Program Improvement Plan
Bachelor of Science in Civil Engineering

Department of Civil Engineering
College of Engineering, Computer Science, and Construction Management
California State University, Chico

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Note: This document describes the Civil Engineering *Program Improvement Plan* (*PIP*). Summaries of findings and actions resulting from implementation of the *PIP* are provided in the companion documents, *Program Improvement Report* (*PIR*), (various dates).

The *PIP* is updated periodically, but only when justified by significant changes to any part of the plan.

The *PIR*s are compiled on an academic year cycle and are based on the plan in effect at the time of the report. Minor deviations from the applicable plan are called out in each report.

History of Modifications to the *Program Improvement Plan*:

Version	Changes
August 2005	Initial description of the plan.

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Introduction

The Civil Engineering Department has, for many years, incorporated multiple modes of assessment. These include senior exit surveys, alumni surveys, employer surveys, the pass-rate on the Fundamentals of Engineering examination, input from the CE Professional Advisory Board, critical evaluations by the Accreditation Board for Engineering and Technology, and instructor self-assessment of courses. Although these past practices have been invaluable to the BSCE program, development and refinement of assessment strategies are ongoing.

The department recently developed and is currently employing a comprehensive plan for direct assessment of all program outcomes. This plan was pilot-tested in two courses during the fall 2003 semester and was fully implemented throughout the curriculum during the spring 2004 semester. This plan simultaneously addresses two aspects – *program assessment* and *student assessment* – through mutual and direct measures of student achievement.

I. Program Learning Outcomes

1. Program Learning Outcomes Summary

The Department of Civil Engineering has adopted for the BSCE degree the program outcomes specified by the Accreditation Board for Engineering and Technology, as listed in Criterion 3:

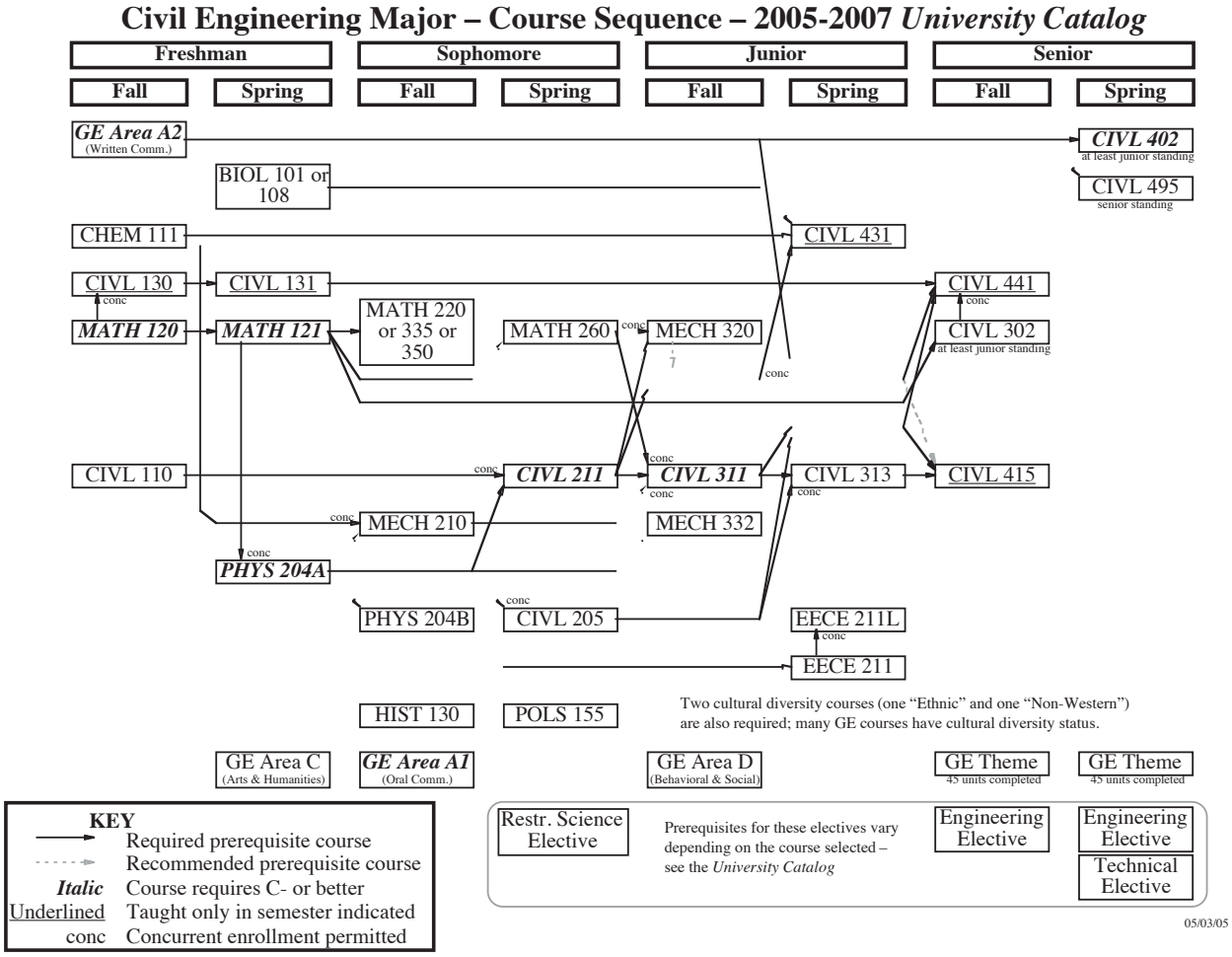
> Engineering programs must demonstrate that their graduates have:
>
> a. an ability to apply knowledge of mathematics, science, and engineering;
> b. an ability to design and conduct experiments, as well as to analyze and interpret data;
> c. an ability to design a system, component, or process to meet desired needs;
> 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 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; and
> k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
>
> Source: *Criteria for Accrediting Engineering Programs*, 2003-2004, Engineering Accreditation Commission, Accreditation Board for Engineering and Technology, Inc., 2002.

2. Distribution of Learning Outcomes Across the Curriculum

The Civil Engineering curriculum is comprised of a minimum of 132 units in general education, math, science, and engineering courses. The program is hierarchical in structure, a feature typical

of engineering programs. Consequently, most courses are specified by the faculty rather than selected by the student and prerequisite chains are common (Table I.2.1).

TABLE I.2.1 COURSE SEQUENCE IN THE CE CURRICULUM



The eleven identified learning outcomes (a-k) are distributed throughout the program so as to provide a gradual increase in student proficiency (Table I.2.2). Concepts are generally introduced in basic courses and then practiced in more advanced courses. In some courses where concepts are practiced, students are not only assessed for what they have learned in that particular course but are also assessed in order to measure their proficiency in selected program outcomes.

Each program outcome is addressed in multiple courses through a progressive distribution of content across the major. For example, outcome c: *ability to design a system component or process to meet desired needs* is introduced, within different contexts, in three courses, is practiced in at least six courses, and is directly assessed in two courses – CIVL 415 *Reinforced Concrete Design* and CIVL 431 *Environmental Engineering*.

