exams will be graded and handed back as soon as possible. Solutions will be discussed.

Final Exam: The final exam will be at 5:45-7:45 pm on Fri, Dec 18. It will cover the entire course (Chapters 18-33), with some emphasis on the more recent material. The final will be closed-book, but you will be given two sides of an 8 1/2 x 11-inch sheet with most of the needed equations.

Grading: The course grade will consist of the following components (though I reserve the right to make grade adjustments based on performance trends):

2 hour exams	30 %
Final exam	25 %
Homework	10 %
Quizzes	10 %
Project	10 %
Lab	15 %

I grade on a curve however to satisfy university requirments, above 95% will be at least an A, above 85% will be at least a B above 75% will be at least a C, above 65% will be at least a D (in most cases the actual curve is significently lower!).

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Plagiarism etc: Plagiarism and cheating are matters of serious concern for students and academic institutions. This is true in this class as well. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class. (Taken from the UAF plagiarism web site, which has many links with good information about this topic)

Complaints and Concerns: You are always welcome to talk to me about anything, however, if you have a non-subject matter question or concern that cannot be resolved by me contact the department chair, Dr. Olson, Physics Department Office, room 102 NSCI.

Alternate References: To see the same topics explained differently, try the following:

Fundamentals of Physics, 5th or 6th edition, Halliday, Resnick, Walker (similar to Serway)

The Feynman Lectures on Physics, Richard Feynman (a great set of books...but rather deep)
Here is a good web site on how to study physics which might be of interest and use: How to study physics

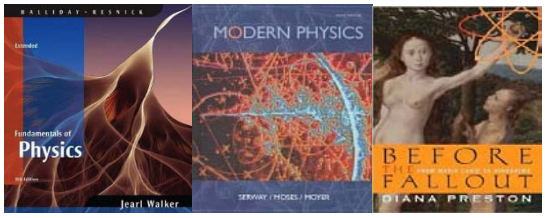
General Advice: Physics is not something you read and memorize, rather it is something you learn how to do. Try the following study procedure:

1. Read the chapter prior to lecture, so that you will know what it's about.
2. Listen carefully to the lecture and take notes.
3. This is crucial: *Do not go back and read and re-read* the chapter until you "understand it." Rather, start working problems, going back through the chapter to clarify points as they come up. I suggest you try to answer all "Checkpoint" problems in the text and the questions at the end of the chapter. If you understand these, you've probably understood the salient points of the chapter.
4. Think! Don't simply try to fit the problems into the form of another problem, think through the problem first.
5. Interesting Physics computer demos

Physics 213, Fall 2010

Syllabus

Course Content: In this course we continue our review of basic physics beginning with geometrical and physical optics. Then we continue with a review of 'modern' physics; e.g. the physics of the 20th century. Our development of modern physics follows the historical development of the experiments and concepts that formed the foundation of quantum mechanics, atomic and nuclear physics and elementary particle physics. We will work from the books listed below.

Required Texts: 

- Halliday, Resnick & Walker, Fundamentals of Physics, 8th ed., Wiley, Pubs
- Serway, Moses & Moyer, Modern Physics, Thomas-Cengage, Pubs.
- Preston, D., Before the Fall-Out, Berkeley Publishing Group, 2005

Calculators: *No calculators may be used during exams or quizzes*. Otherwise, buy yourself a nice one. A basic, simple scientific calculator with trigonometric, exponential, and logarithmic functions is all that you need.

MP3 Players, iPhones, iPods, etc: No electronic devices or headphones are allowed during exams and quizzes.

Lectures: 1:00-2:00pm MWF in NSCI 136. The lectures supplement but do not substitute for the reading. Lectures will cover the major topics, emphasizing and discussing the important points. They are a supplement to your text. Your personal participation is important and it is critical that you read the assigned material before lecture. The lecture schedule is posted on the course web site.

Homework: There will be approximately one homework assignment per week. The assignment will be given out (and posted on the web and in the hall in front of my office) on Wednesdays and will be due on the following Thursday by 5:00PM. Place your homework in the appropriate box in the Physics Department Office. You are encouraged to work with others on the homework, but make sure the paper you turn in is not simply copied from someone else. These

assignments help me assess your understanding of the material, and will count toward your final grade. Late problem sets will not be accepted.

Quizzes: Several short quizzes will be given in class during the semester. They will be closed book and no calculators allowed (or needed). All difficult formulas needed will be given and the quiz will be similar to some of the recent homework or topics covered in class. Dates of the quizzes are posted on the course website calendar.

Term Paper: A short, 5-10 page paper is required of each student. The topic of the paper should relate to modern physics and can be a biography, experiment, observation, theory, etc. *The topic of the paper must be approved by the instructor. Proposed topics are due to the instructor by Friday, October 15, 2010.* Papers are due before Friday December 10, 2010.

Labs: ***A PASSING GRADE IN THE LAB IS NECESSARY TO PASS THE COURSE.***

Each student is required to have a bound lab notebook. This is the place where all notes, diagrams, data records, math, etc. are to be kept. The lab notebooks will be graded for content each week. In addition, there will be a short, weekly quiz based upon the previous week's lab. The lab notebooks may be used to complete the quiz. A formal, written lab report will be required for some labs. This requirement will be announced during the lab.

All labs and reports must be completed to get a passing grade for the lab.
Labs may only be made up if excused and with permission of the course instructor. Questions about the lab should be directed to the teaching assistant in charge of your lab. Make up labs will be available towards the end of the semester, check with the instructor or the lab TA for details. You must have made prior arrangement to make up a lab. All lab reports must be handed in no later than Dec 3, 2010. Reports handed in after that date will receive a zero grade but will count towards lab completion.

Exams: Two one-hour exams will be given during the Friday lecture as follows:

October 1, Halliday, Chapters 33-36

November 5, Serway, Chapters 1-5

The exams will be closed-book, but you will be given one side of an 8 1/2 x 11-inch sheet with most of the needed equations. No calculators, iphones, ipods, etc. are allowed.

Final Exam: The final exam will be from 1-3pm, Wednesday, December 15. It will cover the entire course with emphasis on the more recent material. The final will be closed-book, but you will be given most of the needed equations.

Grading: The course grade will consist of the following weights:

Two, one-hour exams (15% each)	30 %
Final exam	20 %
Homework	15 %
Quizzes	5 %
Labs	20 %
Term Paper	10 %
Total	100 %

Special Needs: The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Plagiarism etc: Plagiarism and cheating are matters of serious concern for students and academic institutions. The UAF Honor Code (or Student Code of Conduct) defines academic standards expected at the University of Alaska Fairbanks which will be followed in this class.

"Students will not collaborate on any quizzes, in-class exams, or take-home exams that will contribute to their grade in a course, unless permission is granted by the instructor of the course. Only those materials permitted by the instructor may be used to assist in quizzes and examinations. Students will not represent the work of others as their own. A student will attribute the source of information not original with himself or herself (direct quotes or paraphrases) in compositions, thesis and other reports. No work submitted for one course may be submitted for credit in another course without the explicit approval of both instructors. Violations of the Honor Code will result in a failing grade for the assignment and, ordinarily, for the course in which the violation occurred. Moreover, violation of the Honor Code may result in suspension or expulsion."

Alternate References: There are many textbooks available for this material. Sometimes reading another text can help clarify your understanding of a topic. The library has shelves of books on introductory physics. There are many web sites covering concepts in physics. However, ***beware!,*** not everything on the web is correct.

General Advice: Physics is not something you read and memorize, rather it is something you learn how to do. Try the following study procedure:

1. Read the chapter prior to lecture, so that you will know what it's about.
2. Listen carefully to the lecture and take notes.
3. Start working problems as soon as the homework is assigned, going back through the chapter to clarify points as they come up. I suggest you try to answer all "Checkpoint" problems in the text and the questions at the end of the chapter. If you understand these, you've probably understood the salient points of the chapter. Don’t wait until the night before the homework is due to begin...this is a good way to fail the course.
4. Think! Don't simply try to fit the problems into the form of another problem, think through the problem first.

Mathematics syllabi

MATH 200, Calculus I

Course Overview

Calculus is one of mathematics' premiere computational tools. It has pervasive applications in all the sciences and is part of the UAF core curriculum.

The two principal tools of calculus are differentiation and integration. Differentiation concerns how changes in one variable affect another. How does a population of bacteria change as time changes? How does the temperature of the ocean change as depth increases?

Integration, on the other hand, is a kind of reverse process to differentiation. We use it to answer questions such as: given the (instantaneous) rate of change of a population during a year, can we reconstruct the total population change for the year? We'll also find there is a surprising connection between integration and geometric area.

We have two principal goals in this class. We need to develop the mathematical theory of derivatives and integrals. We also need to learn how to use these tools in applications. This class has a higher emphasis on problem solving than you might have seen in math classes in the past. This is good; math is more fun when it is more than applying recipes. But there will also be basic computation exercises to do to build your proficiency with the tools.

Specific topics to be covered in this class include: limits and continuity, tangent lines and differentiation, applications of differentiation (modelling, optimization, curve sketching, root finding, etc.), definite and indefinite integration, the Fundamental Theorem of Calculus, and applications of the integral to volume and work problems.

Essential Information

Professor	David Maxwell	Teaching Assistant	David Keller
Office	Chapman 308C	Office	Chapman 302
Email	damaxwell@alaska.edu	Email	drkeller@alaska.edu
Phone	474-1196		
Web	http://www.math.uaf.edu/~maxwell		
Text	**Calculus I**, *James Stewart*		

Prerequisites

The course prerequisites are a grade of 'C' or better in M107 and M108, ACT score of 28 or above, or SAT score of 640 or above, or COMPASS score of 56 or higher. It is frustrating to try to learn calculus before you are ready for it. To help you judge your level of preparation, there will be a short test on Friday, January 22 covering background material for the class. The test will not count toward your grade. Students who do poorly on the test (D or F) will be asked to make an appointment with me by January 29.

Class Time

There will be four one-hour lecture classes each week. Although I'll be doing a lot of the talking during lectures, you are strongly encouraged to stop me at any point to ask questions. I'll

try to ask you questions along the way as well. Lectures are more interesting and relevant when you participate actively.

Recitation Section

There will be a one-hour recitation section each Tuesday lead by TA David Keller. The focus of recitation sections will be on working through problems. Most weeks there will problems for you to work on in small groups with guidance from your TA. These worksheets are not graded. There will also be an opportunity for you to ask your TA questions related to the current weeks homework. Occasionally there will be a (graded) quiz during the recitation section if I feel the class as a whole needs to spend more time working on a particular concept. I'll notify you on class on the Friday in advance if there will be a quiz in the following recitation section.

Lecture Times		Tuesday Recitations	
MWRF	8:00-9:00 Gruening 208	Section F01	8:00-9:00 Chapman 104
		Section F02	11:30-12:30 Chapman 106
		Section F03	9:45-10:45 Duckering 354

Office Hours

My office hours will be posted on my web site and outside my office door. You are very welcome to schedule an appointment outside of my regular office hours; please send me an email and we will arrange a time.

Math Lab

The Math Lab in Chapman 305 has tutors available at scheduled times throughout the week. This is a great place to get help with your homework or while studying. The hours for the Math Lab are posted on its door and on a link from the department's home page at http://www.dms.uaf.edu.

Homework

This class has two homework components: an online component worth 75% of your homework grade and a written component worth 25% of your homework grade.

The online homework problems will be made available via the Web Assign system. The online assignments will be created roughly every other class period and will be due a few days after the problems have been posted. The online problems are more routine or computational problems.

Each week there will also be a written assignment to be handed in at the start of Wednesday's class. The written assignments will comprise more sophisticated problems, for example word problems or graphing exercises. The specific homework problems to be solved will appear on my course web site at the latest on the Wednesday before the homework is due. Solutions to selected homework problems will be posted on my website.

Midterms

There will be three in-class midterm exams. Each midterms will only cover material seen since the previous midterm (i.e. they will not be cumulative). The tentative dates for the midterms are:

Friday 2/19
Friday 3/19
Friday 4/16

Final Exam

There will be a final exam held Monday, May 10, 8:00 – 10:00am at a location to be announced in class. The final will be comprehensive with an emphasis on material learned after the last midterm.

Evaluation

Course grades will be determined as follows:

Midterm 1	1
Midterm 2	1
Midterm 3	1
Final	2

Letter grades will be assigned according to the following scale. This scale is a guarantee. I reserve the right to lower the grade cutoffs, but I will not raise them.

A+	97–100%	C+	77–79%	F < 59
A	93–96%	C	70–76%	
A-	90–92%	C-	(not given)	
B+	87–89%	D+	67–69%	
B	83–86%	D	63–66%	
B-	80–82%	D-	60–62%	

Tentative Schedule

Week	Topics and Events	Week	Topics and Events
1/18 – 1/22	Review of Chapter 1 Friday: Skills Test	3/22 – 3/26	Sections 2.6, 4.5, 4.8 Friday: Last day to withdraw with a W
1/25 – 1/29	Sections 2.1, 2.7, 2.8	3/29 – 4/2	Sections 4.9, 5.2, 5.3
2/1 – 2/5	Sections 2.2, 2.3, 2.5, 3.1 Friday: Last day to drop.	4/5 – 4/9	Sections 5.4, 5.5, 5.6
2/8 – 2/12	Sections 3.2, 3.3, 3.4, 3.5	4/12 – 4/16	Sections 6.1, 6.2 Friday: Midterm 3
2/15 – 2/19	Sections 3.5, 3.6 Friday: Midterm 1	4/19 – 4/23	Sections 6.3, 6.4 Friday: SpringFest (no classes)
2/22 – 2/26	Sections 3.7, 3.8, 3.9	4/26 – 4/30	6.5, 6.6
3/1 – 3/5	Sections 3.10, 4.1, 4.2	5/3 – 5/7	Catch up
3/8 – 3/12	Spring Break	5/10 – 5/14	Exam Week
3/15 – 3/19	Sections 4.3, 4.4, 4.7 Friday: Midterm 2		

Rules and Policies

Attendance

Attend every class. Attend every recitation. Although attendance is not directly part of your grade, it is very easy in a math class to fall behind after skipping even one class. In my experience, people who skip calculus class fail calculus. Nobody wants that.

Collaboration

You are encouraged to work together in solving the written homework problems. But each student must write up his or her solutions independently. Cloning (copying another student's homework) is not permitted and is a form of Academic Dishonesty (see below). If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

With respect to the online problems, you are also welcome to discuss these problems with your fellow students. But you should be aware that the online problems are randomized so that each student gets a slightly different problem. Hence your solutions will all be a little different.

Late Homework

Written homework is due at the start of class on the date due.

UAF has a long campus, and you might be a minute or two late to class some day. If this happens, discreetly hold on to your homework and ask to hand it in at the end of class. I will accept it. If this policy is abused, I will cease accepting homework turned in after the start of class.

Regarding late written homework, I will accept from each student a single late homework with no questions asked. You must notify me no later than the time the homework is due that you intend to take advantage of this opportunity, and you must hand in the homework no later than one week after it was due. Subsequent late homeworks will be accepted only under extenuating circumstances to be determined at my discretion.

Exam Aids

Exams will be written without any aids. No notes, books or calculators will be allowed.

Makeup Exams

You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Disabilities Services

I will work with the Office of Disabilities Services (203 Whitaker, 474-7043) to provide reasonable accommodation to students with disabilities.

Cell Phones

Turn off your cell phone before you come to class.

Incomplete Grade

Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals

A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty

Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

MATH 201X: Calculus II SPRING 2011
Syllabus

MATH 201, Calculus I

Instructor: Gordon Williams

Contact Details: Chapman 303B, giwilliams@alaska.edu, 455-2756

Office Hours: MW 2:15-3, T 12:30-2, F 2:15-3:15, and by appointment. To make an appointment, just drop me an e-mail. You are also welcome to stop by my office at any time and see if I am free (even without a scheduled appointment); however, there is a possibility that I may be busy/away if you haven't set up an appointment. These office hours are subject to change.

Lecture Hours: MWF 1–2 PM DUCK 252, T 2–3 PM GRUE 206

Textbook: Calculus II, James Stewart (custom edition) ISBN 10: 0-495-45830-9 OR Calculus, James Stewart, 6th edition, early transcendentals

~~Course Web Page: http://sites.google.com/a/alaska.edu/gordon-williams/home/201S2011 Prerequisites: a grade of C or better in Math 200 Calculus I or its equivalent~~

COURSE OVERVIEW AND GOALS:

The course description in the catalog reads as follows:

> Techniques and applications of integration. Integration of trigonometric functions, volumes including those using slicing, arc-length, integration by parts, trigonometric substitutions, partial fractions, hyperbolic functions, and improper integrals. Numeric integration including Simpson's rule, first order differential equations with applications to population dynamics and rates of decay, sequences, series, tests for convergence including comparison and alternating series tests, conditional convergence, power series, Taylor series, polar coordinates including tangent lines and areas, and conic sections.

Here's how I think of the course.

A. We continue where Calculus I left off...integration. We will learn several very sophisticated new methods of integration and we will see some new applications. You will be a good integration machine when we're done!

B. Next we will skip to Chapter 11 on Sequences and Series. This will be a completely new topic for most students and an incredibly interesting and surprising one. There are many ways this material relates to earlier ideas and here's one. Even after we're done with Chapter 8: Techniques of Integration, there will be many lovely, continuous, simple functions we still cannot integrate. The ideas in Chapter 11 will give us a powerful technique for attacking these.

