ANALYSIS OF ISO 9000 QUALITY STANDARDS MANAGEMENT CERTIFICATION INSTRUCTION IN CALIFORNIA UNDERGRADUATE ENGINEERING PROGRAMS

A Thesis

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Master of Science

in

Quality Assurance

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by

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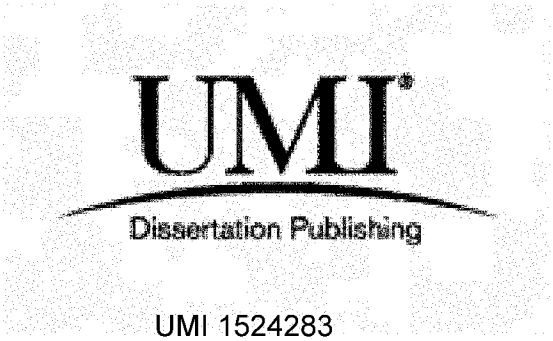

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PREFACE

The idea for this thesis came about when I was having a casual conversation with my son who was an engineering student at a southern California university. I had been employed as a quality professional in various capacities for approximately 20 years. He was in his senior year taking a "business model" class for engineering students in which they modeled a project from inception to production. He recounted a classroom incident in which one team intended to pursue ISO 9000 series certification for their business. The professor greatly discouraged this, emphasizing that ISO certification was a major and unnecessary expense, it added no value, and was just a marketing ploy. He did not want any other teams to consider it.

I was concerned. My impression was that engineering students about to embark on their careers were being indoctrinated into thinking that what I had experienced as a positive quality management system for business success was being denigrated by someone I thought should be more informed concerning the whole purpose of the ISO 9000 series.

After further discussion with my son, I was disturbed to find he had developed a negative attitude toward ISO 9000 certification because of this experience. I wondered whether or not this was a systemic problem with all engineering professors or if this were an isolated incident. This is what gave rise to the idea of this study.

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ABSTRACT

The purpose of this thesis was to study how and to what extent ISO 9000 quality standards management certification is taught on the undergraduate level in courses in California ABET-accredited 4-year engineering programs. The level of knowledge of the standard among graduates is of concern because well-educated engineers are important to the future of businesses in the global economy, and the ISO 9000 series is an enduring standard of global significance. An email survey was conducted of over 2000 undergraduate engineering professors who are currently teaching in public and private California universities. The overview of responses indicates that, although the majority of professors have over 10 years of teaching experience and a past background in industry, ISO 9000 series certification is not widely understood, taught, or valued. Engineering students and their future employers are clearly not gleaning the benefits of learning this valuable global standard.

CHAPTER 1

INTRODUCTION TO THE STUDY

Background

Engineering students in accredited engineering programs are trained in various aspects of the engineering professions as they are in high demand in businesses and industries both public and private in the United States and around the world. Students drawn to engineering are natural problem-solvers, analytical, and proficient in applying knowledge to new challenges. Theirs are the minds needed by companies world-wide and society in general to preserve and improve products, the environment, and quality of life. Career-entry engineers are an important group that needs to understand the use of standards, especially in managing quality of processes.

Modern engineering will not work without standards. There must be a common "language" for meaningful communication. After World War II ended and governments that were formerly enemies resumed trade with each other, delegates from 25 countries met in London to discuss this desired commonality in terms of international standards. This resulted in the creation of the International Organization for Standardization (ISO), a network of regulatory bodies, now headquartered in Geneva, Switzerland, dedicated to developing voluntary world-wide uniformity of standards. These standards have grown to include units of measurement (ISO 31/80), quality concepts (ISO 9000 series),

and environmental management (ISO14000 series), as well as standards covering other areas of international commerce ("The ISO Story," n.d.). The ISO 9000 quality series is of particular interest to businesses, providing "guidance and tools" to ensure customer satisfaction ("ISO 9000-quality Management," n.d.). These businesses—interested in competing globally—employ engineers from many disciplines.

Problem Statement

The ISO 9000 series is one of the important tools used in developing and maintaining a quality management system. Engineering graduates with bachelor's degrees are going into businesses, corporations, industries, and agencies which would realize improvements through quality management processes certified to ISO 9000 standards. In spite of this need, engineering graduates may be entering industry with an unfavorable view of the ISO 9000 standards. If these individuals do not have the opportunity to learn about ISO 9000 certification while in college, at best, they will not understand its purpose and value, and at worst, they may become obstacles to the pursuit of its benefits for their employers and themselves.

This paper presents two hypotheses to explain why undergraduate engineering students are not receiving instruction on ISO 9000 series quality standards management certification:

1. Engineering professors on undergraduate campuses may have limited or obsolete business experience, so do not appreciate the usefulness of ISO 9000 certification.

2. Engineering professors may also feel that ISO 9000 standards is not a necessary or important enough subject to be covered at the undergraduate level; they may feel that students will get the information on the job or in graduate-level studies.

Purpose of the Research

The purpose of this research study is to determine the extent of ISO 9000 series quality standards management certification instruction that undergraduate engineering students receive from their professors, and to ascertain the reasoning behind each professor's particular teaching philosophy regarding ISO 9000 standards. Their survey responses may predict bias of their students for or against ISO certification upon graduation. These potential student biases may affect the ability to appreciate a meaningful quality management system at a future employer's business.

Unless and until other standards emerge to replace it, ISO 9000 certification is the most important and enduring quality management standard that engineering students should be familiar with in order to be prepared for a wide range of employment opportunities. This study will document whether or not they are presented with this knowledge.

Theoretical Basis

An examination of online catalogs and class schedules for California universities reveals little formal coursework which addresses ISO 9000 series standards at all. An empirical study is the only way to determine if these standards are taught or even discussed in the engineering undergraduate curriculum. This thesis evaluates the extent of ISO 9000 certification instruction by using a written survey. This survey is designed to assess an individual professor's experience. The questionnaire covers years of teaching, past or present industry experience, familiarity with ISO 9000 series certification, opinions on the value of the ISO 9000 series standard, and the particulars of ISO 9000 Quality Standards Management instruction on campus.

Limitations

Limitations of this study may include not obtaining enough survey responses from professors to be able to draw meaningful conclusions about the manner and method of current course instruction at their universities, and that a small number of responses may unfairly characterize the total population of professors. In addition, professors may have neither the time nor the inclination to respond to these survey questions if they have no compensation or compelling interest to do so.

Another limitation may be the assumption that the only exposure to ISO 9000 series certification and thus the only source of opinions that students receive is gained exclusively through their undergraduate coursework.

Definition of Terms

ABET: International body for accrediting engineering programs. Formerly Accreditation Board for Engineering and Technology ("ABET History," 2011).

ASABE: American Society of Agricultural and Biological Engineers ("ASABE," 2012).

EIT: Engineer-in-Training, an engineering internship required by some states to become a professional engineer, usually requires passing a test as a senior undergraduate in an ABET-accredited program ("NCEES: Students," n.d.).

ISO: Acronym for the International Organization for Standardization, a global developer of voluntary international standards ("ISO-International Organization for Standardization," n.d.).

ISO 9000: Standard family developed by ISO for Quality Management ("ISO 9000-Quality Management," n.d.).

ISO 14000: Standard family developed by ISO for Environmental Management ("ISO 14000-Environmental Management," n.d.).

MathCAD: Engineering calculation software ("PTC-PTC Mathcad," n.d.).

NQA-1: Quality assurance guidelines for nuclear facilities ("NQA-1-2008 Quality Assurance Requirements," 2013).

PE: Professional Engineer, a license to practice engineering required by many states ("NCEES: Students," n.d.).

QMS: Abbreviation for "Quality Management System."

Six Sigma: A quality defect-reduction system utilizing statistics, initiated by the Motorola Corporation in the 1980s (Drake, Sutterfield, & Ngassam, 2008, p. 33).

Six Sigma Black Belt: A person with experience in taking a leadership role in facilitating Six Sigma principles (Jones, Parast, & Adams, 2010, p. 418).