TABLE I.2.2 DISTRIBUTION OF LEARNING OUTCOMES IN THE MAJOR

Course		Sem. Units	a: ability to apply knowledge of mathematics, science, and engineering	b: ability to design and conduct experiments; analyze and interpret data	c: ability to design a system, component or process	d: ability to function on multi-disciplinary teams	e: ability to identify, formulate, and solve engineering problems	f: understanding of professional and ethical responsibility	g: ability to communicate effectively	h: broad education necessary to understand impact of engineering solutions	i: recognition of the need for, and an ability to, engage in lifelong learning	j: knowledge of contemporary issues	k: ability to use techniques, skills, modern engineering tools for practice
MATH 120	Diff. Calculus	4											
MATH 121	Integ. Calculus	4											
MATH 260	Diff. Equations	4											
MATH selection	one course	3 or 4											
CHEM 111	Chemistry	4											
BIOL 101	Biology	3											
PHYS 204A	Mechanics	4											
PHYS 204B	Elec. & Magnet.	4											
Science elective	one course	3 or 4											
General education	10 courses	30											
MECH 210	Materials Engr.	3											
MECH 320	Dynamics	3											
MECH 322	Thermodynamics	3											
EECE 215	Linear Circuits I	4											
CIVL 110	Graphics for CEs	2											
CIVL 130	Surveying	3											
CIVL 131	Intro. CE Design	3											
CIVL 205	Computer Apps.	2											
CIVL 211	Statics	3											
CIVL 302	Engr. Econ. Stats.	3											
CIVL 311	Strength of Mat.	4											
CIVL 312	Stru. Testing Lab	1											
CIVL 313	Stru. Mech.	4											
CIVL 321	Fluid Mech.	4											
CIVL 402	Contr. Spec., Tech.	4											
CIVL 411	Soil & Foundations	4											
CIVL 415	Reinf. Concrete	4											
CIVL 431	Envir. Engr.	4											
CIVL 441	Transp. Engr.	4											
CIVL 495	Life. Dev. Engrs.	3											
Engr. Elective	2-3 courses	6											
Tech. Elective	1-0 courses	3	Learning outcomes vary depending on course selected …..										

Key

introduced
practiced
practiced & assessed

The courses selected for outcomes assessment all provide significant treatment of the target outcome, do so in a manner that can be assessed, and complement each other when more than one course is identified for a single outcome (rather than just providing redundancy). Assessment is generally undertaken at the upper-division level so as to measure student achievement of a particular awareness, skill, or ability at a relatively advanced level.

3. Direct and Embedded Assessment

The direct assessment process as developed by the CE department is a valuable addition to our portfolio of assessment measures. Changes to the plan are likely; if nothing more than to reflect differing pedagogy when instructional assignments change. One key feature of the CE assessment plan is that it is “embedded” as a natural feature in each related course – so the assessment metric must be tied not just to the course but to the individual instructor, as well.

A detailed description of the assessment plan is provided in Appendix A: Direct Assessment Measures. The assessment plan simultaneously addresses two aspects – *program assessment* and *student assessment* – through common and direct measures of student achievement. The way the plan can address two aspects concurrently results from the different ways that the findings are applied.

In the case of *program assessment*, the assessment results are used to focus on possible weaknesses in and suggested enhancements to the civil engineering program. For example, if the assessment results for ABET outcome c: *ability to design a system, component or process to meet desired needs* as measured in CIVL 415 *Reinforced Concrete Design* consistently fall short, on average, of the specified standard, then the department will consider increased or enhanced treatment of this topic. These programmatic improvements might be incorporated in the assessed course, CIVL 415 in this example, but attention might just as well focus on a preceding required course containing this same learning outcome, e.g., a perceived weakness in this outcome as assessed in CIVL 415 might be addressed by enhancements to CIVL 311*Strength of Materials*, a prerequisite to CIVL 415.

For *student assessment*, the findings are instead applied individually to each student with the objective of ensuring that all graduates attain proficiency in every learning outcome. In situations where a student fails to reach the specified standard of proficiency, the student is required to complete remedial work to ensure that this proficiency is ultimately achieved. In extreme cases, a student might even be required to repeat a course even if his/her aggregate course performance has reached a satisfactory level (i.e., by receiving an *Incomplete* as the course grade, which within one year would convert to an *F* if proficiency is still not demonstrated). It is anticipated that very few students will fail at this aspect of assessment. On the other hand, if many students do fail to demonstrate proficiency, this would be an indication of programmatic deficiency, for which remedial action by individual students would only be considered as a short-term solution – instead, the long-term solution would be to seek programmatic improvements.

The metric chosen as the assessment measure in each course varies by course: from a score on a particular assignment, to an aggregate score on multiple assignments, to an overall course grade. In all cases, the metric is a natural component of the course rather than an artificial element interjected solely for assessment purposes. Consequently, the metric is an integrated component of teaching and learning (i.e., *embedded* assessment). Furthermore, the applicable metric is, in all cases, comprised primarily of the learning outcome for which the metric is intended. This ensures that a student will only be able to meet the specified standard score if they have achieved proficiency in the targeted learning outcome.

During the fall 2003 semester, this assessment plan was pilot-tested in two courses – CIVL 415 *Reinforced Concrete Design* and CIVL 441 *Transportation Engineering*. As with any assessment activity, one part of assessment is to evaluate the effectiveness of the assessment plan. As the pilot test of the CE embedded assessment plan, this was the principal objective of this application. Following this trial, refinements were implemented to the plan followed by comprehensive implementation in all applicable courses during the spring 2004 semester.

4. Collection of Embedded Assessment Data

At the beginning of each semester, instructors of courses having modifications to assessment practices submit syllabi for review by the department chair. The purpose of this review is to verify that the assessment criteria are adequately defined for assessment of student success at attaining the specified outcomes. Of particular concern is that each syllabus must specify the requirement that students will undertake remedial work if they fail to attain the specified standard for the applicable metric and that their ability to pass the course depends also on their ability to attain the standard score. A sample syllabus is provided to demonstrate the incorporation of direct, embedded student assessment (Appendix B: Sample Syllabus – Assessment Statement).

Near the end of each semester, an evaluation template is provided to each instructor for courses in which students are assessed (Appendix C: Sample Assessment Summary – Data Collection). Keeping with the essential requirement that the assessment process must be useful, manageable, and sustainable, the template was designed to provide a clear and complete assessment summary while minimizing additional workload for the instructor.

The template was designed to incorporate all of the different metrics identified for assessment in each course. In some courses there is only one metric that must be passed in order to demonstrate compliance, while a few other courses employ multiple metrics. Although most of the metrics are quantitative, a few are qualitative. Additionally, in most cases a repeat attempt is accommodated for students who failed the assessment in the first try.

To use the template, each instructor enters the specified minimum score(s) required to pass the metric(s) and whether all scores must be passed (for courses with multiple metrics) or whether only one must be passed (to permit recording of repeat attempts). Student names and individual scores are then entered (this is a copy/paste operation from the course grading spreadsheet). The template automatically identifies which students have passed or failed the metric and calculates summary statistics for the course. Instructors are also prompted to make notes about the assessment experience in that particular course, including suggestions for possible changes to the assessment process. Following submission of individual course results, the department chair compiles an overall summary of that semester's assessment.

5. Other Direct Measures of Assessment

Several other methods of assessment have been employed in order to provide additional, supplemental information regarding program effectiveness. While most of these methods are indirect measures, one direct measure, student performance on the California Fundamentals of Engineering (FE) examination (previously called the Engineer in Training exam), has been used with mixed results.

The state provides summary data, by university and major, for all students who take the FE examination. The data consist of numbers of students taking and passing the examination (also reported as a percentage pass rate). The pass rate is also presented for state and national

averages. Consequently, a comparison between the pass rate for Chico CE majors as compared to state and national norms would, seemingly, provide valuable reflection on program performance.

Several factors limit the value of this information, the most significant being that students frequently sit for the examination prior to completing all of the subject matter coursework on which they will be tested. They are, in fact, encouraged by the CE faculty to take the exam early in order to improve their chances of passing the test prior to graduation. These early test-takers likely have a relatively high failure rate, although they may ultimately pass the exam in a subsequent attempt.

A pass rate based on a student's final attempt, that is after all prerequisite coursework has been completed, would be a valuable direct measure of overall program effectiveness. However, the state does not attempt to make this distinction. Consequently, the state reported pass rate for CE majors at Chico will suffer a degree of skewness towards the low end, due to the small number of students taking the test and the variable number of students who might be taking the exam early.