C. We will end with a couple of new methods of representing curves: parametric curves and polar coordinates. In addition to enlarging our repertoire of curves, it is a foreshadowing of some crucial ideas in Calculus III.

COURSE MECHANICS:

> Class meetings will be run as an interactive lecture as much as is possible. I will always begin by asking if there are any questions – about homework or topics recently covered in class— and you

can help things go quickly by writing your questions on the board as we come in to class. Also, I will ask lots of questions of you and encourage you to participate. We will work problems in class too. Lectures will be supplemented with the occasional in-class worksheet or lab activity. You are expected to participate in the lecture by asking questions! I will call on people at random during class.

Attendance is expected and strongly encouraged, but not required. I will take roll regularly.

Online homework will be assigned multiple times each week using the online tool Web Assign. (See instructions on course web site for details.) These assignments will cover the essential practice exercises necessary to make progress in Calculus (approximately 10-15 routine problems per section). All deadlines are final. Your online homework average will be calculated as (points earned)/(points possible).

Textbook homework problems will be assigned regularly. These will be due on a weekly basis and will typically consist of two to three more challenging problems from each section. These problems are especially good practice for learning how to write up a solution to a problem, and a selection of these problems will be graded for both style and correctness (frequently, all of them). Late written homework will not be accepted.

Quizzes will be given intermittently as a check of basic skills. Quizzes will be announced in advance, typically take 20-30 minutes of class time, and grading will emphasize your ability to demonstrate clearly that your answer is the correct one. Make-up quizzes will only be given for excused absences at the instructors discretion. Calculators will not typically be allowed.

For quizzes and written homework the grade bands will be lowered by a letter grade: A (80-100%), B (70-80%), C (60-70%), D (50-60%), F (below 50%).

Exams will be written without the use of calculators. There will be two midterms and a comprehensive final exam. The midterms are tentatively scheduled for Monday February 21st and Monday April 4th. The Final Exam will be Wednesday 11th May 1–3 PM. It is DMS policy that final exams cannot be given early or late.

Make-up Midterms will be given only for excused absences. Except in extreme emergencies, absences must be approved in advance.

Grades will be calculated according to the following rubric:

Written homework / quiz average	10%
Online homework average	10%
Midterm 1	25%
Midterm 2	25%
Final Exam	30%

Grade Bands: A, A- (90 - 100%), B+, B, B- (80 - 89%), C+, C, C- (70 - 79%), D+, D, D- (60 - 69%), F (0 - 59%). I reserve the right to lower the thresholds. Also, in an effort to reward the student who makes significant improvement over the course of the term, a stellar grade on the final may overcome a deficiency on the midterm and improve a student's final grade.

(TENTATIVE) SCHEDULE OF TOPICS:

dates	topics		dates	topics
Week 1	intro, 7.1		Week 10	11.5, 11.6, 11.7
Week 2	7.1, 7.2		Week 11	11.7, 11.8, Review
Week 3	7.3, 7.4		Week 12	Midterm 2, 11.9, 11.10
Week 4	7.5, 7.7, 7.8		Week 13	11.10, 11.11, 10.1
Week 5	7.8, 8.1, 8.2, Review		Week 14	10.1, 10.2, Thanksgiving
Week 6	Midterm 1, 8.3, 11.1		Week 15	10.3, 10.4
Week 7	11.1, 11.2, 11.3		Week 16	10.5, 10.6, Review
Week 8	11.3, 11.4, 11.5		Week 17	Review, Final Exam

MISCELLANEOUS OTHER ISSUES:

Tutoring is available at no extra cost, on a walk-in basis, at the Math Lab in Chapman 305. Hours will be announced and posted on the door. A good way to use the Math Lab is to simply go there to do your homework, so that if any questions arise you can get immediate help.

Course accommodations: If you need course adaptations or accommodations because of a disability, please inform your instructor during the first week of the semester, after consulting with the Office of Disability Services, 203 Whitaker (474-7403).

University and Department Policies: Your work in this course is governed by the UAF Honor Code. The Department of Mathematics and Statistics has specific policies on incomplete grades, late withdrawals, and early final exams, some of which are listed below. A complete listing can be found at http://www.dms.uaf.edu/dms/Policies.html.

Late Withdrawal: This semester the last day for withdrawing with a W appearing on your transcript is Friday, March 25th. If, in my opinion, a student is not participating adequately in the class, I may elect to drop or withdraw this student. Inadequate participation includes but is not limited to: missing an exam, repeatedly failing to take quizzes or complete homework assignments, or having a failing average (below 70%) at the withdrawal date.

Academic Honesty: Academic honesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

Courtesies: As a courtesy to your instructor and fellow students, please arrive to class on time, turn your cell phones and iPods off during class, and pay attention in class.

MATH 202: Calculus III

MTWF 8:00 – 9:00
Gruening 208
http://www.dms.uaf.edu/~eallman/classes/202-fall-2009/202-2009.html

Instructor: Elizabeth S. Allman

Contact Details: Chapman 308B, e.allman@uaf.edu and 474-2479.
Office Hours: T 9-10, W 10:15-11:15, F 10:15-11:15, and by appointment.

Prerequisites: Calc II with a grade of C or better. No exceptions will be made.

Textbook: Calculus (early transcendentals), 5th ed., by J. Stewart, Brooks/Cole

Midterms: (tentative) W October 7, W November 18

Final Exam: Friday, December 18, 8:00 – 10:00 am

COURSE OVERVIEW AND GOALS:

Multivariable calculus is concerned with functions of many variables. Whereas in MATH 200 and MATH 201 you study functions of a single variable (height as a function of age $h(a)$, $f(x)$), in multivariable calculus functions will have more input variables (temperature of a particle in 3-space) or be vector-valued functions (position in 3-space $(x(t), y(t), z(t))$).

Our goal this semester is to extend your knowledge of calculus into the 2-, 3-, and n-dimensional realms. All of the techniques you learned from single variable calculus come into play here. Indeed, taking derivatives and computing integrals in the multivariate setting depends intimately on the ability to apply skills from univariate calculus.

Other interesting topics like vector fields and alternative coordinate systems appear. Multivariate calculus is essential for further study in physics, chemistry, engineering, economics, and many other fields, as well as in mathematics. Though visualization in three dimensions can be hard at first, the benefit is well-worth the effort.

COURSE MECHANICS:

Class meetings will be run as interactive lectures, to the extent possible given the enrollment. That means that while I will be presenting material at the board, and you will be taking notes, I will also be asking for suggestions, ideas, and questions about the material as we go along. I don't expect 'correct' answers, but I do expect you to be actively following and participating (and taking notes) — that makes the class more interesting for us all.

Class attendance is expected, although I will not formally take roll. If you miss a class, you should get notes from another student. Homework assignments will be posted on the course web page either right before class or soon after class is over. You should bookmark the homework web page, as this is where you will find assignments, due dates, and updates.

Quizzes will be given randomly throughout the semester, roughly once per week. These will typically take 10-15 minutes and be similar to recent homework. These serve two primary purposes 1) to encourage you to be present in every class and 2) to ensure that you stay current with the homework. If you expect to miss a class, you should talk to me in advance about having any potential quiz waived — you must have a good reason and (except in situations I consider to be emergencies) you cannot get retroactive approval.

Homework will usually be assigned daily, and collected each Wednesday. I will typically begin each class by asking if there are questions about the last lecture and its homework assignment. That

means you should review notes and make at least an initial attempt on homework problems before the next class meeting, even though problems may not be collected until several days later. While it never hurts to ask, in general I will defer questions about any earlier assignment to my office hours, in order to keep the course moving along.

I encourage you to work with others on the homework, but you must write up solutions independently. You will learn nothing from simply copying someone's solution. Even though you may find you can't do every problem, you must make a reasonable attempt on them all. The entire homework assignment will be checked to be sure you have attempted everything. Selected problems may be graded more completely, if a grader is assigned to this course.

Homework will be accepted until 5pm on its due date, either at my office or in my mailbox in the math department office. I will not accept any late homework that has not been cleared ahead of time or is not due to a genuine emergency (e.g., a death in the family).

Missed examinations that are not approved in advance will result in an 'F' on that exam. No make-up exams will be given except in extreme circumstances (e.g., family death, documented illness, etc.). Notifying me by email or a note that you will miss an exam is not sufficient for advance approval; you must speak with me to be excused.

Tutoring is available at no cost, on a walk-in basis, at the Math Lab in Chapman 305. Hours will be announced, and posted on the door. A good way to use the Math Lab is to simply go there to do your homework, so that if any questions come up you can get immediate help.

Calculators will not be allowed on any examinations or quizzes. This will ensure that testing conditions are equal for everyone. I have no strong feelings on whether you use a calculator when doing homework. As long as you are sure you have the skills to do all calculations by hand, it is fine for you to use technology as a time saver.

Auditing of this course will only be allowed for those who agree to attend regularly, as evidenced by completion of midterm exams and most quizzes.

Grades:

There will be two midterm exams and a cumulative final exam in MATH 202. In addition, there will be weekly homework assignments and regular (announced and unannounced) quizzes. Grades will be assigned using the following weights:

Homework	10 %
Quizzes	15 %
Midterm 1	20 %
Midterm 2	25 %
Final Exam	30 %

Grade Bands: A, A- (90 - 100%); B+, B, B- (80 - 89%); C+, C, C- (70 - 79%); D+, D, D(60 - F%); 69 (0 - 59%). On rare occasion, I may lower the thresholds. Also, in an effort to reward the student who makes significant improvement over the course of the term, a stellar grade on the final may overcome a deficiency on the midterm and improve a student's final grade.

University and Department Policies:

Course accommodations: If you need course adaptations or accommodations because of a disability, please inform your instructor during the first week of the semester, after consulting with the Office of Disability Services, 203 Whitaker (474-7403).

Detailed Policies: Your work in this course is governed by the UAF Honor Code. The Department of Mathematics and Statistics has specific policies on incompletes, late withdrawals, and early final exams, some of which are listed below. A complete listing can be found at

http://www.dms.uaf.edu/dms/Policies.html.

Prerequisites: The prerequisite for MATH 202 is MATH 201 with a grade of C or better. Students not meeting this prerequisite are not eligible to take this course and will be dropped.

Late Withdrawal: This semester the last day for withdrawing with a 'W' appearing on your transcript is October 30.

Graded Coursework: Please keep all graded work for MATH 202 until final grades have been assigned.

Academic Honesty: Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

Courtesies: As a courtesy to your instructor and fellow students, please arrive to class on time and turn your cell phones and iPods off during class.

MATH 302 Differential Equations

Course Overview

A differential equation for a function is an equation involving some of its derivatives. For example,

$$u''(t) = u(t) + 1$$

is a differential equation for the function $u(t)$. You should verify that $u(t) = e^t + 1$ is a solution. In the past you have seen algebraic equations such as

$$u^3 - 2u + 1 = 0$$

where the goal is to find a value of u that solves the equation (e.g. $u=1$). Differential equations are much harder to solve because we are seeking a **function** that solves the equation.

Differential equations occur ubiquitously throughout the sciences and in other quantitative fields. The first section of our textbook gives examples from thermodynamics (Newton's Law of Cooling), population dynamics (population models), physics (velocity, acceleration, and position), chemistry (rates of reactions), and electrical engineering (voltages in circuits). Any time you model the rate of change of some quantity, there is an associated differential equation.

The specific topics covered in this class are: first order differential equations, mathematical modeling, numerical solutions to differential equations, higher order linear equations, elementary linear algebra, systems of differential equations, and Laplace transforms.

Essential Information

Professor	David Maxwell
Office	Chapman 308C
Email	damaxwell@alaska.edu
Phone	474-1196
Web	http://www.maTh.uaf.edu/~maxwell
Text	**Differential Equations: Computing and Modeling**, 4th edition, *Edwards & Penney*

Prerequisites

The course prerequisite is a C or better in Math 202 (Calculus III). We will be using differential and integral calculus frequently in this course.

Class Time

There will be three one-hour lecture classes each week. Although I'll be doing a lot of the talking during lectures, you are strongly encouraged to stop me at any point to ask questions. I'll try to ask you questions along the way as well. Lectures are more interesting and relevant when you participate actively.

Lecture Times

MWF 11:45-12:45 Reichardt 202

Office Hours

My office hours will be posted on my web site and outside my office door. You are very welcome to schedule an appointment outside of my regular office hours; please send me an email and we will arrange a time.

Homework, Quizzes, Labs

Like most math classes, the best way to learn the material in this class is to work on problems. So we'll have regular homework assignments.

Homework will be assigned a little more frequently than once a week. You can expect to hand in homework as follows: Wednesday, Monday, Friday, Wednesday, Monday, Friday, etc.

Homework will be due two classes later than it is assigned, so homework assigned on a Wednesday (for example) will be due on the following Monday. The hope is that you will be motivated to keep on top of the homework if it is due more frequently than once per week.

Homework will be due in my box in the Chapman office, by 4:00pm on the day it is due.

I will accept from every student a single late homework without any questions. Hand in a piece of paper when the homework is due with a note on it to let me know that you are taking your late homework, and and the homework will then be due on the next homework's due date (or one week later, whichever comes first).

There will be occasional unannounced quizzes. These will be 10-15 minute long and emphasizing basic computational techniques. Quizzes cannot be made up unless there are extenuating circumstances.

In addition to the more routine homework, there will be about three labs (i.e short projects) covering more in-depth material. Each lab will take about a week to complete.

Matlab/Octave

From time to time we will use Matlab on assignments and for the labs. I do not expect that you have any Matlab experience, and I will provide materials to help you get up to speed in using Matlab. Matlab is available from the bookstore at an educational price of about $100. You also have the option of using free software, Octave, that has a Matlab-like interface. It's a little more awkward to use Octave, but it is free. Instructions for installing Octave will be available on my web page.

Honors Section

Some students in this class are enrolled in an Honors section. Those students will be working on course projects this semester. A separate syllabus will be handed out on Wednesday, Sept. 8. If you are taking the Honors section, please try to come to class early on the 8th so we can briefly go over the Honors syllabus.

MaTh Lab

The Math Lab in Chapman 305 has tutors available at scheduled times throughout the week. The tutors are most experienced at answering calculus questions, but you might find that some of the tutors (especially the graduate students) would welcome the opportunity to discuss something

other than calculus. The hours for the Math Lab are posted on its door and on a link from the department's home page at http://www.dms.uaf.edu.

Midterms

There will be two midterm exams. These will **not** be comprehensive, and are tentatively scheduled for Monday, October 11 and Monday, November 8.

Final Exam

There will be a comprehensive final exam 10:15–12:15 on Wednesday, December 15.

Evaluation

Course grades will be determined as follows:

Homework	20%
Quizzes	5%
Labs	10%
Midterm 1	20%
Midterm 2	20%
Final	25%

Letter grades will be assigned according to the following scale. This scale is a guarantee. I reserve the right to lower the grade cutoffs, but I will not raise them.

A+ 97–100%	C+ 77–79%	F < 59
A 93–96%	C 70–76%	
A- 90–92%	C- (not given)	
B+ 87–89%	D+ 67–69%	
B 83–86%	D 63–66%	
B- 80–82%	D- 60–62%	

Tentative Schedule

Week	Topics and Events
9/3	Section 1.1
9/6 – 9/10	Chapter 1 Monday: Labor Day
9/13 – 9/17	Chapter 1
9/20 – 9/24	Chapter 2
9/27 – 10/1	Chapter 2
10/4 – 10/8	Chapter 3
10/11 – 10/15	Chapter 3 Monday: First Midterm
10/18 – 10/22	Chapter 3
10/25 – 10/29	Chapter 4 Friday: Last day to withdraw with a 'W'
11/1 – 11/5	Chapter 5

11/8 – 11/12	Chapter 5 Monday: Second Midterm
11/15 – 11/19	Chapter 6
11/22 – 11/26	Chapter 6 Thursday: Thanksgiving
11/29 – 12/3	Chapter 7
12/6 – 12/10	Chapter 7
12/13	Exam Week Monday: Last day of class

Rules and Policies

Attendance
Attend every class. Although attendance is not directly part of your grade, it is very easy in a math class to fall behind after skipping even one class. In my experience, people who skip math classes fail math classes. Nobody wants that.

Collaboration
You are encouraged to work together in solving the written homework problems. But each student must write up his or her solutions independently. Cloning (copying another student's homework) is not permitted and is a form of Academic Dishonesty (see below). If you receive significant help solving a problem, it is customary to make a note in your homework to give the person who helped you credit.

Late Homework
Written homework is due at 4:00 on the date due.

You may turn in one homework late, with no questions asked, so long as you notify me before the time the homework is due. If there are extenuating circumstances in your life you may be able to hand in more than one late homework. Please see me in such an event.

Makeup Exams
You can make up an exam if certain extenuating circumstances prevent you from taking it and if you inform me in advance. Contact me as soon as possible if you are going to miss an exam.

Disabilities Services
I will work with the Office of Disabilities Services (203 Whitaker, 4Þ4-Þ043) to provide reasonable accommodation to students with disabilities.

Cell Phones
Turn off your cell phone before you come to class.

Incomplete Grade
Incomplete (I) will only be given in Computer Science, Mathematics or Statistics courses in cases where the student has completed the majority (normally all but the last three weeks) of a

course with a grade of C or better, but for personal reasons beyond his/her control has been unable to complete the course during the regular term. Negligence or indifference are not acceptable reasons for the granting of an incomplete grade. (Note: this is essentially the old University policy.)