CHAPTER 2

REVIEW OF THE LITERATURE

Engineering Degree Program Accreditation

The Accreditation Board for Engineering and Technology, known since 2005 as ABET, is the accrediting body for engineering programs of higher education recognized in the United States and internationally ("ABET History," 2011). Obtaining a degree from an ABET-accredited institution is not only desirable for a career in engineering, but is required in many instances enumerated on the ABET web site.

> Many forms of professional licensure, registration, and certification also require graduation from ABET-accredited programs as a minimum qualification. In addition, many employers, including the federal government, require graduation from ABET-accredited programs to be eligible for employment in certain fields. Also, multinational corporations are increasingly listing graduation from an accredited program as a requirement for employment...Graduation from an ABET-accredited program offers excellent access to employment in the global market. ("Why Accreditation Matters to Students," 2011)

A particular engineering program's accreditation indicates that graduates will be sufficiently prepared to enter the professions indicated on their degrees. According to Thandapani, Gopalakrishnan, Devadasan, Sreenivasa, and

Murugesh (2012), accreditation serves two purposes. The first is for graduates to be able to achieve world-wide mobility. The second is to ensure that the program maintains quality assurance and continual improvement.

Over 30 California colleges and universities offer current ABET-accredited undergraduate (4-year bachelor's degree) engineering programs. See Appendix A.

The ISO 9000 Series

The ISO 9000 series was first issued in 1987 and was revised in 1994 and 2000 (Cianfrani, Tsiakals, & West, 2009, p. xv).Included in the ISO 9000 family is ISO 9001:2008 which delineates criteria for a quality management system. ISO certification can only be to this particular standard. "It can be used by any organization, large or small, regardless of its field of activity. In fact ISO 9001:2008 is implemented by over one million companies and organizations in over 170 countries" ("ISO 9000-quality Management," n.d.).

To achieve internal consistency, the ISO 9000 quality management standards themselves undergo continuous improvement. The next scheduled revision is in 2015 (Liebesman, 2011, p. 64).

ISO 9001 certification in particular can be an important development in a company's quality processes.

> ISO 9001 specifies requirements for a quality management system where an organization needs to demonstrate its competence to regularly meeting customer and regulatory requirements. It seeks to improve customer

> satisfaction by applying processes for continuous improvement and by ensuring conformity to regulatory requirements. (Diesing, 2011, p. 37)

Availability of Coursework

An Internet exploration of the catalogs of classes available at California colleges and universities shows very little availability of ISO 9000 and quality coursework for engineering students.

California State University Dominguez Hills (CSUDH) is the only California 4-year university which offers undergraduate and graduate degrees and certificates in Quality Assurance. These Bachelor and Master of Science degrees are offered only through online instruction. Topics covered include Total Quality Management, Six Sigma, ISO 9000, reliability, benchmarking, process improvement, quality control, human factors in quality assurance, measurement and testing techniques, quality project management, productivity, quality function management, and customer satisfaction. Undergraduate courses in the BSQA program which specifically address ISO issues are "QAS 312 Interpretation of Technical Documentation" which includes ISO documents, and "QAS 355 Safety and Reliability" designed to "focus on qualifications for ISO 9000" ("BSQA Course Descriptions," 2008). However, CSUDH does not offer an ABET-accredited engineering degree ("Quality Assurance Courses in California," 2013). (ABET does accredit the Bachelor of Science program in Computer Science. This is not an engineering program for the purposes of this study.)

California State University Northridge (CSUN) offers a minor in Quality Assurance for non-Business majors. Included is a course, "Quality Management and Control" ("Minor Quality Management and Assurance," 2012). The course synopsis promises "application of total quality control for improvement of products and services, including both statistical techniques and managerial approaches; control charts, quality costs, responsibility for quality, quality at the source, ethical issues and ISO 9000; international differences in philosophy of quality" ("SOM 467 Quality Management," 2012). CSUN also offers an ABET-accredited Computer Science Bachelor of Science degree. This program provides a selection of courses related to software quality assurance. (Computer Science is not a degree offering included in this study.)

El Camino College is a California community college which offers a 2-year Associates degree and certificate in Quality Assurance. No mention is made in the course descriptions of ISO 9000. Since it is a 2-year college, no program El Camino offers is included in this study ("Quality Assurance Courses in California," 2013).

Engineering students as well as students from other majors could take quality courses offered by these institutions, but these would be considered as continuing education, and not part of their engineering degrees. The heavy unit load required to finish an engineering degree would preclude most students from using this option.

Other quality courses available to California students deal with computer software. The California State University Long Beach Mechanical and Aerospace Engineering program catalog for 2011-2012 offers an Engineering Technology class in Software Quality Assurance focusing on Department of Defense (DOD) standards, not ISO standards ("ET 320, Software Quality," 2011).

The University of Southern California offers a Video Game Quality Assurance course through its Information Technology Program. Focus of the course is on bug testing systems, and it is "not available for major credit in electrical engineering" ("USC Schedule of Classes," 2012).

Process Improvement through ISO 9000 Certification

ISO 9000 is a global standard which has grown in significance for over 25 years beginning mainly in the United Kingdom (UK) and the European Community—now the European Union (EU). The United States and Japan finally began adopting the standard as exports to Europe increased. Important agencies of the US government began promoting ISO 9000 including the DOD, the Food and Drug Administration (FDA), and the Federal Aviation Administration (Marimon, Casadesús, & Heras, 2010, p. 1014).

Growth in ISO-certified companies in the United States has since increased. Now the USA is in the top ten countries with the largest number of organizations with ISO 9000 certificates. The other nine are Italy, UK, Spain,

France, Germany (all part of the EU), China, Japan, India, and Australia (Sampaio, Saraiva, & Guimarães Rodrigues, 2009, p. 1304).

Several studies have taken place concerning the importance of ISO certification. Many in the last five years have taken place outside of the USA. One such study published in "Total Quality Management" surveyed Taiwanese industries. It concluded that ISO certification has a significant positive effect on the performance of manufacturing companies (Wu & Chen, 2011, pp. 869-890).

Another study from Finland affirms that ISO certification improves an organization's performance through "...common elements for good QMS, contract reviews, turning tacit knowledge into explicit knowledge, internal and external audits and the control of quality of production machinery and equipment" (Ollila, 2012, p. 79).

Other studies posit that ISO certification is worth the expense because employee involvement in problem solving and process improvement heightens their satisfaction (Ward, 2012, p. 35), and the resulting systematic quality improvements may significantly enhance world-wide business opportunities (Thandapani, Gopalakrishnan, Devadasan, Sreenivasa, & Murugesh, 2012, p. 156).

An extensive study of California firms contrasted companies with and without ISO certification.

First, ISO adopters had far lower organizational death rates than matched firms within their industries. Second, sales and employment grew

> substantially more rapidly after certification at firms that adopted ISO 9001 than at matched firms. Third, total payroll and (to a lesser extent) annual earnings per employee grew substantially more rapidly after certification at firms that adopted ISO 9001 than at matched firms. (Levine & Toffel, 2010, p. 993)

Levine and Toffel (2010) go on to state that academics are wrong to denounce ISO certification as having no benefit, citing that the improvement in outcomes and value delivered by certification show that it is not merely a business fashion or management "fad."

The State of Engineering Education and its Effect on Business

The University Perspective

Universities market their educational priorities to prospective students (and their parents) on the web pages of their Colleges of Engineering. Thus, their perspectives are overwhelmingly positive. Following are engineering advertisements of some prominent California institutions. The motto of the California State Polytechnic University campuses is "Learn by doing"; University of California, Berkeley's is "Educating Leaders. Creating Knowledge. Serving Society"; University of California, Los Angeles (UCLA) Engineering claims it is the "Birthplace of the Internet"; University of California, Santa Barbara states its engineering college is "The convergence of research and innovation."

The 2013 mission statement of Stanford University affirms that it seeks to educate engineers "...who will make the world a better place by using the power of engineering principles, techniques and systems"; while the Jacobs School of Engineering at the University of California, San Diego (2013) proclaims its partnership with industry.

Vijay Dhir, Dean of Engineering at UCLA, posits that its engineering students have broad appeal. "With these kinds of skills, our students also have the ability to go into business, law and medicine" (Beasley, 2012).