As a possibly more representative enhancement, the CE department is collecting, via the senior exit survey (see Section I.6), the number of students who have taken and who have passed the FE examination by the time of graduation. While students have, for some time, been prompted on this survey to report this information, the return rate on the survey has not been consistently sufficient to ensure valid results. A concerted effort is in process to improve the return rate and to gather this potentially very useful assessment information.

6. Indirect Measures of Assessment

The department generally employs two indirect measures of student assessment. The most significant is the graduating senior exit survey (Appendix D), which consists of two parts; a portion common to all majors in the College of Engineering, Computer Science, and Construction Management, plus a smaller, major-specific portion. The college portion, due to its greater complexity, is generally unchanged from semester to semester. The CE portion, being shorter and simpler, is easily changed to gather a variety of different information at different times, although this has not been the practice in past years. However, the CE portion of the survey was recently modified, partly to permit use of a scan form, and regular updates are now easily implemented. The graduating senior exit survey was first initiated in 1995, the current college portion of the survey dates from 2002, and the current version of the major-specific survey was implemented in 2005.

A significant portion of the senior exit survey consists of questions designed to gage student satisfaction with various aspects of their curricular, co-curricular, and extra-curricular experiences. A five-point Lichert scale is used, having "worst" to "best" responses as "1" to "5" in numerical choices, respectively. The CE program has set "3.50" as a desirable minimum mean response – i.e., a score below 3.50 will trigger in depth evaluation as to probable causes and, if appropriate, consideration of potential remedies.

A second indirect measure of assessment is provided by a survey administered to students by individual instructors in their courses. Each instructor develops, with departmental assistance, a survey instrument designed to measure the success of his/her course at meeting course objectives. This survey is distinct from the campus-wide *Student Evaluation of Teaching* as the intent is to measure course, not instructor, performance. The immediate benefits of the survey results are valuable to instructors as they reflect on the strengths and weaknesses of their courses.

II. Program Educational Goals and Objectives

1. Program Educational Goals and Objectives

The program educational goals and objectives for civil engineering are reviewed periodically and updated as necessary (most recently in 2002), based upon input from the CE Professional Advisory Board and subsequent reflection by the CE faculty. The current statement follows:

> The civil engineering program has two comprehensive goals: to prepare graduates for immediate entry into a variety of professional careers and to provide a solid undergraduate foundation in general principles enabling continued education at advanced levels.
>
> In support of these goals, the program is constructed to provide graduates with a broad-based education as effective problem-solvers and designers in a variety of sub-disciplines within civil engineering. Specific objectives of the program are to:
>
> - supply a rigorous, balanced, comprehensive and contemporary curriculum enabling exposure to many facets of civil engineering, including both breadth and selected depth elements common to the profession.
> - provide an extensive education in mathematics, sciences and engineering topics, including design.
> - provide an effectual general education experience in the humanities and social sciences.
> - develop valuable personal abilities in oral and written communication, critical thinking, leadership and teamwork.
> - enable appropriate use of technology, including computational tools.
> - familiarize graduates with applicable regulatory issues.
> - instill in graduates a sense of coherence, respectfulness, citizenship, community service, and ethical responsibility.
> - provide opportunities for extracurricular learning, professional experiences, and fellowship through activities sponsored by campus-affiliated chapters of national professional and honor societies.

2. Alumni Survey

Civil engineering alumni have been surveyed regularly – most recently on a three-year cycle. Odd-year graduates were surveyed during the summer of an odd calendar year and even-year graduates were surveyed during the summer of an even calendar year. This methodology provides a complete sampling of all graduates that is synchronized with the six-year accreditation review cycle (the last accreditation review was completed spring 2004). The most recent survey (Appendix E) was conducted in 2002.

The department is currently in the process of updating both the survey instrument and the methodology used to administer the survey. During the 2005-2006 academic year, the CE Professional Advisory Board will create a list of alumni survey information that it feels would be valuable to the assessment of the program. This list will then be refined by the program faculty and used to construct, with the assistance of the campus Institutional Research office, an improved survey instrument.

The previous alumni survey did not distinguish between recent and more seasoned graduates. Rather, all even-year graduates, for example, were surveyed as a group, with no attempt to separate the respondents by time subsequent to degree. This approach greatly reduced the sensitivity of the survey in measuring the effectiveness of any program modifications or enhancements, and of the impacts of possible changes occurring in the civil engineering profession.

Once the new survey instrument has been prepared, it will be administered in such a way as to gather information correlated by the time subsequent to degree. Current thinking is to attempt to sample two distinct groups – recent graduates (perhaps one to three years after degree) and alumni transitioning from entry-level to more responsible positions (perhaps six to nine years after degree). Alumni more than about ten years past graduation will likely not be surveyed, since the association between their undergraduate education and their professional activities will, by that time, be significantly reduced.

3. Employer Survey

Known employers of CSUC CE graduates have been regularly surveyed, most recently in 2002 (Appendix F). The survey is administered every six years so as to coincide with the accreditation review cycle. The design and content of this survey instrument is currently undergoing comprehensive review by the program faculty, with the assistance of the CE Professional Advisor Board and the Institutional Research office. It is likely that an entirely new and enhanced survey instrument will be prepared prior to 2008, when the next survey is scheduled.

4. Professional Advisory Board Feedback

The CE Professional Advisory Board (PAB) was established in 1990 and has since met semi-annually. Demographics of the PAB membership have varied over the years, but diversity has been a pervasive characteristic. While the PAB normally numbers between 15 and 20, an individual member may be male or female; young to old; novice to veteran; practicing engineer

or educator; active or retired; a CSUC CE graduate or not. While most members are from the northern California region, some represent more distant reaches of the country and the earth. Maintaining the ranks has not been difficult since many members have repeatedly re-enlisted after their terms have expired and there has always been an ample list of candidates to fill open positions. The board is autonomous from the department although they welcome guidance and suggested tasks from the faculty.

While the PAB reflects a variety of interests, all members share a strong commitment to program assessment and improvement and, as a result, the PAB is one of the most valuable assessment means available to the department. Among other things, the board has also assisted with curriculum design, constituent outreach, fundraising, and advocacy. Currently, the board is evaluating the program's educational goals and objectives and the survey instruments used for alumni and employer feedback. They will also be asked to review and evaluate this *Program Improvement Plan* and the companion *Program Improvement Report*, once they have been completed.

5. Accreditation Board for Engineering and Technology Feedback

The Accreditation Board for Engineering and Technology (ABET) is the accepted national standard for accreditation of engineering programs. The CSUC CE program is accredited by ABET.

An accreditation review is a valuable catalyst for faculty self-reflection on program effectiveness. Following completion of an accreditation review, ABET will also provide statements regarding program strengths and inadequacies. Inadequacies are divided into three categories: a *deficiency* indicates that a particular accreditation criterion is not satisfied; a *weakness* indicates that a criterion is currently satisfied but will deteriorate without remedial action; and a *concern* indicates a criterion is currently satisfied but that positive action is needed to ensure future compliance.

Consequently, the ABET findings provide valuable targets for program improvement. All inadequacies, regardless of category, must be positively addressed prior to the subsequent accreditation review.

III. Analysis, Interpretation, and Application of Assessment Findings

1. Historical Findings

The breadth of assessment measures employed provides valuable guidance for modifications and improvements to the Civil Engineering program. Some of the enhancements that have occurred over the past ten years or so are summarized in Table III.1.1.