Late Withdrawals

A withdrawal after the university deadline from a Department of Mathematical Sciences course will normally be granted only in cases where the student is performing satisfactorily (i.e., C or better) in a course, but has exceptional reasons, beyond his/her control, for being unable to complete the course. These exceptional reasons should be detailed in writing to the instructor, department head and dean.

Academic Dishonesty

Academic dishonesty, including cheating and plagiarism, will not be tolerated. It is a violation of the Student Code of Conduct and will be punished according to UAF procedures.

Discrete Mathematics (MATH/CS F307) Fall 2010

Instructor: Dr. Leah Berman

Office: Chapman 303A

Office Phone: 907-474-7123

Cell Phone: 907-347-4021 (don't call after 9 PM)

e-mail: lwberman@alaska.edu (best way to contact me!)

AIM screen name: leahwrenn

Classroom and class meeting times: Gruening 413, MWF, 1 – 2 PM.

Office hours: MWF 2–3 PM, Th 10 – 11AM, and by appointment. To make an appointment, just drop me an e-mail. You are also welcome to stop by my office at any time and see if I am free (even without a scheduled appointment); however, there is a possibility that I may be busy/away if you haven't set up an appointment. These office hours are subject to change.

Prerequisites: MATH F201X or permission of instructor.

Course description, goals, student learning outcomes: Logic, counting, sets and functions, recurrence relations, graphs and trees. Mathematical induction.

Required Text: Dossey, Otto, Spence, Vanden Eynden. *Discrete Mathematics, 5th edition*.

Instructional methods:

Lecture: Class meets three times a week; these will be primarily active lectures, supplemented with the occasional in-class worksheet. You are expected to participate in the lecture by asking questions! I will call on people at random during class.

Homework: Homework will be assigned on a regular basis; it will be listed on Blackboard, and you will be responsible for checking on a regular basis. All homework problems will be collected and *graded for completeness*; I will not be grading the correctness of the homework, but I will be recording whether or not you attempted all the problems. **You are responsible for asking questions about the homework in class.** You are encouraged to collaborate with your classmates on homework, but you must write up and hand in your solutions individually. You may find it helpful to study in the Math Lab, Chapman 305. Homework (raw count of problems completed) will also count for 5% of your grade.

Quizzes: There will be 20–30 minute quizzes every Friday, excluding weeks in which there are exams.

The first quiz will be September 10, 2010. If, at the end of the semester, you have at least an 80% completeness grade on the homework, then your lowest quiz score will be dropped.

A note about grading of quizzes: The quizzes will serve as your first assessment on much of the material. As such, I do not expect everyone to get everything correct all the time! The guaranteed minimum A grade (not A-) for quizzes is 90% (although it may be lower, at my discretion), and the guaranteed minimum D- grade is 50%.

Exams: There will be three in-class exams. These are tentatively scheduled for Friday October 1, Friday October 29, and Wednesday November 24 (the day before Thanksgiving). There will be one final exam, scheduled for 1 – 3 p.m., Wednesday, Dec. 15.

Tentative schedule: (subject to change)

Weeks	Chapter in the text
1 –2	1
2	Appendix A
3–4	2
5–6	4
7–8	5
9–11	8
12–13	9

Course Policies:

e-mail: *You are responsible for checking your* alaska.edu *e-mail account every day before class.* This is the e-mail address I have access to, and this is what I will use to get in touch with you. If you don't typically check it, then set it up to forward to your main account.

Absences and make-ups: You are expected to attend every class. Missing classes will have an adverse effect on your course grade. *If you miss more than six classes, or if you do not show up to take an exam, I may withdraw you from the course.*

If you must miss class, you are responsible for notifying me ahead of time to make appropriate ar- rangements. Except in unusual circumstances, make-up quizzes and exams will not be given.

Illness: Please do not come to class if you are possibly contagious. If you are too sick to come to class, please e-mail me **BEFORE CLASS**. Except under extreme circumstances, if you do not e-mail me before class I may not be able to arrange for make-up quizzes, etc.

Announcements: From time to time, announcements and comments will be sent out via e-mail. **It is your responsibility to check your e-mail account to receive this information.**

Evaluation:

Homework	5%
Quizzes	25%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final exam	25%

To get a rough sense of how numerical grades correspond to letter grades, in general, 93% is the lower bound for an A and 55% is the lower bound for a D-, with linear interpolation in between, so that a numeric grade may be calculated by putting a percentage into the function $gr(x) = 23/6 + (5/57)(x - 93)$. This implies that the lower bound for an A- is 89.2%, the lower bound for a B- is 77.8%, etc. However, I reserve the right to change this scheme slightly depending on the particulars of the exam (e.g., how easy/hard it was). Also, your final grade will be calculated by summing all your numerical (not letter) grades, weighted as shown above. If you have any questions or concerns, come talk to me!

Support Services: You are strongly encouraged to attend office hours if you have questions, or e-mail/instant message me. I also encourage you to work with other students where appropriate. You may find the Math Lab (Chapman 305) to be helpful as well.

Disabilities Services: The Office of Disability Services implements the Amreicans with Disabilities Act (ADA) and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disability Services (203 WHIT, 474-7043) to provide reasonable accomodation to students with disabilities. Please come talk to me as soon as possible if you have/need accomodations.

Library Science syllabus

Syllabus LS101 - Jensen

Class Meeting Location, Dates and Time

Dates: Fall Semester, 2010, Wed. Sept. 8th-Wed. Oct. 27th
Days: Monday and Wednesday
Time: 9:15-10:15am
Location: Rasmuson Library Computer Lab, level 3 (room 301)
Note that this will be our regular class meeting location, rather than the Gruening classroom indicated in the course catalog. We will meet in Gruening 413 only twice: on Monday October 4th, and Wednesday October 6th, when the lab is unavailable.

See the Announcements section on Blackboard for any last-minute schedule changes.

Instructor Information

Instructor:	*Karen Jensen*
Phone:	474-6695 *(work)*
Office Location:	Room 417, Rasmuson Library
Office Hours:	Tues. 9:00-10:00am, and Wed. 10:30-11:30am, or by advance appointment at other times
E-Mail:	kljensen@alaska.edu
Instructor's Web Page:	http://library.uaf.edu/blogs/collection-development/

Course Calendar

LS101 course calendar fall 2010.docx (19.214 Kb)
Dates are subject to change throughout course. If in doubt, please ask!

Course Description LS101-F01

Library Information and Research is part of the Core Curriculum requirements needed for UAF graduation. **To fulfill this core requirement you may choose** either one of the following two options:

1) Complete the 1-credit course by registering for a classroom section on Fairbanks main campus **OR** a web-based section, **OR** a correspondence section offered through the Center for Distance Education;

2) Pass the LS101 competency exam, administered by UAF's Testing Services. (No credit earned)

Library Information and Research is designed as an introduction to effective library research methods and principles of information organization and retrieval. Class work emphasizes experience with finding and evaluating information, through use of library materials, library catalogs, journal indexes and online databases, and other Internet resources.

Course Goal and Learning Objectives

Goal:
The purpose of this course is for you to learn the skills to find authoritative information on topics for any course assignment or project. You will also find that these lifelong skills will be transferable to information-seeking activities beyond your university education, for both professional work and personal needs and interests.

Student Learning Objectives:
By the end of this course, you should be able to:

-Define a research topic and strategy for finding information about it
-Select a variety of appropriate resources, including background and reference information, books, articles, and Internet sources for your topic
-Critically evaluate the sources you find
-Cite your sources correctly and know how to avoid plagiarism
-Understand the legal and ethical issues of using specific types of information
-Describe the purpose and function of libraries in contemporary society

Instructional Methods

Lectures and hands-on exercises provide the general format for the course during class meetings. Homework and additional materials for this course are online and will not be distributed during class. You will need to use UAF email, Blackboard, and Google Docs to obtain class materials; **you must use your UAF email so that I can communicate with you** and share documents with you. In other words, **you are required to use your UAF email for the duration of this class!** I work in the Rasmuson Library, where I can meet with you individually if you need assistance with the course. You can also call me on the telephone for assistance. Please use my posted office hours, or set up an appointment in advance, so that I will not be occupied when you come in for help.

Short assignments, including reading and written work, will be due almost every day of class. These exercises and readings allow you to practice the skills we discuss in class and are vital not only to your course grade, but to your overall learning. A final project demonstrating your library research abilities will be expected at the conclusion of the course. All graded course material is due by the last day of class for any credit to be given.

Course Policies

- Late assignments: Because this class is condensed, i.e., completed by Oct. 27th instead of the end of the semester, late assignments will lose 1 point for every day they are late. If you turn assignments in on time, you will have the option to re-do the work for missed points. This is not an option for late submissions.
- All assignments must be turned in by the final day of class to receive any credit.

- Early assignments: You may work ahead as much as you like. If you know a lot about library research, you could probably do it all in a weekend. But if you know that much about library research, why not test out of the course requirement instead of taking it? To arrange the test, contact UAF Testing Services.
- In all written work I expect complete sentences with proper spelling, punctuation and grammar, even though you are submitting assignments electronically. Express yourself clearly and completely. I will subtract points for blatant errors. I will not accept assignments that are truly terrible. "Chat" or "texting" language or abbreviations are not acceptable. This is a university course; your written language should demonstrate your ability to communicate effectively.
- Each assignment and the final project are your own work and should reflect your own knowledge of the course material; you will gain nothing from this course if you cannot complete these on your own. **If I determine that materials are copied, zero credit will be given for the course.**
- Honor code: Please refer to page 77 of the UAF catalog for the Student Code of Conduct; this applies to your work in this course.

Course Readings

There is no required textbook. Assigned readings are available via Blackboard. Additional suggested readings will be in the "supplementary material" section in Blackboard. Some of these materials may help you in doing the other readings or assignments; for example it contains a glossary of library terms.

Graded Assignments

All 7 assignments and the Final Project are available on Blackboard. You may submit them electronically via Blackboard, or by email attachment. If you don't know how to do this, please ask me to help you with the first one. See the course calendar for due dates.

Grading Policy

Grading will be based on absolute point scores with no rounding.

Possible grades are **A**, **B**, **C**, **D**, **F**, **AU**, **NB**, and **I; plus and minus grades will not be used**. Incompletes are rarely given, and only under reasonable, unforeseen, exceptional circumstances.

1. Complete all 7 assignments up to 10 points each for total of 70 points.
2. Complete the final project up to 30 points.

3. Do some extra credit. There is an extra credit assignment included in the list of assignments on Blackboard. You could earn up to 10 points for the class this way, depending on the quality of your essay.

Total of 100 graded points possible; final grades are based on the total number of points earned plus any extra credit points:

A = 91 -100
B = 81 - 90
C = 71 - 80
D = 65 - 70
F = 64 or fewer

Disabilities Services

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. I will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities.

Library Science 101, Fall 2010 Course Calendar

Instructor: Jensen

Dates are subject to change as needed.

All "**readings**" and their **due dates** are in the "Readings" section of Blackboard. All "**graded assignments**" and their **due dates** are in the "Assignments" section of Blackboard. If I make changes in due dates Blackboard **Readings** and **Assignments** will be updated; you will not receive a paper handout.

Class meets in Rasmuson 301 computer lab unless otherwise noted.

Wednesday, Sept. 8 DAY ONE

Pre-test. Introductions, review syllabus, purpose of course, assignments, class and grading policies. How to navigate the course in Blackboard, work on and submit assignments. How to get help. Other options to meet Library Science core requirement. Intro to Finding library resources.

PPT: Finding library resources. Optional library tour after class.

Readings due: Finding library resources, Getting acquainted with the UAF Libraries.

Monday Sept. 13 DAY TWO

Organize your research. Formulating topic statements. Topic selection for final project. Citing your sources. Consequences of plagiarism. In-class exercise: identifying parts of a citation.

PPT: Organizing research and citing sources.

Readings due: The Research Process, Plagiarism Videos, Citing Your Sources

Wednesday Sept. 15 DAY THREE

Finding books. Catalogs, access points, integrated library systems, Goldmine. Online books, audio books, book reviews. In-class exercise: catalog searching.

PPT: Finding books.

Graded assignment 1 due: The Research Process: Choosing a Topic

Monday Sept.20 DAY FOUR

Online search strategies. Review graded assignment one. Start assignment two in class.

PPT: Online search strategies.

Readings due: Catalogs, Access Points, Goldmine

Wednesday Sept. 22 DAY FIVE

LC Classification and Call numbers. Systems of organization, searching for call numbers electronically and physically. Different format collection materials. In-class exercise: classification and call numbers.

PPT: Library classification and call numbers

Reading due: Classification Systems

Graded assignment 2 due: Using Library Catalogs

Monday Sept. 27 DAY SIX

Review Access Points assignment. Reference resources. Collection development.

PPT: Reference resources and collection development

Reading due: Reference Sources

Wednesday Sept. 29 DAY SEVEN – Class is halfway through!

Review of concepts. Final Project discussion. Value of libraries. Listen to podcast "Who needs libraries" over weekend.

Movie: **Remote Access: Distant Libraries of the World**

Reading due: Scholarly and Popular Periodicals

Graded assignment 3 due: Finding Library Materials Using Classification Systems and Call Numbers

Monday Oct. 4 DAY EIGHT – **MEET IN GRUENING 413**

Searching for articles. Scholarly and popular periodicals. Database searching. Full-text or indexes. Strategies for searching. In-class exercises: Finding articles.

PPT: Searching for articles

Reading due: UAF Journals List

Graded assignment 4 due: Reference Sources

Wednesday Oct. 6 DAY NINE – **MEETING GRUENING 413**

More on searching for articles. **Podcast:** Who needs libraries?

Work on assignment due Friday.

PPT: Finding articles Part II

Reading due: More on searching for Periodicals

Monday Oct. 11 DAY TEN

Internet and its impact on libraries, information quality, and evaluating web resources. Effective Internet searching. Web 2.0. In-class exercise: evaluate a web page.

PPT: Finding internet resources

Reading due: Evaluating Sources: Think Critically! THIS IS A CRITICAL READING, BE SURE YOU'VE DONE IT BEFORE CLASS!

Graded assignment 5 due: Searching for Articles

Wednesday Oct. 13 DAY ELEVEN

Government documents. Depository library program. Why do we need access to government information? Freedom of Information Act. In-class exercise: Finding government information.

PPT: Government documents: finding government information in the library

Reading due: Government Documents

Graded assignment 6 due: Internet Tools

Monday Oct. 18 DAY TWELVE

Critical thinking and evaluating sources.

Graded assignment 7 due: Issues in the World of Information

Wednesday Oct. 23 DAY THIRTEEN

Intellectual freedom. First amendment. Censorship and selection. Library privacy. In-class exercise: Book challenges to the library board; what should be censored and who should do it?.

PPT: Intellectual Freedom

Reading due: Freedom to Read (on ERes) – be prepared for discussion!

Monday Oct. 25 DAY FOURTEEN

Guest lecture on internet privacy. (Jensen will be gone; please come to class to hear our guest speaker on a topic that will be relevant to you for the rest of your lives!)

Wednesday Oct. 27 – DAY FIFTEEN

Wrap-up. Turn in projects. Post-test. Course evaluations.

FINAL PROJECTS WITH ANNOTATIONS DUE TODAY.

Appendix B – Faculty Vitae

David L. Barnes

1. Education

Ph.D. in Chemical and Bioresource Engineering (Emphasis on Contaminant Fate and Transport), Colorado State University, 1997
M.S. in Civil Engineering (Emphasis in Environmental Engineering), New Mexico State University, 1987
B.S. in Civil Engineering, New Mexico State University, 1985

2. Academic experience

2008-present: Professor and Chair, Department of Civil and Environmental Engineering, UAF
2006-2008: Assoc. Professor and Chair, Department of Civil and Environmental Engineering, UAF
2004-2006: Associate Professor, Department of Civil and Environmental Engineering, UAF
1999-2004: Assistant. Professor, Department of Civil and Environmental Engineering, UAF

3. Non-academic experience

- Research Program Manager, University of Texas, Amarillo National Resource Center for Plutonium.
- Design Engineer, Geoscience Consultants, Ltd, Albuquerque, New Mexico.

4. Certifications or professional registrations

Registered Professional Civil Engineer (New Mexico certificate number 11480)

5. Current membership in professional organizations

Member of the American Society of Civil Engineers.

6. Honors and awards

- US Delegate to the Arctic Council Emergency Prevention, Preparedness and Response Working Group Meeting, 2004, 2007, 2009, 2010
- Voted runner up for Faculty of the Year award by the Associated Students of University of Alaska Fairbanks, 2008.
- Australian Antarctic Division Visiting Scientist, January 2008.

7. Major Service activities (within and outside of the institution)

- Faculty advisor of American Society of Civil Engineers UAF student chapter (1999-2003).
- Department Chair of Civil and Environmental Engineer.
- National Society of Professional Engineers (Vice President of local chapter 2000-2001 and 2002-2003).
- American Society of Civil Engineers Technical Council on Cold Regions, Environmental and Public Health Engineering Committee.
- Contaminants in Freezing Ground International Steering Committee (Co-Chair 2002-2004)

8. Selected Publications and Presentations (in the last five years)

Carlson, A.E. and D.L. Barnes. 2011. Movement of Trichloroethene in a Discontinuous Permafrost Zone. *Journal of Contaminant Hydrology*, 124, no.1-4: 1-13.