In contrast, Kevin C. Craig, Ph.D., Robert C. Greenheck Chair in Engineering Design & Professor of Mechanical Engineering, College of Engineering, Marquette University, feels that engineering education must evolve.

> The quality of engineering education has a direct impact on our ability as a nation to compete in the increasingly global competitive environment of the 21st century. The National Science Board, in November 2007, stated, engineering education must respond immediately to three challenges: the need to adapt to the changing global context of engineering; the need to change the public perceptions of engineering and the need to attract and retain top students in engineering. It also stated that a continuation of the status quo in engineering education in the U.S. is not sufficient in light of the changing workforce demographics and needs...A transformation is needed — for faculty and how they view teaching, for students and how they view learning, for each engineering department and how it views its

> role in collaboration with other departments in preparing students to be 21st-century engineers... (Craig, 2008, p. 18)

The Student Perspective

Recent engineering graduates believe they received a high-quality education, but after embarking in a career feel they may have needed more. "Mechanical Engineering" magazine describes the methodology and results of a 2012 survey it sponsored as follows.

> Survey respondents were presented with a list of engineering tools and techniques and asked to categorize them as fading, enduring, or emerging...few engineers were willing to categorize any of the tools and techniques as fading. This finding suggests that, in the opinion of the modern engineer, the current skill sets remain robust and relevant to meeting today's needs, and that those skills are expected to continue to serve them well in the future...In addition, a large percentage of engineers classify Six Sigma, MathCAD, ISO certification, and NQA-1 as "enduring." ("The State of Mechanical," 2012)

Engineering students may worry that they have served as mere advertisements for their engineering programs rather than having received enough real-world information to get good jobs and do well in their careers. "In short, higher institutions can no longer define success by the number of candidates they admit but by the quality of the students they graduate (Hong & Shull, 2010, p. 276).

Vision 2030 is a recent three-year survey conducted by Warrington, Kulacki, and Warrington (2011), three engineering professors from prominent American universities, which makes a compelling case for change in engineering education, pointing out the need for mechanical engineers especially to participate in solving a multitude of world problems. Six-hundred US-based companies and several thousand practicing engineers, many within ten years of graduation, responded, indicating what they felt were weaknesses in undergraduate programs. "Notably, the lack of knowledge of codes and standards rose to the top of identified weaknesses, which is not surprising given that most US baccalaureate mechanical engineering programs do not devote time to this topic" (Warrington, Kulacki, & Warrington, 2011, p. 3).

The Business Perspective

Graduating engineers cannot rely solely on technical savvy to maintain a career. Much still needs to be gleaned through experience with the processes of the industries in which they find themselves. This is the great benefit of the ISO standard.

> The basic idea of ISO 9000 is to document the best practice identified for a process or activity. How important it is to document tacit knowledge and especially the product development know-how? This know-how is normally something, which cannot be found in text books or in scientific articles. It is the combination of engineering skills, calculation methods, material know-how and lessons learned. Normally it flows from senior

> persons to junior persons...In many instances this most valuable know-how of a company is not documented properly. (Ollila, 2012, p. 73)

In the final analysis, engineers should know about ISO 9000 series certification QMS because it is the most prominent global standard existing to capture valuable process knowledge. Based on the literature review, this is the first study designed to specifically determine the extent of ISO certification instruction that undergraduate engineering students receive from their professors at California universities.

CHAPTER 3

METHODOLOGY

This study was conducted to determine if and how California university undergraduate engineering students are made aware of the ISO 9000 series quality standards certification through their professors.

The intent of the study was to prove the following hypotheses:

1. Engineering professors on undergraduate campuses have limited or obsolete business experience, so do not appreciate the usefulness of ISO 9000 series certification.

2. Engineering professors feel that ISO 9000 is not a necessary or important enough subject to be covered at the undergraduate level; students will get the information on the job or in graduate-level studies.

This study used a written survey questionnaire to learn about ISO 9000 quality standards management certification instruction in California undergraduate engineering programs certified by ABET. Subjects participating in this study were college professors employed in public and private California colleges and universities with accredited engineering programs. Subjects had an opportunity to express the reasoning behind their teaching philosophies regarding ISO 9000 certification.

An ABET website "Accredited Program Search" for Bachelor's (4-year) engineering programs in California yields over 200 approved degree programs in

over 30 universities. See Appendix A. A condensed version of these programs is shown in Table 1: California 4-Year Universities with ABET Accredited Programs.

Table 1

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
California Baptist University	Civil Engineering, BSCE
	Electrical and Computer Engineering, BSECE
	Electrical and Computer Engineering, BSECE
	Mechanical Engineering, BSME
California Institute of Technology	Chemical Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
California Maritime Academy	Facilities Engineering Technology, BS
	Marine Engineering Technology, BS
	Mechanical Engineering, BS
California Polytechnic State University, San Luis Obispo	Aerospace Engineering, BS
	Architectural Engineering, BS
	BioResource and Agriculture Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Environmental Engineering, BS
	Industrial Engineering, BS
	Manufacturing Engineering, BS
	Materials Engineering, BS
	Mechanical Engineering, BS
	Software Engineering, BS
California State Polytechnic University, Pomona	Aerospace Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Construction Engineering Technology, BS
	Electrical Engineering, BS
	Electronic(s) and Computer Engineering Technology, BS
	Electronic(s) and Computer Engineering Technology, BS
	Engineering Technology, BS
	Geospatial Engineering option in Civil Engineering, BS
	Geospatial Engineering option in Civil Engineering, BS
	Industrial Engineering, BS
	Manufacturing Engineering, BS
	Mechanical Engineering, BS

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
California State University, Chico	Civil Engineering, BS
	Computer Engineering, BS
	Electrical/Electronic(s) Engineering, BS
	Mechanical Engineering, BS
	Mechatronics Engineering, BS
California State University, East Bay	Engineering (Industrial Engineering Option), BS
California State University, Fresno	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Geomatics Engineering, BS
	Mechanical Engineering, BS
California State University, Fullerton	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
California State University, Long Beach	Aerospace Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
California State University, Los Angeles	Civil Engineering, B.S.
	Electrical Engineering, B.S.
	Mechanical Engineering, B.S.
California State University, Northridge	Civil Engineering, BSCE
	Computer Engineering, BS
	Electrical Engineering, BS
	Manufacturing Systems Engineering, BSMSE
	Mechanical Engineering, BS
	Civil Engineering, BS
California State University, Sacramento	Computer Engineering, BS
	Electrical and Electronic(s) Engineering, BS
	Mechanical Engineering, BS
Harvey Mudd College	Engineering, BS
Humboldt State University	Environmental Resources Engineering, BS

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
Loyola Marymount University	Civil Engineering, B.S.E.
	Electrical Engineering, B.S.E.
	Mechanical Engineering, B.S.E.
San Diego State University	Aerospace Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Construction Engineering, B.S.
	Electrical Engineering, BS
	Environmental Engineering, BS
	Mechanical Engineering, BS
San Francisco State University	Civil Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
San Jose State University	Aerospace Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Industrial and Systems Engineering, BS
	Materials Engineering, BS
	Mechanical Engineering, BS
Santa Clara University	Civil Engineering, BSCE
	Computer Science and Engineering, BSCSE
	Computer Science and Engineering, BSCSE
	Electrical Engineering, BSEE
	Mechanical Engineering, BSME
Stanford University	Chemical Engineering, BS
	Civil Engineering, BS
	Electrical Engineering, BS
	Environmental Engineering, BS
	Mechanical Engineering, BS