TABLE III.1.1: CE PROGRAM ENHANCEMENTS

- Revisions to the program's mission and educational objectives in 2002
- Development of the new course CIVL 205 *Computer Application in Engineering*
- Modification of the program requirements to accommodate a math selection (one of the following: MATH 220 *Analytical Geometry and Calculus II,* MATH 335 *Elementary Linear Algebra*, or MATH 350 *Introduction to Probability and Statistics*)
- Development of the CE Projects Laboratory (a teaching facility with 29 student workstations, instructor workstation, and media projection) and integration throughout the curriculum
- Integration of AutoCAD and Land Development Desktop in the curriculum
- Incorporation of engineering design and an overview of CE sub-disciplines in the freshman course sequence, CIVL 130 *Surveying* and CIVL 131 *Introduction to Civil Engineering Design*
- Incorporation of earthquake engineering in CIVL 313 *Structural Mechanics*
- Incorporation of probability and statistics in CIVL 302 *Engineering Economy and Statistics*
- Incorporation of multi-disciplinary team projects in CIVL 495 *Lifelong Development for Engineers*
- Affirmation of the continued importance of our professional student chapters

2. Process

All measures of programmatic assessment, both direct and indirect, are administered according to the protocols described previously. As they are available, assessment data are compiled and summarized under the direction of the department chair. This effort culminates over the summer recess for all data collected from the preceding academic year.

Two groups, the CE program faculty and the CE Professional Advisory Board, currently review these summaries. The faculty reviews the assessment findings at a dedicated meeting early in the fall semester, draws conclusions, and suggests possible actions based on the findings. Data summaries and the faculty determinations are then documented in the *Program Improvement Report* (*PIR*), which is completed annually under the direction of the department chair prior to the fall meeting of the Professional Advisory Board.

Based on its review of the *PIR*, the Professional Advisory Board may make additional recommendations to the program faculty. Since the board will always meet subsequent to the

completion of that year's *PIR*, any board findings will be documented in the subsequent year's *PIR*.

To date, students have not been regularly consulted to solicit their input on assessment findings. A possible enhancement to the process, to be explored during the fall 2005 semester, will be to also seek input from a representative student group, possibly the board of the American Society of Civil Engineers student chapter.

APPENDIX A: Direct Assessment Measures

Civil Engineering – Direct Program and Student Assessment

Final Pilot Version S04c

Direct Program Assessment

Key features:

1. Identified elements of selected courses are used to measure, on average, student proficiency at attaining learning outcomes.
2. The measure of outcome assessment varies as appropriate to the course and to the outcome.
3. Faculty meet at least once each semester to review assessment summaries from the previous semester.
4. Programmatic changes are considered as applicable.
5. The effectiveness of the assessment is also evaluated and modified as warranted.

Notes:

• Although the assessment is embedded in selected courses, it is not solely the responsibility of these courses to provide the identified outcome; rather, it is a responsibility of the program (i.e., collectively, of all prior course for which each outcome is a component).

• This assessment plan has all three critical assessment characteristics: it is useful; it is manageable; it is sustainable.

Assessment Components:

Metric - The measure of student proficiency (e.g., a quantitative or qualitative measure of achievement on an assignment or test question which emphasizes the target outcome)
Rubric - Evaluative conclusions versus corresponding descriptions of achievement level (e.g., highest score represents mastery)
Standard - Evaluative result that represents minimally acceptable achievement of proficiency

Direct Student Assessment

Key features:

1. The same assessment Metric used for programmatic assessment is also used to assess achievement by individual students.
2. Each student must achieve the score represented by the Standard.
3. Students failing to demonstrate proficiency will be required to undertake remedial tasks, until the proficiency is attained.
4. This additional course requirement is clearly identified in the syllabus of each course used for direct assessment of ABET outcomes.

Outcome	Course	Description	Metric	Rubric	Standard
a: ability to apply knowledge of mathematics, science, and engineering					
	CIVL 311 Strength of Materials	This course is the fundamental course, Strength of Materials. Course topics include stress, strain, torsion, axial loading, bending, combined loading, thin-walled pressure vessels, column buckling, Mohr's circle, etc. In completing homework, quizzes and exams students are required to apply their knowledge of Statics, Trigonometry, Physics, Algebra, Calculus, Differential Equations, Material Science and Strength of Material's topics.	Student proficiency is measured by the accuracy of their understanding of course topics, their ability to correctly approach a problem solution and their ability to actually solve a problem.	The student solutions to exam and homework questions are rated on a 100% scale. Generally, 90 to 100 percent would represent mastery, 80 percent above adequate proficiency, 70 percent adequate proficiency, and below 70 percent would be indicative that the student lacks proficiency.	A total average of 70 percent on exams and homework is the minimally acceptable achievement of proficiency.
b: ability to design and conduct experiments, as well as to analyze and interpret data					
	CIVL 411 Soil Mechanics & Foundations	Students complete eleven weekly soil experiments in-line with tests conducted in industry by soils engineers. Each experiment is designed to provide data that will allow the students to derive specific soil properties related to the soil classification and the soil strength. Following a laboratory experiment, students are required to analyze and interpret their data to determine the specific soil property(s) available from the experiment. Students are then required to submit their results in a formal laboratory report that outlines the procedures taken, details the results determined, indicates any errors in their procedures, provides an analysis of the accuracy of their findings and specifies possible reasons for any inaccuracies. One of the eleven labs requires students to design the experiment by determining the necessary tests to complete to classify an unknown soil	Student ability will be measured separately as indicated below: Ability to conduct experiments and analyze and interpret data – Student proficiency is measured by the combined score of the eleven laboratory reports, which all require the students to conduct experiments and analyze and interpret data. Ability to design experiments – One student experiment requires the students to design the actual process. For this lab, student proficiency is measured by the students' ability to determine the correct tests to run, to identify any procedure changes necessary to collect the necessary information from the test, and to plan time-management to gather the necessary information during the allotted laboratory time.	Ability to conduct experiments and analyze and interpret data - Lab reports are evaluated on a 100 point scale. Student proficiency will be measure by their course lab-report average. Typically, 90 to 100 points would represent mastery, 80 points adequate proficiency, and below 80 points would be indicative that the student lacks proficiency in this area. Ability to design experiments - Students proficiency will be measured based on their ability to accurately classify their soil based on the data they choose to and were able to collect. A lab report grade for this laboratory of 90 – 100 would represent mastery, 80 points adequate proficiency, and below 80 points would be indicative that the student lacks proficiency in this area.	Ability to conduct experiments and analyze and interpret data - Students are required to achieve an average grade of 80 or higher on the laboratory reports. Ability to design experiments - Students are required to achieve a grade of 80 or higher on this specific laboratory.
	CIVL 415 Reinforced Concrete Design	The course includes a three hour laboratory which requires students to conduct laboratory exercises relating to concrete aggregates, cement, concrete and steel reinforcing. In addition, each student group is required to test and analyze by experiment a bond system for the steel reinforcing for their design project, which is limited to 1/4" in diameter maximum. They must also conduct tension tests to determine the mechanical properties of the chosen steel reinforcing.	Student proficiency is measured by a score on the experimental results related to the bond tests	Project lab report is evaluated on a 10 point basis. Typically, 9 to 10 points would represent mastery, 8 points above adequate proficiency, and 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	The minimally acceptable achievement of proficiency is 7 points on a particular design report.
	CIVL 441 Transportation Engineering	The focus in CE 270 is more on the ability to analyze and interpreted data than on the design of experiments. The laboratory projects require that a fixed procedure be followed in collecting data.	The laboratory reports on the topics of traffic spot speed studies, and traffic volumes studies, traffic accident studies, public transit usage, and origin destination analysis all require comprehensive reports.	Each report is given the score between 0 and 15. Considered in the scoring is report format, neatness, the accuracy and thoroughness of results, a discussion of relevance and accuracy, and students conclusions. An appendix containing data collected in sample calculations is also evaluated.	Each student is required to complete all six reports. A student must receive a score 11 or better on a minimum of two of the reports.