Munk, J., W.E. Schnabel, D.L. Barnes, and W. Lee. 2011. Atomospheric Loading Effects on Free Draining Lysimeters. *Water Resources Research*, 47, Wo5541, doi:10.1029/2010WR009784.

Ranft, R.D., S.S. Seefeldt, M. Zhang, and D.L. Barnes. 2010. Development of a Soil Bioassay for Triclopyr Residues and Comparison with a Laboratory Extraction. *Weed Technology*, 24, no.4: 538-543.

Benning, J.L. and D.L. Barnes. 2009. Comparison of Methods for the Determination of Diffusion Coefficients and Effective Porosities in Through-Diffusion Tests. *Water Resources Research*. 45, W09419, doi:10.1029/2008WR007236.

Benning J.L. and D.L. Barnes. 2009. The Effects of Scale and Spatial Heterogeneities on Diffusion in Volcanic Breccias and Basalts: Amchitka Island, Alaska. *Journal of Contaminant Hydrology*, 106, no. 3-4: 150-165.

Benning, J.L., D.L. Barnes, J. Burger, and J.J. Kelley. 2009. Amchitka Island, Alaska: Moving Towards Long-Term Stewardship. *Polar Record*, 45 no. 233: 133-146.

Chambers, M.K., M.R. Ford, D.M. White, D.L. Barnes, and S. Schiewer. 2009. Transport of Fecal Bacteria by Boots and Vehicle Tires in a Rural Alaskan Community. *Journal of Environmental Management*, 90, no. 2: 961-966.

Chambers, M.K., M.R. Ford, D.M. White, D.L. Barnes, S. Schiewer. 2008. Distribution and Transport of Fecal Bacteria at Spring Thaw in a Rural Alaskan Community. *Journal of Cold Regions Engineering*, 22, no 1: 16-37.

Barnes, D.L. and K. Biggar. 2008. Movement of Petroleum Hydrocarbons Through Freezing and Frozen Soils. *In* Filler, D.M., I. Snape, and D.L. Barnes (Eds) *Bioremediation of Petroleum Hydrocarbons in Cold Regions*, Cambridge University Press: 55-68.

Barnes, D.L. and E. Chuviline. 2008. Petroleum Migration in Permafrost Affected Regions. In Margesin, R. (ed) *Permafrost Soils*, Springer Verlag: 263-278. (Invited chapter).

Barnes, D.L. and S.M. Wolfe. 2008. Influence of Ice on the Infiltration of Petroleum into Frozen Coarse Grain Soil. *Petroleum Science and Technology*, 26, no.7&8: 856-867. (Invited article).

Adhikari. H., D.L. Barnes, S. Schiewer, and D.M. White. 2007. Survivability of Coliforms in Soils at Subzero Temperatures. *Journal of Environmental Engineering*, 133, no. 12: 1098-1105.

Burger, J., M. Gochfeld, C.W. Powers, D. Kosson, J. Halverson, A. Morkill, R. Patrick, P. Sanders, L. Duffy, and D. Barnes. 2007. Scientific Research, Stakeholders, and Policy: Continuing Dialogue During Research on Radionuclides on Amchitka Island. *Journal of Environmental Management*, 85, no. 1*: 232-244*.

Børresen, H.M., D.L. Barnes, and A.G. Rike. 2007. Repeated Freeze-Thaw Cycles and Their Effects on Mineralization of Hexadecane and Phenanthrene in Cold Climate Soils. *Cold Regions Science and Technology*, 49, no. 3: 215-225.

Unsworth, M.. W. Soyer, V. Tuncer, A. Wagner, and D. Barnes. 2007. Hydrogeological Assessment of the Amchitka Island Nuclear Test Site (Alaska) with Magnetotellurics. *Geophysics*, 72 no 3: B47-B57.

Fourie, W., D.L. Barnes, and Y. Shur. 2007. The Formation of Ice From the Infiltration of Water in Frozen Coarse Grain Soils. *Cold Regions Science and Technology*, 28, no 2: 118-128 .

9. Professional development activities

- ASCE ExCEEd workshop participant 2001
- ASCE ExCEEd workshop assistant instructor 2002
- Australian Antarctic Division Visiting Scientist, January 2008.

Billy Connor

1. **Education**
   MS Engineering Management University of Alaska Fairbansk 1985
   BS Civil Engineering University of Alaska 1975

2. **Academic Experience**

July 2005, Director of the Alaska University Transportation Center, Institute of Northern Engineering

January 2009 Adjunct Professor, Department of Civil and Environmental Engineering University of Alaska Fairbanks

3. **Non-academic Experience**
   1975 – 2005 Positions include Research Engineer, Northern Region Hydraulics Engineer, Construction Project Manager, Statewide Research Manager

4. **Certifications or Professional Registrations**
   Registered Professional Civil Engineer, State of Alaska

5. **Current Membership in Professional Organizations**
   Member, American Society of Civil Engineers
   Emeritus Member Transportation Research Board

6. **Honors and Awards**
   KB Woods Award, Transportation Research Board, 1982
   ASCE Cold Regions Journal Best Paper
   ASCE Fairbanks Chapter Engineer of the Year, 2003

7. **Service activities (within and outside of the institution)**
   Past Chair TRB Committee on Managing Pavements
   Co-chair 3rd International Conference on Managing Pavements
   Past Chair TRB Committee on Frozen Soils
   Member TRB Committee on Unsaturated Soils
   Emeritus Member TRC Committee on Environmental Effects on Soil
   Past Member TRB Committee on Strength and Deformation of Soils
   Member of TRB Committee on Pavement Preservation
   Member of Canadian Permafrost Networking Group
   Past Chair ASCE Committee on Frozen Ground
   Member ASCE Committee on Frozen Ground
   Member ASCE Technical Council on Cold Regions Engineering Transportation Committee
   Organizing Committee Ninth International Conference on Permafrost
8. **Selected Publications and Presentations (in the last five years)**
   - "Airport Manager's Guide for the Maintenance of Asphalt Pavements of General Aviation Airports",Thomas L. Moses, J. Leroy Hulsey, Billy Connor, INE/AUTC 08.19 CA08-0564, Jan 2009

- “The Use of Geofiber and Synthetic Fluid for Stabilizing Marginal Soils”, Kenan Hazirbaba, Billy Connor, Duane Davis, Yu Zhang, INE/AUTC RR07.03,Oct 2007

Ming S. Lee

1. **Education**
   Ph.D. in Civil Engineering, University of California Irvine, 2001
   M.S. Civil Engineering, Pennsylvania State University, May, 1996.
   B.S. Agricultural Engineering, National Taiwan University, Taipei, Taiwan, June, 1991.

2. **Academic Experience**
   Civil and Environmental Engineering, University of Alaska Fairbanks, Assistant Professor, August 2006 to present, Full time
   Civil and Environmental Engineering, Utah State University, Postdoctoral Research Associate, July 2005 to July 2006, Full time

3. **Non-academic Experience**
   DKS Associates, Oakland, California, Senior Associate Engineer, November 2003 to June 2005, Full time
   TJKM Transportation Consultants, Pleasanton and Santa Rosa, California, Transportation Engineer, August 2001 to November 2003, Full time

4. **Certifications or Professional Registrations**
   EIT, California

5. **Current Membership in Professional Organizations**
   Associate Member, American Society of Civil Engineers
   Associate Member, Institute of Transportation Engineers

6. **Honors and Awards**

7. **Service activities (within and outside of the institution)**
   Member, Technical Committee on Traveler Behavior and Values (A1C04), Transportation Research Board, 2002 to 2005.
   ABET Accreditation coordinator, Civil and Environmental Engineering, University of Alaska Fairbanks

8. **Selected Publications and Presentations (in the last five years)**
   a) Lee, M. (2007) A Causal Analysis of Motor Vehicle Crash Data in the Cold Regions of the United States. (Published extended abstract) 8th International Symposium on Cold Region Development. Tampere, Finland, September 25 - 27, 2007
   b) Ming Lee and Michael G. McNally. (2006) An empirical investigation on the dynamic processes of activity scheduling and trip chaining. Transportation, Volume 33, Number 6, pp. 553-565
   c) Lee, M., and McNally, M. G. (2003) “On the structure of weekly activity/travel patterns", Transportation Research Part A, Vol. 37/10, pp 823-839.

9. Professional Development Activities

a) ABET Symposium, 2009, Indianapolis, IN
b) ABET Program Assessment Workshop, 2008, Nashville, TN

Horacio Toniolo

1. **Education**
   Universidad Nacional del Litoral (Argentina), Water Resources, B.S., 1991
   Universidad Nacional del Litoral (Argentina), Water Resources Engineering, M.S., 1999
   University of Minnesota, Civil Engineering, Ph.D., 2002

2. **Academic experience**
   Associate Professor, University of Alaska Fairbanks, Dept. of Civil Engineering, 2008 - present
   Assistant Professor, University of Alaska Fairbanks, Dept. of Civil Engineering, 2003 - 2008
   Assistant Researcher, University of Minnesota, 1999 - 2002
   Researcher, Universidad Nacional del Litoral, Argentina, 1992 - 1999

3. **Non-academic experience**
4. **Certifications or professional registrations**
5. **Current membership in professional organizations**
   ASCE – Member
   AGU – Member
   AWRA – Member
   AWRA-AK Section – Past President

6. **Honors and awards**

7. **Major Service activities (within and outside of the institution)**
   - Faculty advisor of American Society of Civil Engineers UAF student chapter (1999-2003).
   - Department Chair of Civil and Environmental Engineer.
   - National Society of Professional Engineers (Vice President of local chapter 2000-2001 and 2002-2003).
   - American Society of Civil Engineers Technical Council on Cold Regions, Environmental and Public Health Engineering Committee.
   - Contaminants in Freezing Ground International Steering Committee (Co-Chair 2002-2004)

8. **Selected Publications and Presentations (in the last five years)**
   - **Toniolo, H.,** Duvoy, P., Vanlesberg, S. and Johnson, J. "Modeling and field measurements in support of the hydrokintecis resource assessment for the Tanana river at Nenana, Alaska". *Journal of Power and Energy,* Vol. 224 Issue A8 (2010), 1127 – 1140.
   - **Toniolo, H**., Derry, J., Irving, K. and Schnabel, W. "Hydraulic and sedimentological characterization of a reach on the Anaktuvuk River, Alaska". *Journal of Hydraulic Engineering*, Vol. 136, No 11 (2010), 935 – 939.
   - Rowland, J., Jones, C., Altmann, G., Bryan, R., Crosby, B., Geernaert, G, Hinzman, L, Kane, D., Lawrence, D., Mancino, A., Marsh, P., McNamara, J., Romanosky, V., **Toniolo, H**., Travis, B., Trochim, E, and Wilson, C. "Arctic landscapes in transition: Responses to thawing permafrost". *EOS*, Vol. 91, No 26, (2010) 229 - 230.
   - **Toniolo**, **H.** Numerical simulation of sedimentation processes in reservoirs as a function of outlet location. *International Journal of Sediment Research*, Vol. 24, No 3, (2009) 339 - 351.
   - **Toniolo, H.**, Kodial, P., Hinzman, L.D. and Yoshikawa, K. "Spatio-temporal evolution of a thermokarst in Interior Alaska". *Cold Regions Science and Technology* (2009). doi:10.1016/j.coldregions.2008.09.007.
   - **Toniolo**, **H**., Parker, G. and Voller V. "Role of ponded turbidity currents in reservoir trap efficiency". *Journal of Hydraulic Engineering,* Vol. 133 No 6, (2007) 579 -595.

- Parker, G. and **Toniolo**, **H**. "Note on the analysis of plunging of density flows". *Journal of Hydraulic Engineering*. Vol. 133 No 6, (2007) 690-694.
- **Toniolo**, **H**. and Cantelli, A. "Experiments on upstream migrating submarine knickpoints". *Journal of Sedimentary Research* 77, (2007) 772 - 783.
- **Toniolo**, **H**., Lamb, M. and Parker, G. "Depositional turbidity currents in diapiric minibasins on the continental slope: Formulation and theory". *Journal of Sedimentary Research* 76, (2006) 783 - 797
- **Toniolo, H.**, Parker, G., Voller, V. and Beaubouef, R. "Depositional turbidity currents in diapiric minibasins on the continental slope: Experiments - numerical simulation and upscaling". *Journal of Sedimentary Research* 76, (2006) 798 - 818
- Lamb, M., **Toniolo, H.** and Parker, G. "Trapping of continuous turbidity currents by intraslope minibasins". *Sedimentology* 53, (2006) 147 -160

9. Professional development activities

Dr. Toniolo has developed strong interrelations with members of other disciplines such as geomorphologists and petroleum geologists. As examples, Dr. Toniolo published several papers in conference proceedings and journals, as well as a chapter in a book co-authored by geomorphologists in Argentina. His research on depositional turbidity currents in minibasins on the continental slope has impacted the oil industry. Dr. Toniolo interacts regularly with petroleum geologists from the ExxonMobile Company as they strive to improve the understanding of fill and spill processes in these minibasins.

Yongtao Dong

1. **Education**
   Ph.D. in Civil Engineering, University of Illinois Chicago, 2003.
   M. S. Structural Engineering, Harbin Institute of Technology, China, 1991.
   B.S. Civil Engineering, Zhengzhou University, China, 1989.

2. **Academic Experience**
   Civil and Environmental Engineering, University of Alaska Fairbanks, Assistant Professor, January 2007 to present, Full time

3. **Non-academic Experience**
   Matrix Engineering Corp., Chicago, Illinois, Structural Engineer, July 2005 to December 2006, Full time.
   Progressive Engineering Inc., Goshen, Indiana, Structural Engineer, June 2003 to June 2005, Full time

4. **Certifications or Professional Registrations**
   PE, Ohio

5. **Current Membership in Professional Organizations**
   Associate Member, American Society of Civil Engineers
   Member, Int. Society of Structural Health Monitoring of Intelligent Infrastructure
   Member, American Concrete Institute

6. **Honors and Awards**

7. **Service activities (within and outside of the institution)**
   Curriculum Review Committee, College of Engineering and Mines, UAF
   Scholarship Committee, College of Engineering and Mines, UAF

8. **Selected Publications and Presentations (in the last five years)**
   c) Dong, Y., Farhad, A. and Karbhari V., "Fatigue performance of reinforce concrete beams with externally bonded CFRP reinforcement," Structures and Infrastructure Engineering, Taylor & Francis Publications, Vol. 7, No. 3, March 2011, 229–241
   d) Yuan, L and Dong, Y., "Loop topology based white light interferometric fiber optic sensors network for application of perimeter security," Photonic Sensors, Vol. 1, No. 1:1-4 (2011)
   e) Dong, Y. and Farhad, A., "Chapter 18 NDE/NDT of Rehabilitated Structures," Service life estimation of civil engineering structures: reinforced concrete and FRP rehabilitation, Editors: Luke S. Lee and Vistasp Karbhari, Woodhead Publishing, 2010

f) Yuan, L and Dong, Y., "Multiplexed fiber optic twin-sensor array based on a combination of Mach-Zehnder and Michelson interferometers," Journal of Intelligent Material Systems and Structures, SAGE Publications, Vol. 20, No. 7, 809-813 (2009).
g) Zhao, M., Dong, Y., Zhao, Y., Tennant, A., and Ansari, F, "Monitoring Bond in FRP Retrofitted Concrete Structures," Journal of Intelligent Material Systems and Structures, Volume 18, No. 8, August 2007, pp 753-890, SAGE Publications.

9. Professional Development Activities

a) Lilly Conference on College and University Teaching, 2008, Pomona, CA

Robert A. Perkins

1. **Education**
   Ph.D., University of North Carolina at Chapel Hill,
   M.S., University of Alaska, Fairbanks. Master of Science in Engineering Management. 1983
   M.S., University of Alaska, Anchorage. Master of Civil Engineering. 1977
   B.S., Florida Atlantic University, Boca Raton, Florida. Bachelor of Science in Engineering. 1972

2. **Academic Experience**
   Civil and Environmental Engineering, University of Alaska Fairbanks, Assistant Professor, Professor, August 1999 to present, Full time

3. **Non-academic Experience**
   Arctic Slope Consulting Group (ASCG) 1986-1989 Arctic Slope Consulting Group (ASCG), Manager of Environmental Services, and,

   1982-1989 ASCG, Manager of Fairbanks, Alaska, Office. Administrative manager of a branch office of an engineering firm. Technical manager of civil and environmental engineering work. State-wide manager of environmental work.

   Self-employed engineering consultant, Fairbanks, Alaska. 1981-1982. Alaska Dept. of Environmental Conservation on-site water and wastewater inspections. Construction management and inspection work.

   Gulf Interstate Engineering Corp. (GIEC). 1979-1981. Alaska representative of Joint Venture (JV with Michael Baker Corp.) to design the Alaska portion of the Northwest Alaska Gas Pipeline. Cost and Schedule engineering for JV, manager of Alaskan pipeline engineering field programs for GIEC.

   Various engineering assignments: 1973-1979. Texas, Alaska, California, and Nigeria (West Africa). Work included management, design engineering, cost and schedule, and planning for pipeline, environmental, industrial and marine projects.