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
University of California, Berkeley	Chemical Engineering and Materials Science and Engineering, BS
	Chemical Engineering and Materials Science and Engineering, BS
	Chemical Engineering and Nuclear Engineering, BS
	Chemical Engineering and Nuclear Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Science and Engineering, BS
	Computer Science and Engineering, BS
	Electrical and Computer Engineering and Materials Science and Engineering, BS
	Electrical and Computer Engineering and Materials Science and Engineering, BS
	Electrical and Computer Engineering and Materials Science and Engineering, BS
	Electrical and Computer Engineering and Nuclear Engineering, BS
	Electrical and Computer Engineering and Nuclear Engineering, BS
	Electrical and Computer Engineering and Nuclear Engineering, BS
	Electrical and Computer Engineering, BS
	Electrical and Computer Engineering, BS
	Industrial Engineering and Operations Research, BS
	Material Science and Engineering, BS
	Materials Science and Engineering and Mechanical Engineering, BS
	Materials Science and Engineering and Mechanical Engineering, BS
	Materials Science and Engineering and Nuclear Engineering, BS
	Materials Science and Engineering and Nuclear Engineering, BS
	Mechanical Engineering and Nuclear Engineering, BS
	Mechanical Engineering and Nuclear Engineering, BS
	Mechanical Engineering, BS
	Nuclear Engineering, BS

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
University of California, Davis	Aerospace Science and Engineering, BS
	Biochemical Engineering, BS
	Biological Systems Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Computer Science and Engineering, BS
	Computer Science and Engineering, BS
	Electrical Engineering, BS
	Electrical Engineering/Materials Sciences and Engineering, BS
	Electrical Engineering/Materials Sciences and Engineering, BS
	Electronic Materials Engineering, BS
	Electronic Materials Engineering, BS
	Materials Science and Engineering, BS
	Mechanical Engineering, BS
	Optical Science and Engineering, BS
University of California, Irvine	Aerospace Engineering, BS
	Biomedical Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering, BS
	Computer Science and Engineering, B.S.
	Computer Science and Engineering, B.S.
	Computer Science and Engineering, B.S.
	Computer Science and Engineering, B.S.
	Electrical Engineering, BS
	Environmental Engineering, BS
	Materials Science Engineering, BS
	Mechanical Engineering, BS

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
University of California, Los Angeles	Aerospace Engineering, BS
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Science and Engineering, BS
	Computer Science and Engineering, BS
	Electrical Engineering, BS
	Materials Engineering, BS
	Mechanical Engineering, BS
University of California, Riverside	Chemical Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Environmental Engineering, BS
	Mechanical Engineering, BS
University of California, San Diego	Aerospace Engineering, BS
	Bioengineering (Biotechnology), BS
	Bioengineering, BS
	Chemical Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
	Structural Engineering, BS
University of California, Santa Barbara	Chemical Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Mechanical Engineering, BS
University of California, Santa Cruz	Computer Engineering, BS
	Electrical Engineering, BS
University of San Diego	Electrical Engineering, BS/BA
	Industrial and Systems Engineering, BS/BA
	Mechanical Engineering, BS/BA

Table 1, continued

California 4-Year Universities with ABET Accredited Programs

School Name	Program and Degree Name
University of Southern California	Aerospace Engineering, BS
	Astronautical Engineering, B.S.
	Biomedical Engineering, B.S.
	Chemical Engineering, BS
	Civil Engineering, BS
	Computer Engineering and Computer Science, BS
	Computer Engineering and Computer Science, BS
	Electrical Engineering, BS
	Environmental Engineering, BS
	Industrial and Systems Engineering, BS
	Mechanical Engineering, BS
University of the Pacific	Civil Engineering, BS
	Computer Engineering, BS
	Electrical Engineering, BS
	Engineering Management, BS
	Engineering Physics, BS
	Mechanical Engineering, BS

Each university's main public web page was explored to find its particular College of Engineering. In most cases, each individual college listed each separate accredited engineering degree program. Email addresses were obtained for professors in each undergraduate program. Computer Science programs that were not linked with an engineering discipline were not included in the study. Any programs which did not list email addresses for professors were also not included.

Requests to participate in the survey were emailed to professors from November 29, 2012 through December 12, 2012, along with a one-page Word document attachment of the Survey Questions. See Appendix B. Questions were

designed to determine the extent of the individual professor's teaching and industry experience and the degree of familiarity with ISO 9000 certification.

Follow-up request emails were sent from January 24, 2013 through January 29, 2013 to professors that did not respond to the first request.

Undergraduate professors at 32 California universities, both public and private, were contacted at a total of quantity of 2,281 distinct email addresses. Overall, 91 email replies were received without surveys, but with comments regarding the study. Of these, 47 professors sent refusals to participate in the survey; 28 said they do not cover or teach ISO 9000; 13 stated they do not know anything about the survey subject; and, 3 cited no relevant experience.

A total of 48 professors did reply with completed surveys. This is a response rate of 2.1%. Survey answers were compiled, tabulated, and analyzed to develop a profile of an undergraduate engineering professor. These responses are examined in the next chapter.

CHAPTER 4

RESULTS AND DISCUSSION

Profile of an Undergraduate Engineering Professor

Analysis of the survey responses will paint the picture of a "typical" undergraduate engineering professor teaching at a California university. Results from each question are shown in table form.

The majority of those who responded have more than 10 years of teaching experience with a past employment in industry, but very few are presently still working in their fields of experience. This supports the hypothesis that their business experience may be obsolete. Table 2: Professional Background of Respondents shows a cross-tabulation of these two variables—industry employment experience and years of teaching (Fink, 2009, pp. 83-84).

Table 2

Professional Background of Respondents

Employed in industry	Years of Teaching				Totals
	Less than 5	5 to 10	More than 10	No response	
Was in Past	2	1	24	2	29
Am at Present		1	2		3
Never in industry		2	6		8
No response			7	1	8
Totals	2	4	39	3	48

Thirty-five professors provided the field of their primary industry experience. Of those that cited an ABET-listed branch of engineering, most were mechanical or electrical engineers. However, 20 percent cited experience in non-ABET fields. See Table 3: ABET-Listed Fields of Industry Experience.

Table 3

ABET-Listed Fields of Industry Experience

ABET Field	Number of Respondents
Mechanical Engineering	5
Electrical & Electronics Engineering	4
Aerospace Engineering	3
Environmental Engineering	3
Industrial Engineering	3
Bioengineering	2
Civil Engineering	2
Structural Engineering	2
Agricultural Engineering	1
Chemical Engineering	1
Construction Engineering	1
Materials Engineering	1
Other non-ABET Fields	7

Survey responses indicate that the vast majority of professors had no experience with ISO 9000 standards certification, had never been directly involved in the certification process, and had no familiarity with any studies regarding ISO certification. These results are also confirmed through emails received from professors who did not fill out the survey questionnaire. See Table 4: Experience with ISO 9000 Certification.

Table 4

Experience with ISO 9000 Certification

Experience with ISO 9000 Certification	Yes	No
Personal/Industrial?	10	38
In Obtaining?	4	44
With Studies?	7	41

As might be expected considering that the majority of professors had no experience with ISO 9000 series certification, the majority stated they did not have enough knowledge to judge its value. Those who felt they had sufficient knowledge of the ISO 9000 series stated overwhelmingly that that it is a good and/or important standard. Only one professor answered that it was too expensive to obtain. Respondents who made specific comments suggested that the following certifications were of more value than ISO 9000: ABET, FDA, ISO 14001, Black Belt Six Sigma, ASABE, EIT and PE. See Table 5: Value of ISO 9000 Certification. (More than one response was allowed.)

Table 5

Value of ISO 9000 Certification

Is ISO 9000 Certification Valuable?	Number of Responses
Yes. It is a good and enduring standard.	12
Yes. It is Important globally.	9
No. It is not important or applicable to US...	0
No. It is too expensive to obtain.	1
I do not know enough about it.	31
Other	3

Only two professors stated that courses specifically covering ISO 9000 certification were offered on their campuses. Approximately an equal number said either it was not offered at all or they were not sure if it were offered. About the same number indicated that they thought courses covering general quality issues were taught at their campuses. Slightly more were not sure. See Table 6: Quality Courses Taught on Campus.

Table 6

Quality Courses Taught on Campus

Courses Taught on Campus	Yes	No	Not sure
ISO 9000 specific	2	20	26
General Quality issues	19	3	24

When asked, "If no specific courses are taught on campus, how is ISO 9000 certification explained or explored," over half the professors were not sure. The majority of those that expressed an opinion felt that the subject would be covered at an individual professor's discretion. Slightly fewer felt it would not be covered at all. See Table 7: Explanation of ISO 9000 Certification on Campus (More than one response was allowed.)