c: ability to design a system, component or process to meet desired needs				
CIVL 415 Reinforced Concrete Design	The course emphasizes the design and analysis of the following components using ACI 318 Standards and accepted ultimate strength design methods: Beams for flexure, shear and bond, deep beams; Axial loading in tension and compression; Column design using interaction equations. In addition, the design project requires the students to analyze, design, and construct a scale model reinforced concrete structure which is an assembly of beam and column elements.	Student proficiency is measured by a score on the design presentations related to the design project with each student having to design a specific component mentioned above.	Project submittals that pertain to the design of structural components are evaluated on a 10 point basis. Typically, 9 to 10 points would represent mastery, 8 points above adequate proficiency, and 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	The minimally acceptable achievement of proficiency is 7 points on a particular design report.
CIVL 431 Environmental Engineering	The following components or processes are designed in phases throughout the semester: i) design population and flow-rate; ii) constituent mass loading; iii) sedimentation basin and sludge production; iv) coagulation/filtration (drinking water), and secondary biological treatment (wastewater); v) disinfection; and vi) sludge management and final disposal of sludges.	Student proficiency is measured by a score on test questions in which the student will have to design a specific component mentioned above.	Test questions that pertain to the design of components or processes are evaluated on a 10 point basis. Typically, 9 to 10 points would represent mastery, 8 points above adequate proficiency, and 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	The minimally acceptable achievement of proficiency is 7 points on a particular design question.
d: ability to function on multi-disciplinary teams				
CIVL 431 Environmental Engineering	Laboratory experiments are performed by multi-disciplinary teams of students who are giving emphasis in their curricula to structures, soil mechanics, hydraulics, transportation, or environmental engineering. The students perform experiments and collect data as a multi-disciplinary team, and then turn in individual reports using the information that the team collected. The students on each team are required to share responsibilities on each experiment.	Student proficiency is measured by scores on individual laboratory reports. (The students must work in teams in order to be able to collect the data for the report.)	Laboratory reports are evaluated on a 10 point basis. Typically, 9 to 10 points would represent mastery, 7 to 8 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency in working with the team and being able to write up the data.	The minimally acceptable achievement of proficiency would be an average score of 7 points for all lab reports submitted during the semester.
CIVL 495 Lifelong Development for Engineers	Students work on multi-disciplinary teams to research a case study in engineering and society. Each team is required to submit a written report as a team and to make an oral presentation where each team member is required to talk for the same amount of time (approximately 15 minutes).	Each student on a team is evaluated on their presentation in class.	The students are rated as excellent, very good, acceptable, and poor.	A score of "acceptable" is the minimally acceptable achievement of proficiency.
e: ability to identify, formulate, and solve engineering problems				
CIVL 415 Reinforced Concrete Design	Students are given ample exposure to identifying, formulation and solving engineering problems both in class via normal homework assignments, on exams and on the comprehensive design project.	Student proficiency is measured by scores on homework, exams and the final design project.	The final grade in this course is the evaluation of this criteria.	The minimally acceptable achievement of proficiency would be a grade of D in this course.
CIVL 441 Transportation Engineering	The student is required to prepare a formal proposal that leads to a formal design study report. In evaluating alternatives for final recommendation, the student must propose design criteria/constrains and evaluate each alternative based on the criteria.	The measure of proficiency is the student's formulation and solution of a design problem.	The evaluation of this concept is not easily made quantitative. The instructor provides comments and feedback to the student on problem formulation and evaluation in the proposal review and in evaluating the final design project.	A clear process must be presented by the student that includes the steps: establishment of design criteria and constraints, development of alternatives, evaluation of alternatives, a final recommendation based on the process.
f: understanding of professional and ethical responsibility				
CIVL 402 Contracts, Specifications and Technical Reports	A reading assignment is required on the subject of ethics in writing. Business relationships, the process of working with clients, procedures used to obtain consulting work, and other practices in operating a professional engineering services business are carefully addressed in the course.	Exam questions address issues in client relationships and contracting for engineering services	Test questions are assigned a score. Possible scores range between approximately 5 and 30.	A score of at least 70% on three or more exam questions that include the topics of ethical and professional responsibility.
CIVL 495 Lifelong Development for Engineers	Students are required to submit weekly memos on class readings. Each week a particular reading assignment focuses on a selected outcome (f-j).	The measure of proficiency is the student's score on a memo assignment. Each assignment is based on the particular outcome to be assessed.	Memos are evaluated on a 10 point basis. Generally, 9 to 10 points would represent mastery, 8 points above adequate proficiency, 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	A score of 7 on a particular memo assignment would be the minimally acceptable achievement of proficiency.
g: ability to communicate effectively				
CIVL 402 Contracts, Specifications and Technical Reports	Communication through writing is certainly a major theme of course. Special attention is given to writing e-mails, ordinary business correspondence, press releases, feasibility studies, proposals, and contract language.	Student proficiency is measured by scores on individual assignments listed above.	Possible scores are as follows: ordinary business correspondence – 30 point exam question, press releases – 50 points, feasibility study – 80 points, proposals – 50 points, and contract – 40 points.	A score of 70% of the possible score on at least 3 of the 5 items.
CIVL 415 Reinforced Concrete Design	Students are required to give at least one technical oral presentation on a topic related to the comprehensive design project.	Student proficiency is measured by the score on this individual presentation.	Presentations are evaluated on a 10 point basis. Typically, 9 to 10 points would represent mastery, 8 points adequate proficiency, and below 8 points would be indicative that the student lacks proficiency in working with the team and being able to write up the data.	The minimally acceptable achievement of proficiency would be a score of 7 points on a particular presentation.
h: broad education necessary to understand impact of engineering solutions in a global and societal context				
CIVL 441 Transportation Engineering	The student is required to prepare a formal proposal that leads to a formal design study report. In evaluating alternatives for final recommendation, the student must propose design criteria/constrains and evaluate each alternative based on the criteria.	The measure of proficiency is the student's consideration of items other than engineering standards and cost. Consideration of societal issues and global impact of the student's recommendation is required in the final design report.	The evaluation of this concept is not easily made quantitative. The instructor provides comments and feedback to the student on societal and global issues in the proposal review and in evaluating the final design project.	Some attention to societal and global issues must be included in every design report.