4. **Certifications or Professional Registrations**
   Certified Industrial Hygienist, American Board of Industrial Hygiene. (Entered retired status – 2006)
   Registered Civil Engineer, Alaska. 1977
   Registered Civil Engineer, California. 1976

5. **Current Membership in Professional Organizations**
   American Conference of Governmental Industrial Hygienists1996
   Alaska Society of Professional Engineers. 1979

American Society of Civil Engineers, Fellow. 1972

6. Honors and Awards

College of Engineering and Mines. Dean's bonus for outstanding research and service 2009.

College of Science, Engineering and Math., Outstanding Graduate Advisor Award, MS Advising. 2003

Fairbanks Chapter, Alaska Society of Professional Engineers (ASPE), Engineer of the Year Award. 1989

Fairbanks North Star Borough, Trails Commission, Member. 1984-1989

Northern Alaska Environmental Center, Conservationist of the Year. 1984

Alaska Board of Registration for Architects, Engineers, Land Surveyors, Member. 1984-1988

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

ASPE, Fairbanks Chapter, Executive Committee.

UAF campus-wide promotion and tenure committee

8. Selected Publications and Presentations (in the last five years)

a) Evaluating the Biodegradability and Effects of Dispersed Oil using Arctic Test Species and Conditions: Phase 1 Activities. Kelly M. McFarlin and Robert A. Perkins William W. Gardiner and Jack D. Word. Proceedings of the Thirty-third AMOP Technical Seminar on Environmental Contamination and Response, June 2010, Halifax, NS. Pp 1243-1251.

b) Evaluation of Risk in Change Orders Report for AK DOT Construction Staff, Perkins, Robert A., Report to the Alaska Department of Transportation, June 2009

c) Sources of Changes in Design-Build Contracts for a Governmental Owner, Perkins, ASCE Journal of Construction Engineering and Management, 135:7, July 2009, pp 588-593.

d) To Pull or Not to Pull: Risk Management of Creosote Piles in Marine Waters, Perkins, Robert A., Proceedings of the Thirty-second AMOP Technical Seminar on Environmental Contamination and Response, Calgary, May 200

e) Evaluation of Public and Worker Exposure due to Naturally Occurring Asbestos in Gravel Discovered During a Road Construction Project, Perkins, Robert A., Hargesheimer, John, and Vaara, Leah. *Journal of Occupational and Environmental Hygiene* . 5:609-616 (September 2008).

f) Asbestos Release from Whole-Building Demolition of Buildings with Asbestos-Containing Material, Perkins, Robert A., Hargesheimer, John and Fourie, Walter. *Journal of Occupational and Environmental Hygiene*, 4:12, (2007) 889 – 894

9. Professional Development Activities

a) Seminars and meetings in distance education.

Keith P. Whitaker

1. **Education**
   J.D., University of Maine School of Law, Portland, ME, 2007
   B.S. Civil Engineering, University of Rhode Island, Kingston, RI, 1986.

2. **Academic Experience**
   Civil and Environmental Engineering, University of Alaska Fairbanks, Instructor, August 2010 to present, Full time

3. **Non-academic Experience**
   - Plymouth Engineering, Inc., Plymouth, Maine, President and Senior Project Manager, July1993 to August 2010, Full time
   - Ames Corp., Bangor, Maine, Senior Structural and Civil Engineer, September 1991 to July 1993, Full time
   - WBRC, Inc., Bangor, Maine, Structural and Civil Engineer, September 1989 to September 1991, Full time
   - Acheron Engineering, Inc., Newport, Maine, Project Engineer, January 1989 to September 1989, Full time
   - WBRC, Inc., Bangor, Maine, Project Engineer, January 1987 to January 1989, Full time

4. **Certifications or Professional Registrations**
   PE:Alaska, Maine, New Hampshire, Massachusetts
   CPESC

5. **Current Membership in Professional Organizations**
   Member, American Society of Civil Engineers

6. **Honors and Awards**

7. **Service activities (within and outside of the institution)**
   Graduate Certificate in Construction Management Program Coordinator,Civil and Environmental Engineering, University of Alaska Fairbanks

8. **Selected Publications and Presentations (in the last five years)**

9. **Professional Development Activities**

Andrew T. Metzger

1. **Education**
   Ph.D. in Civil Engineering (Structures), Case Western Reserve University, May, 2007.
   M.S. (Civil Engineering), Ohio University, November 1995.
   B.S. Civil Engineering, Ohio University, June 1994

2. **Academic Experience**
   Civil and Environmental Engineering, University of Alaska Fairbanks, Assistant Professor, August 2007 to present, Full time

3. **Non-academic Experience**
   RVE, Inc., Corpus Christi, Texas; March 1999 to February 2001 and March 2003 to December 2003 – Project Manager/ Engineer Diver

   Thorson Baker and Associates, Inc., Richfield, Ohio; February 1996 to March 1999 and April 2001 to March 2002 – Project Engineer

4. **Certifications or Professional Registrations**
   P.E., Alaska (#12189)
   P.E., Ohio (#64609)
   P.E., Washington State (#37774)
   National Council of Examiners for Engineering and Surveying (#19574)

5. **Current Membership in Professional Organizations**
   American Society of Civil Engineers, Member

6. **Honors and Awards**
   2009 Outstanding Journal Paper Award for 2009 from the ASCE *Journal of Performance of Constructed Facilities* for an article entitled "Investigation of the Dayton IR 75 Sign Truss Failure of September 11, 2006"

   2009 Certificate of Appreciation for Support and Guidance of Student Athletes Forrest L. Karr (UAF)

   2008 Naval Summer Faculty Research Fellowship, Office of Naval Research

7. **Service activities (within and outside of the institution)**
   Member of UAF Faculty Senate
   American Society of Civil Engineers, Student Chapter Faculty Advisor
   American Society of Civil Engineers, Alaska Section Vice President

8. **Selected Publications and Presentations (in the last five years)**

a) Metzger, A.T., Huckelbridge, A., (2009), "Temporal Nature of Fatigue Damage in Highway Bridges". *ASCE Journal of Bridge Engineering*. ASCE, Reston, VA.

b) Huckelbridge, A., Metzger, A.T. (2009). “Investigation of the Dayton IR 75 Sign Truss Failure of September 11, 2006”. *ASCE Journal of Performance of Constructed Facilities*. ASCE, Reston, VA.

c) Metzger, A. T. (2009). “Applying Responsible Engineering Practices to Arctic Marine Infrastructure”. *Lessons from Continuity and Change in the Fourth International Polar Year, Symposium*. March 4-7. University of Alaska Fairbanks, Fairbanks, AK.

d) Metzger, A. T. (2008). *TR-6072-OCN: Mission-risk Based Work Prioritization for Navy-owned Bridges, Water Tanks, and Waterfront Structures*. Naval Facilities Engineering Service Center, East Coast Detachment. Washington Navy Yard, Washington, D.C.

9. Professional Development Activities

h) CE 603 – Arctic Engineering, Fall 2007.
i) ASCE Webinar: Designing with Engineered Lumber, November 2008.
j) Campbell Scientific CR9000/RTDAQ Training Course, October 13-15, 2009 (course includes content on experimental stress analysis).
k) Structures and Codes Institute, “Frequently Misunderstood IBC/ASCE 7 Structural Provisions”, Anchorage, Alaska, December 9, 2009.
l) ASCE Workshop: “ASCE Practitioner and Faculty Advisor Training Workshop”, August 13-14, 2010.
m) GEOS 615 – Sea Ice, Fall 2010

Dennis M. Filler

1. Education

B.S.E. Civil Engineering (Geotech.), University of Central Florida, Orlando, FL, 1986.
M.S.E. Civil Engineering (Geotech.), University of Central Florida, Orlando, FL, 1988.
Ph.D. Interdisciplinary Engineering, University of Alaska Fairbanks, Fairbanks, AK, 1997.

2. Academic Experience

Civil and Environmental Engineering, University of Alaska Fairbanks, Assistant Professor, August 2006 to present, full time
Civil and Environmental Engineering, University of Alaska Fairbanks, Adjunct Professor, August 1998 - 2006, part time
Civil and Environmental Engineering, University of Kansas, Adjunct Professor, August 1997 - May 1998, part time

3. Non-academic Experience

SLR International (dba SLR Alaska), Fairbanks, Alaska, Fairbanks Manager/Sr. Engineer, 2004-06, full time

Dennis Filler Consulting, Fairbanks, Alaska, Principal, 2002 – present, part time
Shannon & Wilson, Inc., Fairbanks, Alaska, Project Manager/Sr. Engineer, 1998 - 2002, full time
Dressler Consulting Engineers, Inc., Orlando, Florida, Branch Manager/Engineer, 1990 - 94, full time

4. Certifications or Professional Registrations

Registered Professional Engineer, Alaska

5. Current Membership in Professional Organizations

Associate Member, American Society of Civil Engineers

6. Honors and Awards

Outstanding Volunteer Award, 2007 Tanana Valley Robot Rally First Lego League Championship Tournament

ASCE Journal of Cold Regions Engineering *Best Technical Paper Award* 2000-2001

Fairbanks Meeting Ambassador, 4th International Conference on Contaminants in Freezing Ground, Fairbanks, AK, May 30-June 3, 2004

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

Member, ASCE Technical Council on Cold Regions Engineering (TCCRE) – Environmental and Public Health Engineering Committee

Member, ASCE Body of Knowledge Educational Fulfillment Committee

Member, UAF Dept. of Civil & Environmental Engineering Curriculum Committee
Judge Advisor, First Tech Challenge

8. Selected Publications and Presentations (in the last five years)

d) D.M. Filler, D.R. VanStempvoort, and M.B. Leigh. 2009. Remediation of Frozen Ground

Contaminated with Petroleum Hydrocarbons: Feasibility and Limits. In: Margesin R. (Ed.), *Permafrost Soils.* Soil Biology, Vol. 16, Springer-Verlag, Berlin, 348.

e) D.M. Filler, D.L. Barnes, and I. Snape (Eds.). 2008. *Bioremediation of Petroleum Hydrocarbons in Cold Regions*, Cambridge University Press, Cambridge, UK, 273.

f) D.M. Filler, D.L. Barnes, I. Snape, and R.A. Johnson. 2008. Thermally-enhanced bioremediation and integrated designs. In: D.M. Filler, D.L. Barnes, and I. Snape (Eds.), *Bioremediation of Petroleum Hydrocarbons in Cold Regions*. Cambridge University Press, Cambridge, UK.

g) D.M. Filler, C.M. Reynolds, I. Snape, A.J. Daugulis, D.L. Barnes, and P.J. Williams. 2006. Advances in engineered remediation for use in the Arctic and Antarctica. *Polar Record*, 42(2):111-120.

h) *Environmental Remediation in Cold Regions: Emerging Technologies & Future Initiatives*, D.M. Filler and D.L. Barnes, ARCSACC 07 Workshop, May 6-9, 2007, Edmonton, Canada.

i) *Cold Regions Environmental Engineering: State of the Practice and Future Needs*, D.M. Filler, I. Snape, J. Walworth, D. Barnes, R. Hall and C. Kennicott, Workshop at 6th International Conference on Contaminants in Freezing Ground, June 22–26, 2008, Lake Morey, Vermont.

9. Professional Development Activities

n) ICOSSE'11, 2nd International Congress on Sustainability Science & Engineering, Jan. 2011, Tucson, AZ
o) ABET Program Assessment Workshop, 2010, Baltimore, MD
p) 5th International Conference on Technology, Knowledge and Society, 2009, Birmingham, AL
q) ASCE ExCEEd Teaching Workshop, 2007, Flagstaff, AZ

Silke Schiewer

1. **Education**

Ph.D. in Chemical Engineering, McGill University, 1996. Thesis title: Multi-Metal Ion Exchange in Biosorption

Dipl.-Ing. in Mechanical Engineering, Technische Universität Braunschweig, 1993

2. **Academic experience**

University of Alaska Fairbanks, USA, 2001 to present

- Associate Professor in Environmental Engineering
- Assistant Professor in Environmental Engineering

RWTH Aachen University of Technology, Germany, 1999-2001

- Leader of an interdisciplinary research group with 10 Ph.D. students on removal of endocrine disrupters from waste water

Department of Biology, HKBU University, Hong Kong, 1998-1999

- Institute for Natural Resources and Waste Management. Assistant Professor:

Department of Chem. Eng., McGill University, Montreal, Canada, 1996-1997

- Postdoctoral Fellow

Institut für Thermodynamik, TU Braunschweig, Braunschweig, Germany

- Research Assistant: Investigated literature concerning monolithic catalysts

3. **Non-academic experience**

4. **Certifications or professional registrations**

5. **Current membership in professional organizations**

6. **Honors and awards**

7. **Major Service activities (within and outside of the institution)**

- Coordinator for 2003 Engineering Week Open House. This outreach activity with dozens of activities showcased exciting aspects of engineering to the community (over 1000 visitors)
- Member of faculty search committees leading to hires of Drs. Toniolo, Trivedi, Abdelghani, Liu, Zhang, Yang, Lee, Hazirbaba, Filler.
- Chair, graduate admissions committee Civil & Environmental Eng.
- Program Coordinator for EQS and ENVE MS programs
- Faculty Senate Alternate, Member INDS PhD admissions committee
- CEE survey coordinator: Design and evaluation of surveys for ABET assessment
- Peer reviewer for 21 jourals.

8. Selected Publications and Presentations (in the last five years)

- Chaudhuri, A.; Mitra, M.; Schwarz, J.G.; Schiewer, S.: Copper, Zinc, Nickel, and Cobalt biosorption potential of *Fucus vesiculosus* (Phaeophyceae) and *Gracilaria tikvahiae* (Rhodophyta) ***Water Science and Technology*** (accepted)
- Iqbal, M.; Schiewer, S.:; R. Cameron: Mechanistic understanding and performance of biosorption of metal ions by grapefruit peel using FTIR spectroscopy, kinetics and adsorption isotherms modeling, alkali and alkaline metal displacement and EDX analysis ***Journal of Chemical Technology and Biotechnology*** (accepted).
- Horel, A.; Schiewer, S.: Investigation of the physical and chemical parameters affecting biodegradation of diesel and synthetic diesel fuel contaminating Alaskan soils ***Cold Regions Science and Technology***, (accepted)
- Chambers, M.; Ford, M.R.; White, D.M.; Barnes, D.L.; Schiewer, S.: Transport of fecal bacteria by boots and vehicle tires in a rural Alaskan community. ***Journal of Environmental Management*** 90 No 2 (Feb 2009) 961-966.
- Schiewer, S.; Balaria, A.: Biosorption of Pb^{2+} by original and protonated citrus peels: equilibrium, kinetics and mechanism ***Chemical Engineering Journal*** 146 (Feb 2009) 211-219.
- Balaria, A.; Schiewer, S.: Assessment of biosorption mechanism for Pb binding by citrus pectin. ***Separation and Purification Technology*** 63 (Dec 2008) 577-581.
- Psoch, C.; Schiewer, S.: Long term flux improvement by air sparging and backflushing for a membrane bioreactor, and modeling of permeability decline. ***Desalination*** 230 (Sept 2008) 193-204.
- Schiewer, S.; Patil, S.: Modeling the effect of pH on biosorption of heavy metals by citrus peels. ***Journal of Hazardous Materials*** 157 (Aug. 2008) 8-17.
- Schiewer, S.; Patil, S.: Pectin-rich fruit wastes as biosorbents for heavy metal removal: equilibrium and kinetics. ***Bioresource Technology*** 99 No 6 (April 2008) 1896-1903.
- Chambers, M.K.; Ford, M.R.; White, D.M.; Barnes, D.L.; Schiewer, S.: Distribution and transport of fecal bacteria at spring thaw in a rural Alaskan community. ***Journal of Cold Regions Engineering*** 22 No 1 (Mar. 2008) 16-37.
- Adhikari, H.; Barnes, D.; Schiewer, S.; White, D.: Total coliform survival characteristics in frozen soils. ***Journal of Environmental Engineering -ASCE*** 133 No12 (Dec. 2007) 1098-1105.

9. Professional development activities

Juanyu (Jenny) Liu

1. Education

Ph.D. Civil Engineering (Materials and Pavement Engineering), Texas A&M University, 2006
M. S. Civil Engineering (Materials and Pavement Engineering), Texas A&M University, 2001
B. S. Material Science and Engineering, Tongji University, Shanghai, China, 1995

2. Academic experience

August 2006 - present: Assistant Professor, Department of Civil and Environmental Engineering, University of Alaska Fairbanks (UAF).

3. Non-academic experience

June 2001 - August 2006: Research Assistant, Texas Transportation Institute.
September 1995 - December 1999: Research Assistant, State Key laboratory of Concrete Materials Research, China.