Table 7

Explanation of ISO 9000 Certification on Campus

How is ISO 9000 Certification Explained?	Number of Responses
It is covered by another department	1
It is not covered at all	7
It is covered if a student asks	1
It is covered on graduate engineering level	1
It is covered at individual professor's discretion	11
Not sure	27

One of the most critical questions of the study was "Do you personally instruct students about ISO 9000 certification? Why or why not?" The consensus seemed to be that students will learn either on the job or at the graduate level. This confirms the second hypothesis. No one felt students needed to know the subject for a job, and very few felt that undergraduates needed to know in

general. See Table 8: Personal to Instruction of Students on ISO 9000 Certification. (More than one response was allowed.)

Table 8

Personal Instruction of Students about ISO 9000 Certification

Do You Personally Instruct Students?	Number of Responses
Yes. They need to know for a job.	0
Yes. They need to know in general.	6
No. They will learn on the job if needed.	18
No, Not important on the undergraduate level.	6
Other comments (all negative)	22

Answers provided in the "Other Comments" were all in the negative. Portions of some of the most pertinent comments from professors are listed below. They expressed that ISO 9000 was not taught, should not be taught, or was not of value.

> Not typically an element in Environmental Engineering curriculum. My guess is that Quality Control issues are included in courses covering manufacturing and industrial operations. (Survey #3)
>
> ISO 9000 does not seem to be very much valued in the construction industry in US; engineering-related certifications for products and services seem to have more value. (Survey #42)

I do not teach courses in which it would be appropriate to teach ISO 9000. (Survey #46)

Not sure they are used much in my field. (Survey #25)

Not relevant to the courses I teach, although I don't know enough about it. (Survey #26)

Covered in classes I do not teach (industrial systems engineering?) (Survey #32)

No, probably peripheral to subjects I teach, although I don't know enough about it. (Survey #47)

The last portion of the survey was an opportunity for the professor to provide any other pertinent explanations or comments. Most comments reinforced the previous tone as far as lack of knowledge of ISO 9000 certification or its lack of necessity. There were some enlightening observations about the state of instruction on their campuses as follows.

Most professors do not have industrial experience and are not familiar with ISO 9000. The professors who are familiar with ISO 9000 see it as "on the job training" or employer responsibility. Faculty see as their mission to "educate" students, not train them. (Survey #10)

We also have a Quality program here at the university, but it is run out of the college of sciences, not engineering. (Survey #19)

I have no idea what it is. I'm a civil and environmental engineering faculty member... (Survey #29)

> Some of our mechanical engineers will need ISO900X (or similar) certification, but most probably won't, and our industrial engineering department generally handles this stuff (I think). (Survey #37)
>
> I teach my students about ISO 14000, enough to know what ISO is and the value of ISO certification. I mention ISO 9000 to give them context, but do not teach it in any detail. (Survey #11)
>
> I teach an undergrad class on "Engineering Professionalism," the content of which is specified by ABET for our accreditation. They do not include ISO 9000 as a topic; but I would include it if they did. (Survey #38)

In summary, the profile of a "typical" undergraduate engineering professor shows the following characteristics: more than 10 years of past industry experience in mechanical or electrical engineering; no experience with ISO 9000 series certification; not enough experience to judge its value; not sure if ISO 9000-specific courses or general quality courses are taught on campus; does not know how ISO 9000 certification is covered, and does not personally teach the subject in his/her courses.

CHAPTER 5

SUMMARY OF FINDINGS/CONCLUSIONS

The final assessment of ISO 9000 series quality standards management certification instruction in California undergraduate engineering programs shows a disappointing level of knowledge on the part of professors tasked with educating students. The majority of answers were "Don't know" or "Not sure." Comments from other professors that did not complete the survey confirm this lack of interest or knowledge.

Although an actual survey response of only 2.1% is not statistically significant, some conclusions may be still be made about the state of undergraduate engineering education in California with regard to teaching the ISO 9000 standards. The second hypothesis—engineering professors feel that ISO 9000 is not a necessary or important enough subject to be covered at the undergraduate level, and students will get the information on the job or in graduate-level studies—is fully supported by the survey results.

However, a definite conclusion cannot be made on the first hypothesis; that undergraduate engineering professors have limited or obsolete business experience, so do not appreciate the usefulness of ISO 9000 series certification. While a majority of professors have past industry experience and are no longer employed in their original fields of expertise, it would be difficult to assume that this experience is obsolete. After all, the ISO 9000 series has been in existence

for over 25 years. It is hard to believe that they would have never encountered the standard during their engineering experience.

These study findings should be of interest to quality professionals seeking to promote ISO 9000 certification instruction and understanding in undergraduate engineering education. Rather than be further concerned about why professors are not teaching the ISO standards, it would be more productive to concentrate on how best to impart this information to engineering students. Since one professor in the survey indicated a willingness to follow whatever course content ABET mandates, an option may be to reach out to ABET to request it add ISO standards to these requirements. More studies sampling universities in other states or graduate-level professors may generate other productive suggestions to increase the knowledge of ISO 9000 series certification among the undergraduate engineering student population.

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APPENDICES

APPENDIX A

ABET LIST OF CALIFORNIA 4-YEAR ACCREDITED PROGRAMS

School Name	Location	Website	Program and Degree Name	Accreditation Dates	Accredited Campus Locations	Criteria	Date of Next Comprehensive Review	Accredited By	International Mutual Recognition Agreement
California Baptist University	Riverside, CA, US		Civil Engineering, BSCE	10/01/2010-Present	Main Campus	Civil Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Baptist University	Riverside, CA, US		Electrical and Computer Engineering, BSECE	10/01/2010-Present	Main Campus	Computer Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Baptist University	Riverside, CA, US		Electrical and Computer Engineering, BSECE	10/01/2010-Present	Main Campus	Electrical and Electronics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Baptist University	Riverside, CA, US		Mechanical Engineering, BSME	10/01/2010-Present	Main Campus	Mechanical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Institute of Technology	Pasadena, CA, US	www.caltech.edu	Chemical Engineering, BS	10/01/1936-Present	Main Campus	Chemical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Institute of Technology	Pasadena, CA, US	www.caltech.edu	Electrical Engineering, BS	10/01/1995-Present	Main Campus	Electrical and Electronics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Institute of Technology	Pasadena, CA, US	www.caltech.edu	Mechanical Engineering, BS	10/01/2002-Present	Main Campus	Mechanical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Maritime Academy	Vallejo, CA, US	www.csum.edu	Facilities Engineering Technology, BS	10/01/1999-Present	Main Campus	General Criteria Only (TAC)	2013-2014	Technology Accreditation Commission	Sydney Accord
California Maritime Academy	Vallejo, CA, US	www.csum.edu	Marine Engineering Technology, BS	10/01/1977-Present	Main Campus	Naval Architecture and Marine Engineering Technology	2013-2014	Technology Accreditation Commission	Sydney Accord
California Maritime Academy	Vallejo, CA, US	www.csum.edu	Mechanical Engineering, BS	10/01/2001-Present	Main Campus	Mechanical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Aerospace Engineering, BS	10/01/1969-Present	Main Campus	Aerospace Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Architectural Engineering, BS	10/01/1975-Present	Main Campus	Architectural Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	BioResource and Agriculture Engineering, BS	10/01/1973-Present	Main Campus	Agricultural Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Civil Engineering, BS	10/01/1973-Present	Main Campus	Civil Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Computer Engineering, BS	10/01/1995-Present	Main Campus	Computer Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	*San Luis Obispo, CA, US*	*www.calpoly.edu*	*Computer Science, BS*	*10/01/1986-Present*	*Main Campus*	*Computer Science*	*2014-2015*	*Computing Accreditation Commission*	*Seoul Accord*
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Electrical Engineering, BS	10/01/1969-Present	Main Campus	Electrical and Electronics Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Environmental Engineering, BS	10/01/1971-Present	Main Campus	Environmental Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Industrial Engineering, BS	10/01/1969-Present	Main Campus	Industrial Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Manufacturing Engineering, BS	10/01/1995-Present	Main Campus	Manufacturing Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Materials Engineering, BS	10/01/1971-Present	Main Campus	Materials Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Mechanical Engineering, BS	10/01/1969-Present	Main Campus	Mechanical Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California Polytechnic State University, San Luis Obispo	San Luis Obispo, CA, US	www.calpoly.edu	Software Engineering, BS	10/01/2007-Present	Main Campus	Software Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Aerospace Engineering, BS	10/01/1970-Present	Main Campus	Aerospace Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Chemical Engineering, BS	10/01/1972-Present	Main Campus	Chemical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Civil Engineering, BS	10/01/1970-Present	Main Campus	Civil Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Computer Engineering, BS	10/01/2002-Present	Main Campus	Computer Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	*Pomona, CA, US*	*www.csupomona.edu*	*Computer Science, BS*	*10/01/1994-Present*	*Main Campus*	*Computer Science*	*2014-2015*	*Computing Accreditation Commission*	*Seoul Accord*
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Construction Engineering Technology, BS	10/01/1976-Present	Main Campus	Construction Engineering Technology	2017-2018	Technology Accreditation Commission	Sydney Accord
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Electrical Engineering, BS	10/01/1970-Present	Main Campus	Electrical and Electronics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Electronic(s) and Computer Engineering Technology, BS	10/01/1976-Present	Main Campus	Computer Engineering Technology	2017-2018	Technology Accreditation Commission	Sydney Accord
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Electronic(s) and Computer Engineering Technology, BS	10/01/1976-Present	Main Campus	Electrical and Electronics Engineering Technology	2017-2018	Technology Accreditation Commission	Sydney Accord
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Engineering Technology, BS	10/01/1976-Present	Main Campus	Engineering Technology (General)	2017-2018	Technology Accreditation Commission	Sydney Accord