	CIVL 495 Lifelong Development for Engineers	Students are required to submit weekly memos on class readings. Each week a particular reading assignment focuses on a selected outcome (f-j).	The measure of proficiency is the student's score on a memo assignment. Each assignment is based on the particular outcome to be assessed.	Memos are evaluated on a 10 point basis. Generally, 9 to 10 points would represent mastery, 8 points above adequate proficiency, 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	A score of 7 on a particular memo assignment would be the minimally acceptable achievement of proficiency.
i: recognition of the need for, and an ability to, engage in lifelong learning					
	CIVL 495 Lifelong Development for Engineers	Students are required to submit weekly memos on class readings. Each week a particular reading assignment focuses on a selected outcome (f-j).	The measure of proficiency is the student's score on a memo assignment. Each assignment is based on the particular outcome to be assessed.	Memos are evaluated on a 10 point basis. Generally, 9 to 10 points would represent mastery, 8 points above adequate proficiency, 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	A score of 7 on a particular memo assignment would be the minimally acceptable achievement of proficiency.
j: knowledge of contemporary issues					
	CIVL 495 Lifelong Development for Engineers	Students are required to submit weekly memos on class readings. Each week a particular reading assignment focuses on a selected outcome (f-j).	The measure of proficiency is the student's score on a memo assignment. Each assignment is based on the particular outcome to be assessed.	Memos are evaluated on a 10 point basis. Generally, 9 to 10 points would represent mastery, 8 points above adequate proficiency, 7 points adequate proficiency, and below 7 points would be indicative that the student lacks proficiency.	A score of 7 on a particular memo assignment would be the minimally acceptable achievement of proficiency.
k: ability to use techniques, skills, and modern engineering tools for engineering practice					
	CIVL 131 Introduction to Civil Engineering Design	Engineering Tools: • Total Survey Stations with on-board computers and related surveying equipment. • Computer drafting programs, AutoCAD and Land Development Desktop. Laboratory project: • Define survey point data (raw field data) during surveying course, CE10. • Prepare a digital terrain model of existing surface. • Develop a digital terrain model of proposed surface given design criteria. • Compute earthwork quantities for project. • Produce a set of design plans and specifications. • Select a desired project for field stakeout and identify strategic stakeout points. • Stakeout project points in field, document fieldwork and discuss proposed project. • Comment on selected project and compare with those not selected. Laboratory activity: The activity captures the basics of engineering design by leading individual students through a simulated project. Beginning with data collection and reduction, students prepare a computer model of existing terrain features. Students then prepare a proposed project within a given scope, along with technical reference guidelines. After completing and analyzing individual projects, surveying teams of three to four students select one preferred project for field stakeout. Upon completion, the team and instructor evalu	Design projects are scored at strategic intervals to provide evaluation of progress and guidance towards the desired outcome. Intervals for evaluating techniques and skills using modern engineering tools are as follows: 1. Digital terrain model of existing surface. 2. Develop a digital terrain model of proposed surface given design criteria. 3. Compute earthwork quantities for project. 4. Produce a set of design plans and specifications. 5. Select a desired project for field stakeout and identify strategic stakeout points. 6. Stakeout project points in field, document fieldwork and discuss proposed project. 7. Comment on selected project and compare with those not selected.	Minimum project scores must be earned to receive a certain grade level in the class. The course grade level cannot be higher than the project grade level as follows: Course Grade Homework Requirement A Requires 90% or better of total project points B Requires 80% or better of total project points C Requires 70% or better of total project points D Requires 60% or better of total project points F Less than 60% of possible project points or missing two or more laboratories will result in a failing grade for this course.	The minimum achievement on this project to pass the course is 70 percent. (revised 1/16/04)
	CIVL 415 Reinforced Concrete Design	As an early laboratory exercise, students are required to create shear and moment envelopes for a three-span continuous beam for all possible combinations of full span distributed dead and live loading. They use a computer structural analysis program (like Visual Analysis, which is available in our computer lab) to analyze the structure for each load case. The results then must be ported to some graphing software program (like Microsoft Excel) which will allow the shear and moment values to be superimposed on one graph as a function of x. The resulting envelopes are then compared to those calculated using ACI moment coefficients.	Student proficiency is measured by a score on this exercise.	Exercise is evaluated based on completeness, quality and answering the questions given on the assignment. It is evaluated on a 20 point basis. 18 to 20 points would represent mastery, 16 to 18 points above adequate proficiency, 12 to 16 points adequate proficiency, and below 12 points, students lack proficiency.	A minimally acceptable achievement of proficiency is 12 points on this exercise.

APPENDIX B: Sample Syllabus – Assessment Statement

DEPARTMENT OF CIVIL ENGINEERING
CONTRACTS SPECIFICATIONS AND TECHNICAL REPORTS
CE 119 Spring 2004

INSTRUCTOR: Dr. Thomas C. Ferrara
Office: Langdon 203B
Office Hours: MTW 2:00 to 2:40 pm
tferrara@csuchico.edu

COURSE HOURS: MTWF 1:00PM - 1:50PM OCNL 247

BASIS OF EVALUATION:
Grades will be based on a course score determined as follows:

Various assignments, Quizzes	250 points
2 Midterm examinations	200 points
Final examination	100 points
	550 total

The various assignments will include a course journal, a press release assignment with several parts, and a multi-part major writing assignment that will model a consulting engineering project. Some of the various assignments will be writing assignments to be completed during the class period. These may be both announced and unannounced. Reading will be assigned to be completed prior to many class periods and will be the basis of 10 or more unannounced quizzes. The midterm exams will be held about the seventh and fourteenth weeks of the semester. The final exam will occur **Wednesday May 19, 2004 from 2:00 to 3:50 PM in OCNL 247**. The exams will be closed textbooks but class handouts will be allowed and may be required. You may use any notes you take in your own hand during all exams and quizzes.

A course score based on the above point system will be established for each student. The standard course score is based on the mean assignment and examination grades with unsatisfactory and missing work eliminated from computation of the mean. During 7 recent terms this standard course score averaged 76.5%. The standard course score will be the approximate break between a B- and a C+. Twelve percent below the standard score will be the approximate break point between a D+ and a C-. Note that a C- or better in CE 119 is required for graduation with a major in CE. Three out of 56 students failed to achieve the C- grade over the immediate prior 4 semesters. The top course score has always equated to an A grade and almost certainly will this term.

SPECIAL PROGRAM ASSESSMENT:
In addition to the above grading criteria there are two special criteria that all students must satisfy in order to attain a C- or better in CE 119.

1. Understanding of ethical and professional responsibility:
A reading assignment is required on the subject of ethics in writing. Business relationships, the process of working with clients, procedures used to obtain consulting work, and other practices in operating a professional engineering services business are carefully addressed in the course.
Exam questions that address issues in client relationships and contracting for engineering services will be administered. A score of at least 70% on three or more exam questions that include the topics of ethical and professional responsibility is required.

2. Ability to communicate effectively:
Communication through writing is certainly a major theme of CE 119. Special attention is given to writing e-mails, ordinary business correspondence, press releases, feasibility studies, proposals, and contract language in this course. Five course requirements include ordinary business correspondence – 30 point exam question, press releases – 50 points, feasibility study – 80 points, proposals – 50 points, and contract – 40 points. A score of 70% of the possible score on at least 3 of the 5 items is required.

Students not meeting both of these assessment criteria will be given an incomplete in CE 119 if their overall course grade is C- or better. A statement will be filed in the department office that specifies work that must be completed in order to clear the incomplete. Once work is completed the original course grade will be assigned. The work must be completed prior to October 1, 2004 or the incomplete will be converted to a D+ grade and the student will be required to repeat CE 119.

Students with an overall course grade of D+ or below, and not meeting the two criteria, will be assigned the grade earned and expected to repeat CE 119 in order to graduate in civil engineering at CSU, Chico.

The above grade standards will apply to students who consistently display positive professional attributes. Missing examinations, quizzes, or failing to adequately complete and turn in **all** assignments is not consistent with good professional practice. Students doing so will not be graded on the above basis but at the discretion of the instructor. This discretion will not be applied in a random or arbitrary manner. It might also be used to help students should unfortunate, uncontrollable events occur. Note that missing a class session may cause you to miss an assignment or quiz and thus be graded at the discretion of the instructor. The instructor will make a special effort to conduct an in-class, required exercise whenever there is light attendance.

Completing **all** assignments helps you at least four ways:

1. You will develop good professional habits that will serve you well throughout a professional career.
2. Knowledge and experience gained may put you at an advantage during an examination.
3. You get credit for your work, which will enhance your course score.
4. Your grade will be based upon a class standard that you and your classmates have established. The uncertainty of being graded at the discretion of the instructor is eliminated.

COURSE PREREQUISITE: Freshman composition and completion of 60 college units (in the CE program).

TEXTS:

1. Culp, Gordon and Anne Smith, Managing People (Including Yourself) for Project Success, Van Nostrand Reinhold, 1992, 307 pp. (C)
2. Alred, Gerald J., Charles T. Brusaw, and Walter E. Oliu, Handbook of Technical Writing, Bedford/St. Martin, Seventh Edition, 2003, 645 pp. (A)

APPENDIX C: Sample Assessment Summary – Data Collection

Outcome Assessment Summary V1.3

Program Outcome:	a: ability to apply knowledge of mathematics, science, and engineering	Instructor:	Emerson
Course:	CE 101 Strength of Materials	Semester:	S2004

Description:	This course is the fundamental course, Strength of Materials. Course topics include stress, strain, torsion, axial loading, bending, combined loading, thin-walled pressure vessels, column buckling, Mohr's circle, etc. In completing homework, quizzes and exams students are required to apply their knowledge of Statics, Trigonometry, Physics, Algebra, Calculus, Differential Equations, Material Science and Strength of Material's topics.
Metric:	Student proficiency is measured by the accuracy of their understanding of course topics, their ability to correctly approach a problem solution and their ability to actually solve a problem.
Rubric:	The student solutions to exam and homework questions are rated on a 100% scale. Generally, 90 to 100 percent would represent mastery, 80 percent above adequate proficiency, 70 percent adequate proficiency, and below 70 percent would be indicative that the student lacks proficiency.