4. Certifications or professional registrations

Registered Professional Civil Engineer (State of Alaska, No. 12464)

5. Current membership in professional organizations

International Society for Concrete Pavements
American Society of Civil Engineers
American Society of Engineering Education
American Concrete Institute

6. Honors and awards

- Honorary Faculty/Staff, Department of Athletics for support and guidance in the academic endeavors of student-athletes, UAF, 2009 & 2010
- ASCE ExCEEd 2009 Fellow
- Faculty Development Award, UAF, 2006 & 2007
- "Who's Who in Science and Engineering", 9th Edition, Marquis Who'sWho®, 2006
- Graduate student research and presentation grant, Texas A&M University, 2006
- Travel award, NSF workshop for the Advancement and Retention of Underrepresented and Minority Engineering Educators, 2006
- "Who's Who in America", 60th Edition, Marquis Who'sWho®, 2006

7. Major Service activities (within and outside of the institution)

- TRB AFH50 (Committee on Portland Cement Concrete Pavement Construction)
- TRB AFK30 (Committee on Characteristics of Nonbituminous Components of Bituminous Paving Mixtures)
- ASCE Highway Pavement Committee
- ASCE Geo-Institute Pavements Committee
- Associate Editor, ASCE Journal of Materials in Civil Engineering

- Associate Editor, Journal of Civil, Environmental, and Architectural Engineering, Scientific Journals International
- Member of the Chancellor's Campus Diversity Action Committee, UAF, 2010-2013
- Judge, Alaska Statewide High School Science Symposium, 2010
- Guest editor, Special Issue on "Energy Efficient and Environmentally Friendly Paving Materials", ASCE Journal of Materials in Civil Engineering, 2009-2010
- Paper reviewer for journals and international conference, since 2005
- Proposal reviewer, since 2009
- Associate editor, sessions on Pavement and Materials Engineering, and Highway Maintenance, 10th International Chinese Conference of Transportation Professionals, 2009
- Faculty Senate Committee on the Status of Women, UAF, since 2009
- Book reviewer, the First Edition of English-Chinese and Chinese-English Transportation Glossary, ASCE Transportation & Development Institute (T&DI) and North America Chinese Overseas Transportation Association (NACOTA), 2007-2008
- Co-chair, Organizing Committee, 6th International Conference on Traffic and Transportation Studies, 2008
- Session Chair, 5th International Conference on Maintenance and Rehabilitation of Pavements and Technological Control, 2007
- Civil and Environmental Engineering outcome evaluation committee, UAF, 2008
- Civil and Environmental Engineering advisory board, UAF, since 2006

8. Selected Publications and Presentations (in the last five years)

- L. Li, J. Liu, X. Zhang, and S. Saboundjian, "Resilient Modulus Characterization of Alaskan Granular Base Materials", submitted for presentation and publication at the 90th TRB Annual Meeting (under review), 2010.
- J. Liu and P. Li, "Low Temperature Performance of Sasobit-modified Warm Mix Asphalt", ASCE Journal of Materials in Civil Engineering (under review), 2010.
- J. Liu, S. Saboundjian, P. Li, B. Connor, and B. Brunette, "Laboratory Evaluation of Sasobit-modified Warm Mix Asphalt for Alaskan Conditions", ASCE Journal of Materials in Civil Engineering (under review), 2010.
- S. Saboundjian, J. Liu, P. Li, and B. Brunette1, "Late Season Paving of a Low-Volume Road using Warm-Mix Asphalt: an Alaskan Experience", Transportation Research Record: Journal of the Transportation Research Board (accepted), 2010.
- P. Li, J. Liu, and S. Saboundjian, "Materials and Temperature Effects on the Resilient Response of Asphalt Treated Alaskan Base Course Materials", ASCE Journal of Materials in Civil Engineering (in press), 2010.

9. Professional development activities

J. LEROY HULSEY

1. Education

Missouri School of Mines and Metallurgy, Civil Engineering, B.S., 1964
University of Missouri at Rolla , Civil Engineering, M.S., 1966
University of Illinois, Post Graduate, 1968-1971
University of Missouri-Rolla, Structural Engineering, Ph.D., 1976

2. Academic experience

2006 - Present Associate Director of the Alaska University Transportation Center
2006 – Present Professor of Civil & Environmental Engineering; University of Alaska Fairbanks
1993 –2006 Assoc. Professor, Dept. of Civil Eng., University of Alaska Fairbanks;
1987 - 1993 Assoc. Professor, Dept. of Civil Eng., Univ. of Alaska Fairbanks. Depart. Chairman 1988 -
1990 Assoc. Professor, Univ. of Alaska Fairbanks & Civil Dept. Chairman.
1985 - 1987 Assistant Director of the Institute for Transportation Research & Education (ITRE),
General Services Administration, University of North Carolina , & professor at North Carolina State University.

3. Non-academic experience

2001 - Present President, CEO of Alignment Systems, Inc.
Vice President of Advanced Engineering Consolidated Technologies, Inc.
1965 – 1987 Design engineer, Military service during Vietnam conflict, corporate executive, owner of two companies.

4. Certifications or professional registrations

Professional Engineer: North Carolina (inactive), Alaska, Illinois (inactive), Alabama, Missouri (inactive)
Structural Engineer: Illinois

5. Current membership in professional organizations

Dr. Hulsey is past President, of the Fairbanks Chapter of ASCE

6. Honors and awards

7. Major Service activities (within and outside of the institution)

- He is a paper reviewer and serves on
- several committees for ASCE, ACI, ACEC and TRB and serves as on a research panel for the National
- Academy of Sciences. Examples are ASCE Steel Bridge and TRB A2F04 Construction of Bridges &
- Structures and TRB committee A1A02 Management and Productivity.

8. Selected Publications and Presentations (in the last five years)

- Zhaohui "Joey" Yang1, Qiang Li2, Gang Xu2, and J. Leroy Hulsey, "Seasonal Freezing Effects on the Dynamic Behavior of Highway Bridges", ASCE Conf. Proc. doi.:10.1061/41102(375) 19, Soil Dynamics and Earthquake Engineering (GSP 201) Proceedings of the 2010 GeoShanghai International Conference
- Hazirbaba, K. Zhang, Y. and Hulsey, J.L. **"**Evaluation of temperature and freeze–thaw effects on excess pore pressure generation of fine-grained soils" *Soil Dynamics and Earthquake Engineering* (27 October 2010).
- Yang et al., 2008a Z. Yang, F. Xiong, G. Xu, ***J.L. Hulsey*** and E.E. Marx, **...** World Conference on Earthquake Engineering October 12–17, Beijing, ***China*** (2008)
- Hulsey, J.L. and Muench, M. (***2007***) "TIRE CHAIN DAMAGE ON BRIDGE DECK WEARING SURFACES", Region Development ***ISCORD 2007***, September 25-27, ***2007***, Tampere, Finland. **...**
- Ma, Z., Chaudhury, S., Millam, J., and ***Hulsey***, J. L. (***2007***) "Field Test and 3D FE Modeling of Decked Bulb-Tee Bridges" , Region Development ***ISCORD 2007***, September 25-27, ***2007***, Tampere, Finland**.**
- Ma, Z**.,** Chaudhury, S., Millam, J., and Hulsey, J. L. (2007) "Field Test and 3D FE Modeling of Decked Bulb-Tee Bridges," ASCE Journal of Bridge Engineering, Vol. 12, No. 3, pp. 306 – 314.
- Hulsey, J.L., Cherlopalle, D. and Ma, Z., 2006, "SEISMIC PERFORMANCE OF ALASKA BRIDGES BY DENALI 2002 EARTHQUAKES", Fifth National Seismic Conference on Bridges and Highways, San Francisco, California, September 18-20.
- Ma, Z., Millam, J., Chaudhury, S., and Hulsey, J. L., 2004 ,"Field Test and 3D FE Modeling of Decked Bulb-Tee Bridges", Proceedings of 3rd International Symposium on High Performance Concrete and the National Bridge Conference, October 2003, Florida.
- Ma, Z., Hulsey, J. L., Millam, J., and Chaudhury, S.(2003) ,"A Note on Single Lane Live Load Distribution Factors for the Alaska Style Bulb-Tee Bridges, Proceedings of National Concrete Bridge Conference, October 2002, Tennessee.
- "Deck Wearing Surfaces for the Yukon River Bridge", 2002, Hulsey, J.L., Raad, L., and Conner, B. ,ASCE Proceedings, 11th International Conference on Cold Region Engineering, Anchorage, Alaska, May 20-22.
- "Bridge Construction", 2000, Journal: Transportation in the New Millenium, Hill, J., Idriss, R., Hulsey, J.L., Kannankutty, R., Csogi, R., A2F04: Committee on Construction Bridges and Structures, Transp. Research Board.
- **Professional development activities**

Xiong Zhang

1. **Education**
   Ph.D in Civil Engineering, Texas A&M University (TAMU), 2004
   M.S. in Civil Engineering, China Institute of Water Resources & Hydropower Research (IWHR), Beijing, China, 1995
   B.S. in Civil Engineering, Tongji University, Shanghai, China, 1992

2. **Academic Experience**
   September 2006 ~ present: Assistant Professor, Department of Civil and Environmental Engineering, University of Alaska Fairbanks (UAF).
   October 2005 ~ August 2006: Research Associate IV, Louisiana Transportation Research Center (LTRC), Baton Rouge, Louisiana.
   September 2004 ~ October 2005: Postdoctoral Research Associate, Zachry Department of Civil Engineering, TAMU.
   May 1995 ~ September 2000: Geotechnical Engineer, Department of Geotechnical Engineering, IWHR, China.

3. **Non-academic Experience**
   May 1995 ~ September 2000: Geotechnical Engineer, Department of Geotechnical Engineering, IWHR, China.

4. **Certifications or Professional Registrations**
   Registered Professional Civil Engineer, State of Alaska

5. **Current Membership in Professional Organizations**
   Associate Member, American Society of Civil Engineers
   Member, American Society of Engineering Education

6. **Honors and Awards**
   ASCE ExCEEd 2009 Fellow
   Honorary Faculty, Department of Athletics, UAF, 2006.
   Travel Award, Institution of Northern Engineering, UAF, 2006-2010.
   Faculty Development Award, UAF, 2006.
   Buchanan Research Assistantship, TAMU, 2000-2003.
   Academic Excellence Scholarship, TAMU, 2000
   Outstanding Engineer, IWHR, Beijing, China, 1996-1998

7. **Service activities (within and outside of the institution)**
   UAF Faculty Senate, Graduate Academic & Advisory Committee, UAF
   Computer Advisory Board, College of Engineering and Mines, UAF.
   Webmaster, Department of Civil and Environmental Engineering, UAF.
   Graduate Admission Review Committee, Department of Civil and Environmental Engineering, UAF.
   Faculty advisor, Chinese Students Association at UAF

Committee Member, TRB AFP60 Committee on Engineering Behavior of Unsaturated Soils
Committee Member, TRB AFS20 Committee on Soil and Rock Instrumentation
Committee Member, ASCE Geo-Institute Pavement Committee
Committee Member, ASCE Geo-Institute Shallow Foundation Committee
Committee Member, ASCE Geo-Institute Unsaturated Soil Mechanics Committee
Editorial Board Member, Geomechanics and Engineering, An International Journal (GAE)

8. Selected Publications and Presentations (in the last five years)

- Zhang, X. and Li, L. (2010). "Some Limitations in the Constitutive Modeling of Unsaturated Soils and Solutions." ASCE International Journal of Geomechanics (in press).
- Li, L., Liu, J., Zhang, X., and Saboundjian, S. (2011). "Influencing factors on Resilient Properties of Alaskan Base Course Materials", Transportation Research Record: Journal of the Transportation Research Board (Accepted).
- Lytton, R.L. and Zhang, X. (2011). "Design of Foundations on Expansive Soils." Geo-Strata (accepted).
- Zhang X., Liu, J. and Li, P. (2010). "A New Method to Determine the Shapes of Yield Curves for Unsaturated Soils," Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Volume 136, Issue 1, pp. 239-247.
- Zhang, X. and Lytton, R.L. (2009). "A Modified State Surface Approach on Unsaturated Soil Behavior Study (I) Basic Concept." Canadian Geotechnical Journal, Volume 46, Number 5, pp. 536-552.
- Zhang, X. and Lytton, R.L. (2009). "A Modified State Surface Approach on Unsaturated Soil Behavior Study (II) General Formulation." Canadian Geotechnical Journal, Volume 46, Number 5, pp. 553-570.
- Zhang X. and Briaud, J. L. (2009). "A Total Stress-Pore Water Pressure Formulation of Coupled Consolidation Analysis for Saturated Soils." International Journal of Geotechnical Engineering, Volume 3:171-185.
- Zhang, X. and Lytton, R.L. (2009). "Discussion of Analysis of Deep Moisture Barriers in Expansive Soils. I: Constitutive Model Formulation." ASCE International Journal of Geomechanics, Volume 9, Issue 2, pp 82-83.
- Zhang, X. and Lytton, R.L. (2009). "Discussion of Analysis of Deep Moisture Barriers in Expansive Soils. II: Water Flow Formulation and Implementation." ASCE International Journal of Geomechanics, Volume 9, Issue 2, pp 84-87.
- Zhang, X. and Lytton, R.L. (2008). "Discussion of a New Modeling Approach for Unsaturated Soils Using Independent Stress Variables." Canadian Geotechnical Journal, Vol. 45, No.12, pp. 1784-1787.
- Zhang, X. and Briaud, J. L. (2008). "Coupled Water Content Method for Shrink and Swell Predictions." International Journal of Pavement Engineering Published on: 16 October 2008. DOI: 10.1080/10298430802394154.
- Zhang, X. and Briaud, J. L. (2008). "Improved Approach to Construct Constitutive Surfaces for Stable-Structured Soils Covering Both Saturated and Unsaturated Conditions" Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Volume 134, Issue 6, pp. 876-882.

- Abu-Farsakh, M., Chen, Q., Sharma, R.S., Zhang, X. (2008). “Large-Scale Model Footing Tests on Geogrid-Reinforced Foundation and Marginal Embankment Soils.” Geotechnical Testing Journal, ASTM, Volume 31, Issue 5.
- Zhang, X. and Tao, M. (2007). “Discussion of Effect of Gas on Pore Pressure in Wet Landfills.” Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 133, No. 11. Pp 1470-1472.
- Liu, J., Zhang, X., and Zollinger, D.G.. (2007). “A Two-Step Fracture Mechanics-based Approach for Assessing Early-age Delamination Distress.” Transportation Research Record: Journal of the Transportation Research Board, No. 2016, pp. 76-84.
- Chen, Q., Abu-Farsakh, M., Sharma, R.S., Zhang, X. (2007). “Laboratory Investigation of the Behavior of Foundations on Geosynthetic Reinforced Sands.” Transportation Research Record: Journal of the Transportation Research Board, No. 2004, pp. 28-38.

9. Professional Development Activities

- National Science Foundation Regional Grants Conference, University of Maryland at College Park, 2006.
- Quality Education for Minorities (QEM) Network Workshop, National Science Foundation, Las Vegas, Nevada,2007
- 19th Annual Lilly-West Teaching conference, Cal Poly , 2007
- NCAT Professor Training Course, 2008
- PDCA’s 5th Biennial Professors’ Driven Pile Institute, Utah State University, Logan, UT, 2009.
- 2009 ASCE ExCEEd Teaching Workshop, Northern Arizona University Flagstaff, AZ.

Yuri Shur

1. Education

- D. Sc., Geology (Engineering Geology and Permafrost Study), USSR Institute of Hydrogeology and Engineering Geology
- Ph.D., Civil Engineering (Soil Mechanics with application to Arctic Engineering), USSR Institute of Foundations and Underground Structure
- M.S., Civil Engineering, Moscow State University of Civil Engineering

2. Academic experience

2008 - Present Professor University of Alaska Fairbanks
2001 - 2008 Associate Professor University of Alaska Fairbanks
1992 - 1995 University of Alaska-Fairbanks; Department of Agriculture and Forestry, Research Assistant

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3. Non-academic experience

2000 – 2001 Harding Lawson Associates, Anchorage, Alaska; Associate Engineer
1998 – 2000 Golder Associates Inc., Anchorage, Alaska; Senior Geotechnical Engineer
1997 – 1998 Harding Lawson Associates, Anchorage, Alaska; Associate Engineer
1995 – 1997 Raytheon Service Company, Anchorage, Alaska; Staff Senior Civil Engineer
1970-1991 National Institute of Engineering Geology and Hydrogeology, Moscow, Senior Scientist, Head of Department of Permafrost Geotechnics
1964-1970 National Institute of Foundations and Underground Structures, Moscow, Engineer, Senior Engineer

4. Certifications or professional registrations

5. Current membership in professional organizations

- International Permafrost Association. Member of Engineering Working Groups.
- American Permafrost Association, 2008 President-elect, 2009 – President, 2010 Past-president.
- American Society of Civil Engineers *Technical Committee on Cold Region, Frozen Ground Engineering*
- Permafrost Technology Foundation, Fairbanks, Board of Directors 2003-2010

6. Honors and awards

7. Major Service activities (within and outside of the institution)

- Journal Review: Arctic, Antarctic and Alpine Research
    - Cold Regions Science and Technology
    - Journal of Geophysical Research-Atmospheres
    - Permafrost and Periglacial Processes
    - Cold Regions Engineering