California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Geospatial Engineering option in Civil Engineering, BS	10/01/1992-Present	Main Campus	Civil Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Geospatial Engineering option in Civil Engineering, BS	10/01/1992-Present	Main Campus	Surveying and Geomatics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Industrial Engineering, BS	10/01/1976-Present	Main Campus	Industrial Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Manufacturing Engineering, BS	10/01/1988-Present	Main Campus	Manufacturing Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State Polytechnic University, Pomona	Pomona, CA, US	www.csupomona.edu	Mechanical Engineering, BS	10/01/1970-Present	Main Campus	Mechanical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Chico	Chico, CA, US	www.csuchico.edu	Civil Engineering, BS	10/01/1968-Present	Main Campus	Civil Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Chico	Chico, CA, US	www.csuchico.edu	Computer Engineering, BS	10/01/1987-Present	Main Campus	Computer Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Chico	*Chico, CA, US*	*www.csuchico.edu*	*Computer Information Systems, BS*	*10/01/2008-Present*	*Main Campus*	*Information Systems*	*2015-2016*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Chico	*Chico, CA, US*	*www.csuchico.edu*	*Computer Science, BS*	*10/01/1987-Present*	*Main Campus*	*Computer Science*	*2015-2016*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Chico	Chico, CA, US	www.csuchico.edu	Electrical/Electronic(s) Engineering, BS	10/01/1971-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Chico	Chico, CA, US	www.csuchico.edu	Mechanical Engineering, BS	10/01/1971-Present	Main Campus	Mechanical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Chico	Chico, CA, US	www.csuchico.edu	Mechatronics Engineering, BS	10/01/1996-Present	Main Campus	General Criteria Only (EAC)	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Dominguez Hills	*Dominguez Hills, CA, US*	*www.csudh.edu*	*Computer Science, BS*	*10/01/1998-Present*	*Main Campus*	*Computer Science*	*2016-2017*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, East Bay	Hayward, CA, US	www.csueastbay.edu	Engineering (Industrial Engineering Option), BS	10/01/2001-Present	Main Campus	Industrial Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fresno	Fresno, CA, US	www.csufresno.edu	Civil Engineering, BS	10/01/1968-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fresno	Fresno, CA, US	www.csufresno.edu	Computer Engineering, BS	10/01/1999-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fresno	Fresno, CA, US	www.csufresno.edu	Electrical Engineering, BS	10/01/1965-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fresno	Fresno, CA, US	www.csufresno.edu	Geomatics Engineering, BS	10/01/1979-Present	Main Campus	Surveying and Geomatics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fresno	Fresno, CA, US	www.csufresno.edu	Mechanical Engineering, BS	10/01/1965-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fullerton	Fullerton, CA, US	www.fullerton.edu	Civil Engineering, BS	10/01/1985-Present	Main Campus	Civil Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fullerton	Fullerton, CA, US	www.fullerton.edu	Computer Engineering, BS	10/01/2007-Present	Main Campus	Computer Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fullerton	*Fullerton, CA, US*	*www.fullerton.edu*	*Computer Science, BS*	*10/01/1988-Present*	*Main Campus*	*Computer Science*	*2014-2015*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Fullerton	Fullerton, CA, US	www.fullerton.edu	Electrical Engineering, BS	10/01/1985-Present	Main Campus	Electrical and Electronics Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Fullerton	Fullerton, CA, US	www.fullerton.edu	Mechanical Engineering, BS	10/01/1985-Present	Main Campus	Mechanical Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Aerospace Engineering, BS	10/01/1999-Present	Main Campus	Aerospace Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Chemical Engineering, BS	10/01/1980-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Civil Engineering, BS	10/01/1963-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Computer Engineering, BS	10/01/1974-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	*Long Beach, CA, US*	*www.csulb.edu*	*Computer Science, BS*	*10/01/1995-Present*	*Main Campus*	*Computer Science*	*2012-2013*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Electrical Engineering, BS	10/01/1963-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Long Beach	Long Beach, CA, US	www.csulb.edu	Mechanical Engineering, BS	10/01/1963-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Los Angeles	Los Angeles, CA, US	www.calstatela.edu	Civil Engineering, B.S.	10/01/1965-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Los Angeles	*Los Angeles, CA, US*	*www.calstatela.edu*	*Computer Science, B.S.*	*10/01/2005-Present*	*Main Campus*	*Computer Science*	*2012-2013*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Los Angeles	Los Angeles, CA, US	www.calstatela.edu	Electrical Engineering, B.S.	10/01/1965-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Los Angeles	Los Angeles, CA, US	www.calstatela.edu	Mechanical Engineering, B.S.	10/01/1965-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