Standard 1:	70	Standard 2:		Standard 3:	
Must all standards be satisfied (Y,N)?			Y	"N" means only one must be passed.	

Instructor Evaluation Summary

Number of students achieving standard:	16	76%
Number of students failing standard:	5	24%

Comments related to student performance at achieving this outcome measurement.

The standard is directly tied to student achievement in the course. Many of them struggle in this course due to poor Static's skills, others due to poor math skills. Timed testing environments for students weak in these areas may further compound their difficulty in passing the course. All students who failed the standard received a course grade less than C- (the minimum grade required to progress in the major).

Comments related to the suitability of this outcome measurement.

The standard itself is very suitable. It would be of interest to determine a better way to test student knowledge without a time element. Some students simply don't work well under the perceived notion of not enough time.

Suggestions for possible changes to this outcome measurement.

The outcome measurement itself doesn't need changed but perhaps tests can be shortened or exam times lengthened.

Instructions: Enter information in blue fields. Yellow fields will be updated automatically.

a: ability to apply knowledge of mathematics, science, and engineering				Emerson
CE 101 Strength of Materials				S2004
Number of students achieving standard:	16		76%	
Number of students failing standard:	5		24%	

Student Name	Score 1	Score 2	Score 3	Standard Met
Standard =	70			
names hidden	82			TRUE
	80			TRUE
	57			FALSE
	75			TRUE
	82			TRUE
	30			FALSE
	93			TRUE
	49			FALSE
	88			TRUE
	54			FALSE
	88			TRUE
	79			TRUE
	67			FALSE
	84			TRUE
	90			TRUE
	86			TRUE
	94			TRUE
	88			TRUE
	74			TRUE
	77			TRUE
	75			TRUE
Please note that XXXXXXX and XXXXXXX are taking the course through				
Univeristy Extension and are not officially enrolled in the program at this time.				

APPENDIX D: Graduating Senior Survey Instrument

Graduating Senior Survey

College of Engineering, Computer Science, and Technology
CSU, Chico

Dear Graduating Senior,

The College of ECT has developed the enclosed survey to give you a forum for letting us know what you think of your experience at CSU, Chico, and to help us to continually improve the curriculum and services we offer. We care a great deal about the programs and your feedback is essential to helping us provide the highest quality education we can deliver. Thank you in advance for your time and attention to this survey.

We hope the years you have spent with us have enriched your life and provided you with the foundation for a successful career. Please stay in touch!

With best wishes, The College of ECT Faculty

PLEASE USE NO. 2 PENCIL

RIGHT	WRONG

1. Major
- ◯ CE
- ◯ CIS
- ◯ CM
- ◯ CMPE
- ◯ CSCI
- ◯ EE
- ◯ ME
- ◯ MECA
- ◯ MFGT
- ◯ Other

2. Graduation date

Semester — Year 200 ☐
- ◯ Spring
- ◯ Summer
- ◯ Fall

3. Did you come to Chico State as a...
- ◯ First-time freshman
- ◯ Transfer

4. How many semesters did you attend Chico State?
- ◯ 1-3
- ◯ 4-6
- ◯ 7-9
- ◯ 10-12
- ◯ 13+

5. What is your overall GPA?
- ◯ Below 2.25
- ◯ 2.25 - 2.49
- ◯ 2.50 - 2.74
- ◯ 2.75 - 2.99
- ◯ 3.00 - 3.24
- ◯ 3.25 - 3.50
- ◯ 3.51 - 3.74
- ◯ 3.75 - 4.00

6. If you had an internship, co-op, or job related to your major while in school, how valuable was the experience?
- ◯ Did not have internship, co-op, or job
- ◯ Very valuable
- ◯ Valuable
- ◯ Somewhat valuable
- ◯ Not valuable

7. If you were involved in any student/professional society, activities, or clubs, how valuable was the experience?
- ◯ Was not involved in societies, activities, or clubs
- ◯ Very valuable
- ◯ Valuable
- ◯ Somewhat valuable
- ◯ Not valuable

8. We are interested in your future plans. After graduating are you planning to...

Attend graduate school	◯ Yes	◯ No
Begin working	◯ Yes	◯ No

If you are NOT planning to work full-time, or if you have not begun looking for a job, please skip to Question 13.

9. How many job offers have you received?
- ◯ None
- ◯ One
- ◯ Two
- ◯ Three
- ◯ Four +

10. Do you currently have a job offer that you are likely to accept? ◯ Yes ◯ No

If 'Yes,' please provide:

Company name_____

Your job title _____

Starting annual salary
- ◯ Less than $30K
- ◯ $30-40K
- ◯ $41-50K
- ◯ $51-60K
- ◯ $61-70K
- ◯ $71K or more

11. If you interviewed through the campus Career Planning & Placement Office, how helpful was it?
- ◯ Did not interview through campus office
- ◯ Very helpful
- ◯ Helpful
- ◯ Somewhat helpful
- ◯ Not helpful

12. If you found a job that you are likely to accept, how did you find it?
- ◯ Campus Career Planning & Placement Office
- ◯ Faculty/department referral
- ◯ Online posting
- ◯ Mailed resume
- ◯ Personal connections
- ◯ Other:_____

13. Did you take a comprehensive exam (EIT, CMfgT or other) for your discipline?
- ◯ No, did not take
- ◯ Yes, and passed
- ◯ Yes, and did not pass
- ◯ Yes, and waiting for results

14. If you took a comprehensive exam, did you also attend a review course to prepare you for the exam? ◯ Yes ◯ No

If 'Yes,' how valuable was the course?
- ◯ Very valuable
- ◯ Valuable
- ◯ Somewhat valuable
- ◯ Not valuable

Educational Satisfaction Questions

At Chico State, how satisfied were you with the...	Very Dissatisfied				Very Satisfied
15. Quality of teaching by faculty in your department	⬭	⬭	⬭	⬭	⬭
16. Quality of teaching by other faculty	⬭	⬭	⬭	⬭	⬭
17. Access to faculty in your department	⬭	⬭	⬭	⬭	⬭
18. Availability of courses in your department	⬭	⬭	⬭	⬭	⬭
19. Quality of courses in your department	⬭	⬭	⬭	⬭	⬭
20. Access to laboratory facilities and equipment	⬭	⬭	⬭	⬭	⬭
21. Quality of laboratories and equipment	⬭	⬭	⬭	⬭	⬭
22. Access to computer facilities	⬭	⬭	⬭	⬭	⬭
23. Quality of computer facilities	⬭	⬭	⬭	⬭	⬭
24. Academic advising from your major advisor	⬭	⬭	⬭	⬭	⬭
25. Academic advising from the Advising Office	⬭	⬭	⬭	⬭	⬭
26. Career advice from faculty in your department	⬭	⬭	⬭	⬭	⬭
27. Availability of General Education courses	⬭	⬭	⬭	⬭	⬭
28. Quality of General Education courses	⬭	⬭	⬭	⬭	⬭
29. The overall quality of your education	⬭	⬭	⬭	⬭	⬭
30. Your overall experience at Chico State	⬭	⬭	⬭	⬭	⬭

Program Outcomes Questions

Based on your educational experience here at Chico State how well prepared are you to...	Very Unprepared				Very Well Prepared
31. Apply knowledge of math, science, engineering, or technology to solve problems	⬭	⬭	⬭	⬭	⬭
32. Design and conduct experiments	⬭	⬭	⬭	⬭	⬭
33. Analyze and interpret experimental data	⬭	⬭	⬭	⬭	⬭
34. Design a component or system to meet desired needs	⬭	⬭	⬭	⬭	⬭
35. Function on a multidisciplinary team	⬭	⬭	⬭	⬭	⬭
36. Identify, formulate, and solve technical problems	⬭	⬭	⬭	⬭	⬭
37. Communicate technical matters in writing	⬭	⬭	⬭	⬭	⬭
38. Communicate technical matters orally	⬭	⬭	⬭	⬭	⬭
39. Understand professional and ethical responsibilities	⬭	⬭	⬭	⬭	⬭
40. Understand contemporary issues facing society	⬭	⬭	⬭	⬭	⬭
41. Use modern tools and technology	⬭	⬭	⬭	⬭	⬭
42. Enter the workplace	⬭	⬭	⬭	⬭	⬭
43. Continue learning	⬭	⬭	⬭	⬭	⬭
	Strongly Disagree				Strongly Agree
44. I would recommend my major program to others.	⬭	⬭	⬭	⬭	⬭

Major-Specific Supplemental Questions

Please locate your major-specific questions on the sheet provided. NOTE: Not all majors have supplemental questions. Enter your responses to the right.