8. Selected Publications and Presentations (in the last five years)

- Kanevskiy, M, Shur, Y, Fortier, D, Jorgenson MT, and Stephani, E, 2011. "Cryostratigraphy of late Pleistocene syngenetic permafrost (yedoma) in northern Alaska, Itkillik River exposure," Quaternary Research, doi:10.1016/j.yqres.2011.12.003.
- Douglas, T.M., Fortier, D., Shur, Y., Kanevskiy, M.Z., Laodong Guao, Yihua Gai, and Bray, M.T., 2011 Biogeochemical characteristics of thermokarst-cave ice in the CRREL Permafrost Tunnel, Alaska. *Permafrost and Periglacial Processes* Article first published online: 28 JAN 2011 | DOI: 10.1002/ppp.709
- French, H., Shur, Y., 2010. The principles of cryostratigraphy, *Earth-Science. Rev*iews, 101:190-206, doi:10.1016/j.earscirev.2010.04.002
- Ping, C.L., G. J. Michaelson, L. Guo, M. T. Jorgenson, M. Kanevskiy, Y. Shur, and F. Dou. 2010 Soil Carbon and Material Fluxes across the Eroding Alaska Beaufort Sea Coastline *Journal of Geophysical Research – Biogeosciences* (accepted)
- Jorgenson, M. T., Romanovsky, V., Harden, J., Shur, Y., O'Donnell, J., Schuur, E. A. G. and Kanevskiy, M. 2010. Resilience and Vulnerability of Permafrost to Climate Change. *Canadian Journal of Forest Research*, 40: 1219-1236
- Osterkamp T. E., M. T. Jorgenson , E. A. G. Schuur, Y. L. Shur, M. Z. Kanevskiy, J. G. Vogel and V. E. Tumskoy, 2009. Physical and Ecological Changes Associated with Warming Permafrost and Thermokarst in Interior Alaska. *Permafrost and Periglac. Process.* 20: 235–256
- Darrow, M.M, Huang, S.L., Shur, Y., and Akagawa, S., 2008. Improvements in frost heave laboratory testing of fine-grained soils. *Journal of Cold regions Engineering*, 22 (3): 65-78.
- C. L. Ping, G. J. Michaelson, J. M. Kimble, V. E. Romanovsky, Y. L. Shur,
- D. K. Swanson, and D. A. Walker, 2008. Cryogenesis and soil formation along a bioclimate gradient in Arctic North America. *Journal of Geophysical Research*, vol. 113, G03S12, doi:10.1029/2008JG000744,
- Walker, D. A., H. E. Epstein, V. E. Romanovsky, C. L. Ping, G. J. Michaelson, R. P. Daanen, Y. Shur, R. A. Peterson, W. B. Krantz, M. K. Raynolds, W. A. Gould, G. Gonzalez, D. J. Nicolsky, C. M. Vonlanthen, A. N. Kade, P. Kuss, A. M. Kelley, C. A. Munger, C. T. Tarnocai, N. V. Matveyeva, and F. J. A. Daniëls, 2008, Arctic patterned-ground ecosystems: A synthesis of field studies and models along a North American Arctic Transect, J. Geophys. Res., 113, G03S01, doi:10.1029/2007JG000504

9. Professional development activities

JOHN P. ZARLING

1. Education

Ph.D. Engineering Mechanics, Michigan Technological University 1971.
M.S. Engineering Mechanics, Michigan Technological University, 1966.
B.S. Mechanical Engineering, Michigan Technological University, 1964

2. Academic experience

1997-present Professor of Mechanical Engineering, Emeritus;
1994-1997 Professor of Mechanical Engineering;
1986-1994 Professor of Mechanical Engineering, Associate Dean of the School of Engineering, and Director of Institute of Northern Engineering;
1980-1986 Professor and Head of Department of Mechanical Engineering
1976-1980 Associate Professor and Head of Department of Mechanical Engineering;
1976-1976 Associate Professor

3. Non-academic experience

Dr. Zarling has 20 years of consulting experience, including 25 or more clients in Alaska.

4. Certifications or professional registrations

Alaska PE

5. Current membership in professional organizations

American Society of Civil Engineers
American Society of Mechanical Engineers (Past Chairman-Milwaukee Section)

6. Honors and awards

7. Major Service activities (within and outside of the institution)

8. Major Peer Reviewed Publications (Last 5 Years)

- Zarling, J. P., 2006, "TAPS Corridor Engineering Climate Data" internal report to Alyeska Pipeline Service Co., Fairbanks, AK
- Zarling, J. P., 2004, "TAPS Corridor Engineering Climate Data" internal report to Alyeska Pipeline Service Co., Fairbanks, AK
- Zarling, J. P., 2002, "TAPS Corridor Engineering Climate Data" internal report to Alyeska Pipeline Service Co., Fairbanks, AK.
- Sorensen, S. P., Smith, J. and Zarling, J. P., 2002, "Thermal Performance of TAPS Heat Pipes with Non Condensable Gas Blockage", Cold Regions Impacts on Transportation and Infrastructure, Proceedings 11th International Conference, ASCE, Anchorage AK, pp. 1-12.
- Forsstrom, A., Long, E.L., Zarling, J.P., and Knutsson, S., 2002, "Thermosyphon Cooling of Chena Hot Springs Road", Cold Regions Impacts on Transportation Infrastructure, Proceedings 11th International Conference, ASCE, Anchorage AK, pp. 645-655.

- Zarling, J. P. 2000, “Three Ring Release Mechanism Analysis and Potential Freezing”, Alaska Smokejumpers, Bureau of Land Management, Ft. Wainwright, Alaska, May 2000.
- Zarling, J. P. 2000, “Thermal Analysis of Foundation System for Oil Storage Tanks at the Red Dog Mine Port Facility, Peratrovich, Nottingham, and Drage, Anchorage, Alaska, June 2000.
- Zarling, J. P. 1999, “HCCP Boiler Performance Guarantee Tests” for Golden Valley Electric, Fairbanks, Alaska, May 1999.
- Zarling, J. P., 1999, “Thermosyphon Installation of Chena Hot Springs Road”, Report to Alaska Department of Transportation and Public Facilities, October 1999.
- Zarling, J. P., 1998, “Analysis of Thaw Settlement of Pump Station No. 1”, Consulting Report to Alyeska Pipeline Service Company, Fairbanks, Alaska.

9. Professional development activities

Appendix C – Equipment

The College employs several technicians that maintain teaching and research laboratories and two information technicians to maintain the computer laboratories and the computational infrastructure (hardware and software) of the College. Below is a list of the laboratories and the available equipment.

Room # DU 124 Structural laboratory. Major equipment and instrumentation includes:

U.T.M. - Tinius-Olsen (300 kip machine)
M.T.S. 55 kip with a good set of accessories and instrumentation
Forney concrete compression tester
Soittest automated Marshall press
Hardness tester
Charpy impact tester
Water baths

All the equipment is modern (except the Tinius-Olsen, but it is very usable) and in very good condition. The MTS is a satisfactory instructional facility for advanced students. There is a need for a simple-to-use instructional testing machine and technical support.

Room # DU 129 Asphalt and metal specimen preparation. Equipment includes:

Metal preparation system for metallurgical specimens
Degreaser
Viscometers
Penetration apparatus
Sulfur pot
Flash point apparatus
Fume hood system

The equipment is in good condition. Space is limited for instruction.

Room # DU 142 Construction material preparation laboratory. New, well-equipped laboratory for aggregate, concrete, and asphalt specimen preparation. Contains scales, sieves, sieve shakers, ovens, compactors, mixers, vibrators, and other equipment. Although small, this is a very good instructional facility.

Room # DU 146 Laboratory assignment room. Used for explaining laboratory assignments, performing pre- and post-laboratory calculations. This room is a very good instructional facility.

Room # DU 144 Undergraduate soils laboratory, equipped with:

K. triaxial cell

Stress path triaxial
3 hand-operated direct shear apparatus
2 odometers
2 pinhole test apparatuses
2 unconfined compressive machines
3 electronic balances
4 compaction periameters
This is a new, well-equipped laboratory, and a very good instructional facility.

Room # DU 343 and 345 Environmental Engineering Laboratory

These labs are shared jointly by the BSCE and BSCE graduate programs in environmental quality engineering and science.

These labs are general-purpose rooms for environmental chemistry experiments. Room 343 is generally used as a wet chemistry lab when students perform basic chemical experiments. Room 345 is generally used as a unit-process lab to demonstrate pilot-scale processes. These labs are minimally equipped but suitable. More sophisticated equipment is available in the research labs, which are frequently used for demonstrations.

Room # DU 245 Hydraulics Laboratory

Large, open, multipurpose space used for some fluid mechanics labs in the fall and spring semesters, and for several laboratory demonstrations in water resource engineering, hydraulic engineering, and engineering hydrology. It was originally designed exclusively as a hydraulics lab and includes a Plexiglas 4" x 12" x 20' flow channel, a new 24" x 24" x 35' flow channel, a pipe network experiment, a pump turbine test setup, a wind tunnel, and miscellaneous equipment. Additional bench space and a wave tank are planned.

Since the last general visit in 1999, there has been a limited amount of money available for equipment purchases. In most years, the BSCE department has had approximately $5,000 for equipment repair and maintenance. Occasionally, additional special funds are available, with amounts of about $20-30k. Some equipment has been replaced or modernized. In nearly every year, most equipment requests have been honored and several testing machines have been calibrated and repaired. In spring 2005 $80k was made available to BSCE to repair old equipment and purchase new. Those funds are currently being spent.

While new, modern equipment is always appreciated, our present laboratories are well equipped for the undergraduate instructional program. We have a modest but adequate replacement and repair budget (about $5,000 per year). We also make use of a large and well-equipped machine shop and an excellent technician staff to build many repairs and new equipment.

One consequence of our growing research program has been the crowding of the instructional laboratory space. The undergraduate laboratory program has not been compromised to date, but this crowding could be a future problem. We have requested a large-bay research facility that would accommodate many of our projects and alleviate some of the crowding.

We believe our present laboratory equipment setup is very good for our BSCE program. As mentioned earlier, an equipment repair and replacement fund allows us to keep up with most

requests. If the BSCE program grows, we will add more sections and maintain the present section size. We do not see the need for greatly expanded undergraduate laboratory facilities at this time.

An ongoing concern is the continual updating and maintenance of computer hardware and software. The renovation of the Duckering Building will allow a complete data communication link to be available in every lab station and allow students experience with modern acquisition systems.

The technicians group of CEM handles the maintenance and servicing of laboratory equipment. They are very capable and their well-equipped shops are able to make most repairs and rebuilds. We occasionally contract out some testing, maintenance, and repair.

14 Jun 11

LAB DESCRIPTIONS FOR ABET REPORT

Criterion 7. Facilities

A.3 Laboratories

- *(Add this heading at the top of Page 108, above the two paragraphs preceding the description of Room #DU124.)*
- *Delete the first sentence of the last paragraph preceding the description of Room #DU124 and substitute the following:* The College employs three information technicians to maintain computer laboratories and the computational infrastructure (hardware and software) of the College, and a laboratory manager to coordinate the use of teaching and research laboratories and to secure major maintenance and calibration services.

Rooms # DU 121 and DU 123 Asphalt Pavement Laboratory

- *Add these labs and the following text:*
  Major equipment includes:
  Pine gyratory compactor
  NCAT oven for testing asphalt content
  Freas mechanical convection oven
  Drying and cleaning ovens
  Precision scale

  IPC simple performance tester
  Micro-deval aggregate abrasion tester
  Marshall stability tester
  Programmable rheometer
  Sand equivalent tester
  Specific gravity bench and precision scale

Room # DU 124 Structural Materials Laboratory

- *Delete in its entirety and substitute the following:*
  Major equipment includes:
  Tinius-Olsen Super L 30 kip universal testing machine upgraded with M-Test software and controller
  Tinius-Olsen H100KU 22 kip electro-mechanical load frame with Navigator software
  Forney concrete compression tester, 250 kip
  Rockwell hardness tester
  Charpy impact tester

  All the equipment is current and in good to new condition. The second Tinius-Olsen was recently purchased to provide a simple-to-use instructional testing machine suitable for use by undergraduates.

Room # DU 125 Steel and Bridge Laboratory

- *Add this lab and the following text:*
  Major equipment includes:
  Quanser Shaker II table (2 each)
  Bridgeport vertical milling machine
  Metal lathe 6 x 30
  Delta drill press
  Plasma cutter torch and table

  This is a large lab, well equipped for instruction in steel structures, particularly, and is also used to prepare projects such as the Steel Bridge competition.

Room # DU 127 Superpave Laboratory

- *Add this lab and the following text:*
  Major equipment includes:
  Direct tension tester
  Bending beam rheometer
  Rolling thin film oven
  Pressure aging vessel
  Prentex vacuum oven
  Dynamic shear rheometer

  This equipment is heavily used for asphalt research, and is in good condition, although the dynamic shear rheometer is an old model.

Room # DU 129 Advanced Geotechnical Laboratory

- *Delete in its entirety and substitute the following:*
  Major equipment includes:
  Geotest Direct Shear Friction Machine
  CBR Test Frames, Versaloader (2 each)
  Automatic Soil Compactor
  Soil Stiffness Gauge (2 each)
  Ro-Tap Sieve Shaker
  Mettler high capacity precision balance
  Convection oven

  All the equipment is current and in good condition. Space is limited for instruction.

Room # DU 142 Soils and Concrete Laboratory

- *Delete in its entirety and substitute the following:*
  Major equipment includes:
  Gilson aggregate screening machines (2 each)
  Ro-Tap Sieve Shaker
  MaryAnn Sieve Sifter
  Automatic Soil Compactor

Target Guardmatic 20 inch masonry saw for sample cutting
Convection oven
Precision scales
Sieves, concrete molds, sample splitters, air meters, concrete vibrators and other equipment
Floor sump for sample preparation and mixing
Air handling and filtration equipment

Although small for the amount of use, this is a very good instructional facility

Room # DU 143 Frozen Ground Laboratory

- *Add this lab and the following text:*
  Major equipment includes:
  Walk-in freezer with custom large frost heave cell
  Specimen storage/conditioning freezers
  Sample drying oven
  Asphalt pavement beam compactor (support for Asphalt Pavement Lab)

  Although small, with some shared use, this lab is efficiently and effectively used for research in frozen ground.

Room # DU 144 Geotechnical Laboratory

- *Delete in its entirety and substitute the following:*
  Major equipment includes:
  ELE triaxial cells and control panel
  Soiltest direct shear apparatus (2 each)
  Deadwieght soil consolidation frame (2 each)
  ELE direct/residual shear apparatus
  Freas oven
  Precision scales

  This is a large, well-equipped laboratory with ample counter space and a large whiteboard. It is a very good instructional facility.

Room # DU 146 Advanced Hydraulics Laboratory

- *Delete in its entirety and substitute the following:*
  This room is being prepared as a hydraulics and advanced geotechnical research laboratory, with a custom-designed research flume currently on order. Although primarily for research, it will also be used for instructional demonstrations.

Room # DU 149 Advanced Materials Laboratory

- *Add this lab and the following text:*
  Major equipment includes:
  MTS 311 servohydraulic load frame, 220 kip, with environmental chamber
  MTS 318 servohydraulic load frame, 55 kip, with environmental chamber

Cox CS-7500 servohydraulic load frame, with environmental enclosure
Fredlund soil water characteristic cell
Freezers for sample conditioning and for frost heave testing
GCTS dual actuator load frame, 22 kip, for liquefaction testing

Room # DU 245 Hydraulics Laboratory

- *Delete in its entirety. This is the "Administrative Office, Department of Civil and Environmental Engineering". Move the text to DU 334.*

Room # DU 334 Hydraulics Laboratory

- *Add this lab to the report and transfer text previously shown under DU 245 (with modifications), as follows:*
  Large, open multi-purpose space used for some fluid mechanics labs in the fall and spring semesters, and for several laboratory demonstrations in water resources engineering, hydraulic engineering, and engineering hydrology. Originally designed exclusively as a hydraulics lab, it includes
  Tecquipment 12 hydraulics flow channel
  Hydraulics fluid circuit (pipe network)
  Gilkes hydraulics pelton wheel test set
  Hydraulic benches, gravimetric and volumetric
  Reynolds flow apparatus
  Discharge measure tanks, pressure calibration gauges, viscometers, and various other hydraulics instruction equipment.

  This is a well-equipped instructional laboratory.

Room # DU 343 Environmental Engineering Laboratory

- *Delete reference to DU 345, which is now filled with the graduate student offices.*

C. Equipment

- *Delete the text from "Room # DU 124 Structural Laboratory" through "Room # DU 245 Hydraulics Laboratory" and substitute the following:*

Rooms # DU 121 and DU 123 Asphalt Pavement Laboratory

Major equipment includes:
Pine AFG2AS gyratory compactor
Thermolyne NCAT oven for testing asphalt content
Precision Scientific 645 Freas mechanical convection oven
Sheldon 1685 drying oven and Tempyrox PryoClean oxidizing oven
Precision scale

IPC simple performance tester
Gilson Micro Deval MD-2000 aggregate abrasion tester

Soiltest AP-170C Marshall stability tester
Brookfield DV-III programmable rheometer
Gilson SE-2B/SEA-100 sand equivalent tester
Specific gravity bench and precision scale

Room # DU 124 Structural Materials Laboratory

Major equipment includes:
Tinius-Olsen Super L 30 kip universal testing machine upgraded with M-Test software and controller
Tinius-Olsen H100KU 22 kip electro-mechanical load frame with Navigator software
Forney FT-21 concrete compression tester, 250 kip
Wilson 5JR BB Rockwell hardness tester
Tinius-Olsen and TMI Charpy impact testers

All the equipment is current and in good to new condition. The second Tinius-Olsen was recently purchased to provide a simple-to-use instructional testing machine suitable for use by undergraduates.

Room # DU 125 Steel and Bridge Laboratory

Major equipment includes:
Quanser Shaker II table (2 each)
Bridgeport vertical milling machine
Maximat Standard metal lathe 6 x 30
Delta drill press 70-200
Powermax 1000 plasma cutter torch and table

This is a large lab, well equipped for instruction in steel structures, particularly, and is also used to prepare projects such as the Steel Bridge competition.