California State University, Northridge	Northridge, CA, US	www.csun.edu	Civil Engineering, BSCE	10/01/1994-Present	Main Campus	Civil Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Northridge	Northridge, CA, US	www.csun.edu	Computer Engineering, BS	10/01/2006-Present	Main Campus	Computer Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Northridge	*Northridge, CA, US*	*www.csun.edu*	*Computer Science, BS*	*10/01/1985-Present*	*Main Campus*	*Computer Science*	*2013-2014*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Northridge	Northridge, CA, US	www.csun.edu	Electrical Engineering, BS	10/01/1994-Present	Main Campus	Electrical and Electronics Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Northridge	Northridge, CA, US	www.csun.edu	Manufacturing Systems Engineering, BSMSE	10/01/2001-Present	Main Campus	Manufacturing Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Northridge	Northridge, CA, US	www.csun.edu	Mechanical Engineering, BS	10/01/1994-Present	Main Campus	Mechanical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Sacramento	Sacramento, CA, US	www.csus.edu	Civil Engineering, BS	10/01/1965-Present	Main Campus	Civil Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Sacramento	Sacramento, CA, US	www.csus.edu	Computer Engineering, BS	10/01/1987-Present	Main Campus	Computer Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Sacramento	*Sacramento, CA, US*	*www.csus.edu*	*Computer Science, BS*	*10/01/1986-Present*	*Main Campus*	*Computer Science*	*2015-2016*	*Computing Accreditation Commission*	*Seoul Accord*
California State University, Sacramento	Sacramento, CA, US	www.csus.edu	Electrical and Electronic(s) Engineering, BS	10/01/1969-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, Sacramento	Sacramento, CA, US	www.csus.edu	Mechanical Engineering, BS	10/01/1965-Present	Main Campus	Mechanical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
California State University, San Bernardino	*San Bernardino, CA, US*	*www.csusb.edu*	*Computer Science, BS*	*10/01/1988-Present*	*Main Campus*	*Computer Science*	*2013-2014*	*Computing Accreditation Commission*	*Seoul Accord*
DeVry University, Southern California	*Pomona, CA, US*	*www.devry.edu*	*Biomedical Engineering Technology, BS*	*10/01/2007-Present*	*Main Campus*	*Bioengineering and Biomedical Engineering Technology*	*2010-2011*	*Technology Accreditation Commission*	*Sydney Accord*
Harvey Mudd College	Claremont, CA, US	www.hmc.edu	Engineering, BS	10/01/1962-Present	Main Campus	Engineering, Engineering Physics & Engineering Science Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Humboldt State University	Arcata, CA, US	www.humboldt.edu	Environmental Resources Engineering, BS	10/01/1981-Present	Main Campus	Environmental Engineering	2016-2017	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Loyola Marymount University	Los Angeles, CA, US	www.lmu.edu	Civil Engineering, B.S.E.	10/01/1967-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Loyola Marymount University	Los Angeles, CA, US	www.lmu.edu	Electrical Engineering, B.S.E.	10/01/1967-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Loyola Marymount University	Los Angeles, CA, US	www.lmu.edu	Mechanical Engineering, B.S.E.	10/01/1967-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Aerospace Engineering, BS	10/01/1964-Present	Main Campus	Aerospace Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	*www.sdsu.edu*	*Civil Engineering, BS*	*10/01/1964-Present*	Main Campus	*Civil Engineering*	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Computer Engineering, BS	10/01/2002-Present	Main Campus	Computer Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Construction Engineering, B.S.	10/01/2008-Present	Main Campus	Construction Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Electrical Engineering, BS	10/01/1964-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Environmental Engineering, BS	10/01/2002-Present	Main Campus	Environmental Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Diego State University	San Diego, CA, US	www.sdsu.edu	Mechanical Engineering, BS	10/01/1964-Present	Main Campus	Mechanical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Francisco State University	San Francisco, CA, US	www.sfsu.edu	Civil Engineering, BS	10/01/1986-Present	Main Campus	Civil Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Francisco State University	*San Francisco, CA, US*	*www.sfsu.edu*	*Computer Science, BS*	*10/01/1993-Present*	*Main Campus*	*Computer Science*	*2013-2014*	*Computing Accreditation Commission*	*Seoul Accord*
San Francisco State University	San Francisco, CA, US	www.sfsu.edu	Electrical Engineering, BS	10/01/1986-Present	Main Campus	Electrical and Electronics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Francisco State University	San Francisco, CA, US	www.sfsu.edu	Mechanical Engineering, BS	10/01/1986-Present	Main Campus	Mechanical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Aerospace Engineering, BS	10/01/1989-Present	Main Campus	Aerospace Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Chemical Engineering, BS	10/01/1966-Present	Main Campus	Chemical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Civil Engineering, BS	10/01/1959-Present	Main Campus	Civil Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Computer Engineering, BS	10/01/1989-Present	Main Campus	Computer Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	*San Jose, CA, US*	*www.sjsu.edu*	*Computer Science, BS*	*10/01/1994-Present*	*Main Campus*	*Computer Science*	*2017-2018*	*Computing Accreditation Commission*	*Seoul Accord*
San Jose State University	San Jose, CA, US	www.sjsu.edu	Electrical Engineering, BS	10/01/1959-Present	Main Campus	Electrical and Electronics Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