Q1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	Q6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
Q2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	Q7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
Q3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	Q8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
Q4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	Q9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
Q5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	Q10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

Thank you for completing the survey, and please stay in touch with us!

Graduating Senior Survey – Supplemental Questions

Major-Specific Questions – CE:

Please mark your responses on the scan form (at the bottom of the second page).

Q1. Did you complete a CE Pattern? If so, which? If not, leave blank.

A	B	C	D	E
Construction	Environmental	Structural	Transportation	Water Resources

How important were the following factors in your decision to attend CSU, Chico?

A	B	C	D	E
Not Important	←		→	Very Important

Q2. Reasonable cost
Q3. Engineering program reputation
Q4. Geographical location

For each of the following topics, how well are they emphasized in the CE program?

A	B	C	D	E
Not Enough	↔	About Right	↔	Too Much

Q5. Environmental
Q6. Geotechnical
Q7. Hydraulics
Q8. Structures
Q9. Surveying
Q10. Transportation

Please provide written comments below and return this sheet with your scan form.

What things did you like best about the CE program?

What things do you suggest to improve the CE program?

Your responses are confidential. Thank you for completing this survey.

APPENDIX E: Alumni Survey Instrument

CALIFORNIA STATE UNIVERSITY, CHICO
DEPARTMENT OF CIVIL ENGINEERING
Professional Advisory Board Alumni Questionnaire

Please complete this form regardless of current field of employment

BACKGROUND INFORMATION

Name and Address (Optional): _____

Education: CSUC Civil Engineering Graduate? _____ If so, year graduated: _____

Number of undergraduate semesters enrolled at CSUC: _____

List any Post-Graduate Degree(s): _____

Where/When obtained: _____

Employment: Are you currently employed in civil engineering? ___Yes ___No

Current employer: _____

Years with this employer: _____ Location: _____

Nature of business: Government _____ Industry _____ Consulting _____ Other_____

Approximately how many civil engineers at this employer? _____

Approximately how many CSUC civil engineers at this employer? _____

Previous employer(s): _____

Years with previous employer(s): _____

In which state(s) are you registered? _____

SURVEY QUESTIONS

1. What are the principal discipline areas in which you work?

A. ___	Construction	E. ___	Structures	I. ___	Water Resources/Supply
B. ___	Environmental	F. ___	Surveying	J. ___	Administration/Management
C. ___	Geotechnical	G. ___	Transportation	K.	Other _____
D. ___	Land Development	H. ___	Solid/Hazardous Waste		_____

PLEASE USE THE DISCIPLINE AREAS LISTED ABOVE TO ANSWER QUESTIONS 2 & 3

2. For what areas of civil engineering do you feel that CSUC CE engineering program best prepared you?

   First (Best) _____ Second _____ Third_____

3. For what areas of civil engineering do you feel that CSUC CE engineering program least prepared you?

First (Least) _____ Second _____ Third _____

In comparison to your peers from other civil engineering programs, how do you feel that your undergraduate civil engineering experience at CSUC has prepared you for your professional career?

Better prepared_____ As well prepared _____ Not as well prepared _____

5. Please expand on question 4 by completing the following table:

AREA	Better Prepared	As well Prepared	Not as well Prepared
Technical aspects of Design			
Practical aspects of Design			
Construction			
Codes & Regulations			
Client Relations			
Project Management			
Communication Skills			
Ethics			

6. Would you recommend or encourage your son or daughter to attend CSUC Civil Engineering if they were interested in the discipline? ____Yes ____No

7. Please respond to the following items by indicating how well your education at CSUC prepared you for your career by using one of these responses.

4= Excellent skills or preparation **2**= Poor skills or preparation **3**= Adequate skills or preparation **1**= No opinio

a. ___ Apply your education in mathematics, science, and engineering to assigned tasks
b. ___ Design and conduct experiments
c. ___ Analyze and interpret data
d. ___ Design system, component or process to meet needs
e. ___ Design civil engineering projects
f. ___ Function on multi-disciplinary teams
g. ___ Identify, formulate, and solve engineering problems
h. ___ Understanding professional and ethical responsibility
i. ___ Communicate effectively (written, oral, technical)
j. ___ Broad education (knowledge of Arts, Humanities, Business aspects of life)
k. ___ Continuing in life-long education
l. ___ Knowledge of contemporary issues
m. ___ Use techniques, skills and tools in engineering practice

8. Please provide any additional comments in the space provided below.

_____

_____

_____

The CSUC Civil Engineering Department and Professional Advisory Board thank you for taking the time to respond to this questionnaire.

June 2004 – Odd Year Grads

APPENDIX F: Employer Survey Instrument

CALIFORNIA STATE UNIVERSITY, CHICO
DEPARTMENT OF CIVIL ENGINEERING
Professional Advisory Board
Employer Survey

This survey is to be completed by a senior or supervising civil engineer in your organization. Should you not fit that classification, please pass this survey to someone who does. Please respond to as many of the following as possible. Space for comments is available on the reverse side. Please feel free to copy this form if more than one supervising engineer would like to respond.

1. Name/Address of Organization (optional):
   Your current position/job title:
   ____ President/Owner ____ Chief Engineer ____ Project Engineer ____ Other

2. What is the highest degree you have completed?

3. Are you a CSU, Chico CE graduate? _____ Yes _____ No

4. Nature of your organization:
   _____ Consultant _____ Government Agency _____ Other (Type:
)

5. Approximate number of CE graduates employed in your office:
   _____ 1-5 _____ 5-25 _____ 25-50 _____ 50-100 _____ 100+

6. Approximate number of **all CE graduates** whose work you are familiar with during the past 10 years: _____ 1-5 _____ 5-25 _____ 25-50 _____ 50-100
   100+

7. Approximate number of **CSU, Chico CE graduates** whose work you are familiar with during the past 10 years: _____ 1-2 _____ 3-5 _____ 6-10 _____ 10+

8. Does your organization have a rotation or other form of formal training program for newly graduated civil engineers? _____ Yes _____ No

For items 9 and 10, please fill in all blanks with one of the following:

"0" to indicate unknown or no opinion "2" to indicate neither agreement nor disagreement

"1" to indicate strong agreement "3" to indicate strong disagreement

9. Relative to expectations, CSU, Chico CE graduates:
   ____ are fast learners. ____ are resourceful in completing work assignments.
   _____ work efficiently with their peers. ____ exhibit fresh thinking and have new ideas.
   _____ are responsive to superiors. ____ supervise subordinates efficiently and productively.

10. When compared to other engineering graduates, CSU, Chico CE graduates are adequately, or well prepared in the following subject areas:
    _____ communication skills _____ simulation and computer modeling

_____ statistics
_____ engineering mechanics
_____ engineering design process
_____ water resources and hydrology
_____ soil mechanics and foundations
_____ transportation engineering
_____ professional engineering issues
_____ engineering sciences
_____ humanities and social sciences
_____ environmental and sanitary engineering
_____ structural analysis and design
_____ engineering economy

Comments or questions regarding CE at CSU, Chico, are appreciated (include your name and address on the reverse if you wish a response):

01/02