Room # DU 127 Superpave Laboratory

Major equipment includes:
FTS RS33AL direct tension tester
Cannon TE bending beam rheometer
Cox CS-325 rolling thin film oven
ATS pressure aging vessel
Prentex 9900E vacuum oven
ATS dynamic shear rheometer

This equipment is heavily used for asphalt research, and is in good condition, although the dynamic shear rheometer is an old model.

Room # DU 129 Advanced Geotechnical Laboratory

Major equipment includes:
Geotest S2450 large friction shear machine
ELE Versaloader CBR test frames, (2 each)
ELE Automatic Soil Compactor
Humboldt 4140 soil stiffness gauge (2 each)
Tyler RX-29 Ro-Tap sieve shaker
Mettler high capacity precision balance
Despatch LAC-67 convection oven

All the equipment is current and in good condition. Space is limited for instruction.

Room # DU 142 Soils and Concrete Laboratory

Major equipment includes:
Gilson TS-1 and TM-3 aggregate screening machines
Gilson SP-1 sample splitter
Tyler RX-29 Ro-Tap sieve shaker
Rainhart SS-25 MaryAnn 12" sieve sifter
ELE automatic soil compactor
Target Guardmatic 20 inch masonry saw for sample cutting
Blue M DL-1320 gravity convection oven
Precision scales
Sieves, concrete molds, sample splitters, air meters, concrete vibrators and other equipment
Floor sump for sample preparation and mixing
Air handling and filtration equipment

Although small for the amount of use, this is a very good instructional facility

Room # DU 143 Frozen Ground Laboratory

Major equipment includes:
Kolpak walk-in freezer with custom large frost heave cell
True T-35 and T-72 specimen storage/conditioning freezers
VWR sample drying oven
Cos CS-1000 asphalt pavement beam compactor (support for Asphalt Pavement Lab)

Although small, with some shared use, this lab is efficiently and effectively used for research in frozen ground.

Room # DU 144 Geotechnical Laboratory

Major equipment includes:
ELE triaxial cells and control panel
Soiltest D-130 direct shear apparatus (2 each)
ELE deadwieght soil consolidation frame (2 each)

ELE direct/residual shear apparatus
Scientific Precision Freas oven
Precision scales

This is a large, well-equipped laboratory with ample counter space and a large whiteboard. It is a very good instructional facility.

Room # DU 146 Advanced Hydraulics Laboratory

This room is being prepared as a hydraulics and advanced geotechnical research laboratory, with a custom-designed research flume currently on order. Although primarily for research, it will also be used for instructional demonstrations.

Room # DU 149 Advanced Materials Laboratory

Major equipment includes:
MTS 311 servohydraulic load frame, 220 kip, with environmental chamber
MTS 318 servohydraulic load frame, 55 kip, with environmental chamber
Cox CS-7500 servohydraulic load frame, with environmental enclosure
Fredlund soil water characteristic cell
True TS-49 and So-Low Pr-100F freezers for sample conditioning and for frost heave testing
GCTS SS-100-VFdual actuator load frame, 22 kip, for liquefaction testing

Room # DU 334 Hydraulics Laboratory

Large, open multi-purpose space used for some fluid mechanics labs in the fall and spring semesters, and for several laboratory demonstrations in water resources engineering, hydraulic engineering, and engineering hydrology. Originally designed exclusively as a hydraulics lab, it includes
Tecquipment 12 hydraulics flow channel
Technovate 9009 hydraulics fluid circuit (pipe network)
Gilkes hydraulics pelton wheel test set
Tecquipment H1 and H1D hydraulic benches, gravimetric and volumetric
Reynolds flow apparatus
Discharge measure tanks, pressure calibration gauges, viscometers, and various other hydraulics instruction equipment.

This is a well-equipped instructional laboratory.

Appendix D – Institutional Summary

The Institution

a. Name and address of the institution

   University of Alaska Fairbanks
   PO Box 757500
   Fairbanks, Alaska 99775-7500
   www.uaf.edu

b. Name and title of the chief executive officer of the institution

   Pat Gambel, UA System President
   Brian Rogers, UAF Chancellor

c. Name and title of the person submitting the self-study report.

   David Barnes, Chair, Civil and Environmental Engineering Department

d. Name the organizations by which the institution is now accredited and the dates of the initial and most recent accreditation evaluations.

   The university has been accredited by the Northwest Commission on Colleges and Universities since 1934. The most recent full-scale accreditation evaluation was in 2001. This was followed in 2006 by a five-year interim report. The next NWCCU accreditation self-study will be submitted in fall 2011.

1. Type of Control

Description of the type of managerial control of the institution, e.g., private-non-profit, private-other, denominational, state, federal, public-other, etc.

State and Federal.

2. Educational Unit

Describe the educational unit in which the program is located including the administrative chain of responsibility from the individual responsible for the program to the chief executive officer of the institution. Include names and titles. An organization chart may be included.

The College of Engineering and Mines (CEM) is organized into six departments:

a. Civil and Environmental Engineering
b. Computer Science
c. Electrical and Computer Engineering
d. Mechanical Engineering
e. Mining and Geological Engineering

f. Petroleum Engineering,

and offers the following programs

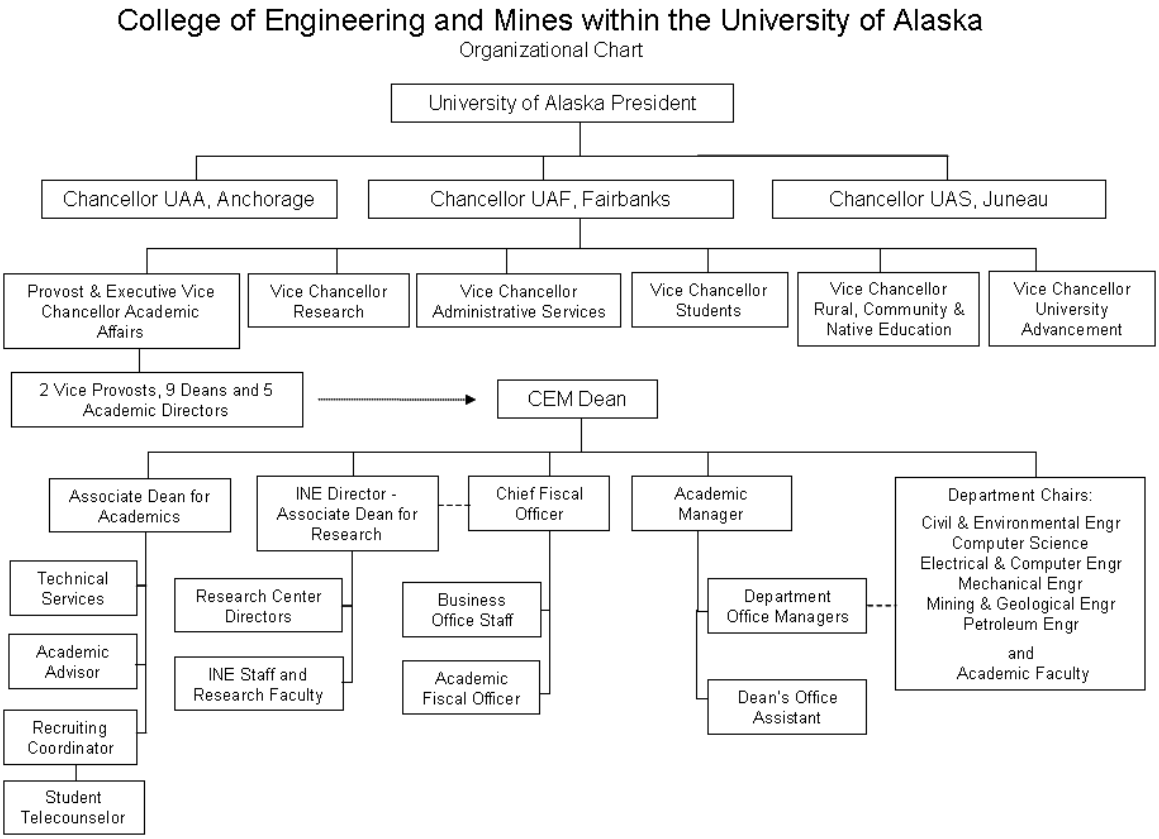
- Arctic Engineering M.S.
- Civil Engineering B.S., M.C.E., M.S.
- Computer Engineering B.S.
- Computer Science B.S., M.S.
- Construction Management graduate certificate
- Electrical Engineering B.S., M.E.E., M.S.
- Engineering Ph.D.
- Engineering Management M.S.
- Environmental Quality Engineering M.S.
- Environmental Quality Science M.S.
- Geological Engineering B.S., M.S.
- Mechanical Engineering B.S., B.S/M.S., M.S.
- Mineral Preparation Engineering M.S.
- Mining Engineering B.S., M.S.
- Petroleum Engineering, B.S., M.S.
- Science Management M.S.

The FY 10 enrollment in the college was 672 undergraduate students and 146 graduate students, and there were 101 degrees awarded. Grant-funded research expenditures in INE (Institute of Northern Engineering) totaled $14,306,000 in FY 10, with total research expenditures of $18,184,000.

The Computer Science department joined CEM in FY11, and with the addition of their 7 faculty, CEM/INE currently has 59 faculty, including 6 that are research only, and 46.5 staff members.

The college organization chart is below. The top level administration from the chart is:
CEM Dean – Douglas Goering
Associate Dean for Instruction – Charlie Mayer
INE Director – Associate Dean for Research – Daniel White
Executive Officer – Ross Newcombe
Civil and Environmental Engineering Department Chair – David Barnes
Computer Science Department Chair – Kara Nance
Electrical and Computer Engineering Department Chair – Charlie Mayer
Mechanical Engineering Department Chair – Jonah Lee
Mining and Geological Engineering Department Chair – Rajive Ganguli
Petroleum Engineering Department Chair – Catherine Hanks

The CEM Dean reports to the UAF Provost, Susan Henrichs, who reports to the UAF Chancellor, Brian Rogers, who reports to the UA President, Pat Gambel.



3. Academic Support Units

List the names and titles of the individuals responsible for each of the units that teach courses required by the program being evaluated, e.g., mathematics, physics, etc.

Chemistry, John Keller, Chemistry and Biochemistry Department Chair
Math, John Rhodes, Mathematics and Statistics Department Chair
Physics, John Olson, Physics Department Chair
College of Liberal Arts (CLA), Burns Cooper, Interim Dean College of Liberal Arts. CLA offers the general education requirement courses.

4. Non-academic Support Units

List the names and titles of the individuals responsible for each of the units that provide non-academic support to the program being evaluated, e.g., library, computing facilities, placement, tutoring, etc.

Libraries [http://www.uaf.edu/uaf/academics/libraries], Responible Individual: Paul McCarthy, Interim Dean of Libraries.
UAF computing facilities are operated by OIT (Office of Information Technology); [www.uaf.edu/oit], Responsible Individual: Steve Smith , Chief Information Technology Officer.
UAF Academic Advising Center provides placement testing and advising; [www.uaf.edu/advising], Responsible Individual: Linda Hapsmith, Director.

Tutoring is provided within the academic units. The Department of Mathematical Sciences (DMS) provides daily tutoring in the Math Lab, located in the Chapman Building [http://www.dms.uaf.edu/dms/MathLab/MathLabIntro.html], Responsible Individual: Latrice Laughlin, Instructor, Department of Mathematics and Statistics. The Engineering Tutoring Lab is located in the Duckering Building and is manned 6 days a week by engineering student tutors, Responsible Individual: Charlie Mayer, Associate Dean for Instruction, CEM.

5. Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. If other standards are used for this program, the differences should be indicated.

The standard definition of credit hour applies at UAF: 1 credit hour represents 1 hour of class per week (or three laboratory hours per week) for 14 weeks per semester.

6. Tables

Complete the following tables for the program undergoing evaluation.

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Table D-1. Program Enrollment and Degree Data

Civil Engineering

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current Year	AY10-11	FT	44	34	20	45		143	32	0	24	8	1
		PT	3	4	2	13		22	7				
1	AY09-10	FT	47	18	17	45		127	34	0	17	13	2
		PT	3	3	3	13		22	18				
2	AY08-09	FT	35	24	12	41		112	32	0	17	6	2
		PT	3	3	0	10		16	14				
3	AY07-08	FT	42	16	21	24		103	26	0	16	8	1
		PT	6	4	3	16		29	18				
4	AY06-07	FT	20	19	16	36		91	22	0	17	4	2
		PT	6	1	2	7		16	13				

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the fall visit.

FT – full time
PT – part time

UAF Institutional Research tracks enrollment past the 4th year as being in the senior year; hence there is no separate data for 5th and succeeding years.

Table D-2. Personnel

Name of the Program

Year[1]: AY10/11

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[3]			
Faculty (tenure-track)	11		
Other Faculty (excluding student Assistants)	1	1	
Student Teaching Assistants	6		
Student Research Assistants			
Technicians/Specialists			
Office/Clerical Employees	1		
Others[4]			

Report data for the program being evaluated.

[1] Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

[2] For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc. For faculty members, 1 FTE equals what your institution defines as a full-time load.

[3] Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

[4] Specify any other category considered appropriate, or leave blank.

Appendix E Alumni Survey Questionnaires

UAF Civil & Environmental Engineering
Alumni Survey

The alumni survey is a critical element in assessing ABET objectives for the Civil and Environmental Engineering Department (BSCE) at UAF and evaluating the effectiveness of our BSCE program. Each year we send a survey to those alumni 3 and 5 years post graduation. Results are used by the BSCE faculty and our Advisory Board to determine areas for improvement in our program and make changes to the curriculum or program requirements. A summary of the survey results will be posted on our web site.

Thank you for taking the time to provide this valuable information.

What is the nature of your employer?
Consulting (design, operation, and maintenance)
Construction
Manufacturing
Natural Resource Industry (Mining, Oil, Gas, etc.)
Government
Other _____ (please specify)

Please indicate the names or acronym of any professional organizations (e.g. ASCE) that you are a member of.

How many times did you attend events organized by professional organizations in the past year?

Please describe your other professional involvement (e.g. organizing seminars, giving presentations, service as board member of professional organization).

Have you taken the PE or FE exam after completing your BS degree? Yes/No

Did you obtain your PE or EIT license? Yes/No PE/EIT

How many professional conferences did you attend in the past year? _____

How many credit hours of university–level or other technical courses did you take in the past year?

How often did you attend other educational events (e.g., presentations, trainings, and workshops) in 2008? _____

In retrospective, what do you appreciate most about your Bachelor of Science education at the UAF BSCE Dept?

What changes would you suggest to improve the BS education at UAF BSCE Dept?

Do you have any other comments?

Appendix F Employer Survey Questionnaires

UAF Civil & Environmental Engineering
Employer Survey
BS program in Civil Engineering

The annual employer survey is a critical element in measuring ABET objectives for the Civil and Environmental Engineering Department (BSCE) at UAF and evaluating the performance of our recent BSCE graduates. Results will be reviewed by the BSCE faculty and our Advisory Board to determine areas for improvement and make changes to the curriculum or program requirements. A summary of the survey results will be posted on our web site.

Thank you for taking the time to provide this valuable information.

What is your primary business?
Consulting (design, operation, maintenance)
Construction
Manufacturing
Natural Resource Industry (Mining, Oil, Gas, etc.)
Government
Other _____ (please specify)
What area best describes your primary activity in Civil Engineering?
General
Environmental
Geotechnical
Structures
Water Resources
Transportation
Construction
How many Civil Engineers do you supervise?
1-2
3-5
6-10
11-20
20 or more

What percent of the Civil Engineers you supervise are UAF BSCE graduates?
None
1-25%
26-50%
51-75%
76-100%
When did you hire your most recent UAF BSCE Program graduate?
Within the last year
1-2 years ago
2-3 years ago
3-5 years ago
More than 5 years ago
Never

(More questions on the next page)

How would you rate engineers in your company that graduated from the UAF BS Civil Eng. program in the last 5 years with respect to the following skills?

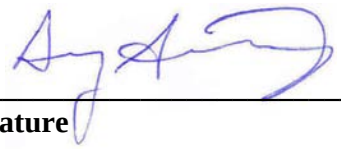
		Outstanding	Good	Satisfactory	Poor	Very poor
Objective 1	Technical skills (i.e., math, science, and engineering)					
	BSCE subdiscipline skills (e.g., structures, water resources, transportation)					
	Ability to analyze data, including use of modern computing tools (e.g. for curve fitting and statistical evaluation)					
	Ability to design a system, component or process					
	Critical thinking skills (e.g. identify problems and develop alternative solutions)					
	Understanding of northern issues & cold climate engineering					
Objective 2	Oral communication skills					
	Written communication skills					
	Graphical communication skills					
	Ability to work on a multi-disciplinary team (e.g., team building, communicating, coaching and applying discipline within a group)					
	Work attitude and interpersonal skills					
Objective 3	Demonstrating high professional and ethical standards					
	Understanding health, safety, environmental, and social issues associated with engineering					
	Overall qualifications of UAF BSCE graduates					

Signature Attesting to Compliance

By signing below, I attest to the following:

That B.S. Civil Engineering Program has conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*

_Douglas J. Goering_____ _____
Dean's Name (As indicated on the RFE)



_____ **__June 24, 2011_ _____**
Signature **Date**