San Jose State University	San Jose, CA, US	www.sjsu.edu	Industrial and Systems Engineering, BS	10/01/1963-Present	Main Campus	Industrial Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Materials Engineering, BS	10/01/1962-Present	Main Campus	Materials Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
San Jose State University	San Jose, CA, US	www.sjsu.edu	Mechanical Engineering, BS	10/01/1963-Present	Main Campus	Mechanical Engineering	2017-2018	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Santa Clara University	Santa Clara, CA, US	www.scu.edu	Civil Engineering, BSCE	10/01/1936-Present	Main Campus	Civil Engineering	2016-2017	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Santa Clara University	Santa Clara, CA, US	www.scu.edu	Computer Science and Engineering, BSCSE	10/01/1985-Present	Main Campus	Computer Engineering	2016-2017	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Santa Clara University	Santa Clara, CA, US	www.scu.edu	Computer Science and Engineering, BSCSE	10/01/2009-Present	Main Campus	Computer Science	2016-2017	Computing Accreditation Commission	Seoul Accord
Santa Clara University	Santa Clara, CA, US	www.scu.edu	Electrical Engineering, BSEE	10/01/1936-Present	Main Campus	Electrical and Electronics Engineering	2016-2017	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Santa Clara University	Santa Clara, CA, US	www.scu.edu	Mechanical Engineering, BSME	10/01/1936-Present	Main Campus	Mechanical Engineering	2016-2017	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Stanford University	Stanford, CA, US	www.stanford.edu	Chemical Engineering, BS	10/01/1959-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Stanford University	Stanford, CA, US	www.stanford.edu	Civil Engineering, BS	10/01/1936-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Stanford University	Stanford, CA, US	www.stanford.edu	Electrical Engineering, BS	10/01/1936-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Stanford University	Stanford, CA, US	www.stanford.edu	Environmental Engineering, BS	10/01/2002-Present	Main Campus	Environmental Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
Stanford University	Stanford, CA, US	www.stanford.edu	Mechanical Engineering, BS	10/01/1936-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Chemical Engineering and Materials Science and Engineering, BS	10/01/2005-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Chemical Engineering and Materials Science and Engineering, BS	10/01/2005-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Chemical Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Chemical Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Nuclear and Radiological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Chemical Engineering, BS	10/01/1952-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Civil Engineering, BS	10/01/1936-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Computer Science and Engineering, BS	10/01/1983-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Computer Science and Engineering, BS	10/01/1995-Present	Main Campus	Computer Science	2012-2013	Computing Accreditation Commission	Seoul Accord
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Materials Science and Engineering, BS	10/01/2005-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Materials Science and Engineering, BS	10/01/2005-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Materials Science and Engineering, BS	10/01/2005-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Nuclear and Radiological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering, BS	10/01/1936-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Electrical and Computer Engineering, BS	10/01/1936-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Industrial Engineering and Operations Research, BS	10/01/1949-Present	Main Campus	Industrial Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Material Science and Engineering, BS	10/01/2005-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Materials Science and Engineering and Mechanical Engineering, BS	10/01/2005-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Materials Science and Engineering and Mechanical Engineering, BS	10/01/2005-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Materials Science and Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Materials Science and Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Nuclear and Radiological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Mechanical Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Mechanical Engineering and Nuclear Engineering, BS	10/01/2005-Present	Main Campus	Nuclear and Radiological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Mechanical Engineering, BS	10/01/1936-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Berkeley	Berkeley, CA, US	www.berkeley.edu	Nuclear Engineering, BS	10/01/1963-Present	Main Campus	Nuclear and Radiological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Aerospace Science and Engineering, BS	10/01/1984-Present	Main Campus	Aerospace Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Biochemical Engineering, BS	10/01/1999-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Biological Systems Engineering, BS	10/01/1985-Present	Main Campus	Biological Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Chemical Engineering, BS	10/01/1966-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Civil Engineering, BS	10/01/1965-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Computer Engineering, BS	10/01/1993-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Computer Science and Engineering, BS	10/01/1987-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Computer Science and Engineering, BS	10/01/1995-Present	Main Campus	Computer Science	2012-2013	Computing Accreditation Commission	Seoul Accord
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Electrical Engineering, BS	10/01/1965-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Electrical Engineering/Materials Sciences and Engineering, BS	10/01/1993-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Electrical Engineering/Materials Sciences and Engineering, BS	10/01/1993-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Electronic Materials Engineering, BS	10/01/1993-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Electronic Materials Engineering, BS	10/01/1993-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Materials Science and Engineering, BS	10/01/1990-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Mechanical Engineering, BS	10/01/1965-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Davis	Davis, CA, US	www.ucdavis.edu	Optical Science and Engineering, BS	10/01/2005-Present	Main Campus	Optics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Aerospace Engineering, BS	10/01/1994-Present	Main Campus	Aerospace Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Biomedical Engineering, BS	10/01/2006-Present	Main Campus	Bioengineering and Biomedical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Chemical Engineering, BS	10/01/1994-Present	Main Campus	Chemical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Civil Engineering, BS	10/01/1976-Present	Main Campus	Civil Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Computer Engineering, BS	10/01/1994-Present	Main Campus	Computer Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Computer Science and Engineering, B.S.	10/01/2009-Present	Main Campus	Computer Engineering	2013-2014	Computing Accreditation Commission	Seoul Accord
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Computer Science and Engineering, B.S.	10/01/2009-Present	Main Campus	Computer Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Computer Science and Engineering, B.S.	10/01/2009-Present	Main Campus	Computer Science	2013-2014	Computing Accreditation Commission	Seoul Accord
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Computer Science and Engineering, B.S.	10/01/2009-Present	Main Campus	Computer Science	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Electrical Engineering, BS	10/01/1968-Present	Main Campus	Electrical and Electronics Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Environmental Engineering, BS	10/01/1997-Present	Main Campus	Environmental Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Materials Science Engineering, BS	10/01/2003-Present	Main Campus	Materials Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Irvine	Irvine, CA, US	http://www.uci.edu/	Mechanical Engineering, BS	10/01/1978-Present	Main Campus	Mechanical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Aerospace Engineering, BS	10/01/1985-Present	Main Campus	Aerospace Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Chemical Engineering, BS	10/01/1983-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Civil Engineering, BS	10/01/1983-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Computer Science and Engineering, BS	10/01/1986-09/30/1992, 10/01/1995 -Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Computer Science and Engineering, BS	10/01/1995-Present	Main Campus	Computer Science	2012-2013	Computing Accreditation Commission	Seoul Accord
University of California, Los Angeles	*Los Angeles, CA, US*	*www.ucla.edu*	*Computer Science, BS*	*10/01/1995-Present*	*Main Campus*	*Computer Science*	*2012-2013*	*Computing Accreditation Commission*	*Seoul Accord*
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Electrical Engineering, BS	10/01/1983-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Materials Engineering, BS	10/01/1985-Present	Main Campus	Materials Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Los Angeles	Los Angeles, CA, US	www.ucla.edu	Mechanical Engineering, BS	10/01/1985-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Riverside	Riverside, CA, US	www.ucr.edu	Chemical Engineering, BS	10/01/1993-Present	Main Campus	Chemical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Riverside	Riverside, CA, US	www.ucr.edu	Computer Engineering, BS	05/01/2001-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Riverside	*Riverside, CA, US*	*www.ucr.edu*	*Computer Science, BS*	*10/01/2005-Present*	*Main Campus*	*Computer Science*	*2012-2013*	*Computing Accreditation Commission*	*Seoul Accord*
University of California, Riverside	Riverside, CA, US	www.ucr.edu	Electrical Engineering, BS	10/01/1992-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Riverside	Riverside, CA, US	www.ucr.edu	Environmental Engineering, BS	10/01/1993-Present	Main Campus	Environmental Engineering	2012-2013	*Engineering Accreditation Commission*	*Washington Accord | Bilateral* Engineers Canada
University of California, Riverside	Riverside, CA, US	www.ucr.edu	Mechanical Engineering, BS	10/01/1997-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Aerospace Engineering, BS	10/01/2000-Present	Main Campus	Aerospace Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Bioengineering (Biotechnology), BS	10/01/2001-Present	Main Campus	Bioengineering and Biomedical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Bioengineering, BS	10/01/1987-Present	Main Campus	Bioengineering and Biomedical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Chemical Engineering, BS	10/01/1985-Present	Main Campus	Chemical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Electrical Engineering, BS	10/01/1982-Present	Main Campus	Electrical and Electronics Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	La Jolla, CA, US	www.ucsd.edu	Mechanical Engineering, BS	10/01/1987-Present	Main Campus	Mechanical Engineering	2013-2014	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, San Diego	*La Jolla, CA, US*	*www.ucsd.edu*	*Structural Engineering, BS*	*10/01/1987-Present*	Main Campus	*General Criteria Only (EAC)*	*2013-2014*	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Barbara	Santa Barbara, CA, US	www.ucsb.edu	Chemical Engineering, BS	10/01/1968-Present	Main Campus	Chemical Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Barbara	Santa Barbara, CA, US	www.ucsb.edu	Computer Engineering, BS	10/01/2007-Present	Main Campus	Computer Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Barbara	*Santa Barbara, CA, US*	*www.ucsb.edu*	*Computer Science, BS*	*10/01/1984-Present*	*Main Campus*	*Computer Science*	*2014-2015*	*Computing Accreditation Commission*	*Seoul Accord*
University of California, Santa Barbara	Santa Barbara, CA, US	www.ucsb.edu	Electrical Engineering, BS	10/01/1967-Present	Main Campus	Electrical and Electronics Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Barbara	Santa Barbara, CA, US	www.ucsb.edu	Mechanical Engineering, BS	10/01/1967-Present	Main Campus	Mechanical Engineering	2014-2015	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Cruz	Santa Cruz, CA, US	www.ucsc.edu/oncampus/	Computer Engineering, BS	10/01/1987-Present	Main Campus	Computer Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of California, Santa Cruz	Santa Cruz, CA, US	www.ucsc.edu/oncampus/	Electrical Engineering, BS	10/01/2002-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of San Diego	San Diego, CA, US	www.sandiego.edu	Electrical Engineering, BS/BA	10/01/1990-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of San Diego	San Diego, CA, US	www.sandiego.edu	Industrial and Systems Engineering, BS/BA	10/01/1999-Present	Main Campus	Industrial Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of San Diego	San Diego, CA, US	www.sandiego.edu	Mechanical Engineering, BS/BA	10/01/2006-Present	Main Campus	Mechanical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Aerospace Engineering, BS	10/01/1960-Present	Main Campus	Aerospace Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Astronautical Engineering, B.S.	10/01/2012-Present	Main Campus	Aerospace Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Biomedical Engineering, B.S.	10/01/2008-Present	Main Campus	Bioengineering and Biomedical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Chemical Engineering, BS	10/01/1950-Present	Main Campus	Chemical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

University of Southern California	Los Angeles, CA, US	www.usc.edu	Civil Engineering, BS	10/01/1942-Present	Main Campus	Civil Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Computer Engineering and Computer Science, BS	10/01/2002-Present	Main Campus	Computer Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Computer Engineering and Computer Science, BS	10/01/2002-Present	Main Campus	Computer Science	2015-2016	Computing Accreditation Commission	Seoul Accord
University of Southern California	*Los Angeles, CA, US*	*www.usc.edu*	*Computer Science, BS*	*10/01/1986-09/30/1994, 10/01/2002-Present*	*Main Campus*	*Computer Science*	*2015-2016*	*Computing Accreditation Commission*	*Seoul Accord*
University of Southern California	Los Angeles, CA, US	www.usc.edu	Electrical Engineering, BS	10/01/1942-Present	Main Campus	Electrical and Electronics Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Environmental Engineering, BS	10/01/1996-Present	Main Campus	Environmental Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Industrial and Systems Engineering, BS	10/01/1957-Present	Main Campus	Industrial Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of Southern California	Los Angeles, CA, US	www.usc.edu	Mechanical Engineering, BS	10/01/1942-Present	Main Campus	Mechanical Engineering	2015-2016	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Civil Engineering, BS	10/01/1971-Present	Main Campus	Civil Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Computer Engineering, BS	10/01/1983-Present	Main Campus	Computer Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	*Stockton, CA, US*	*http://www.pacific.edu/*	*Computer Science, BS*	*10/01/1990-Present*	*Main Campus*	*Computer Science*	*2016-2017*	*Computing Accreditation Commission*	*Seoul Accord*
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Electrical Engineering, BS	10/01/1971-Present	Main Campus	Electrical and Electronics Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Engineering Management, BS	10/01/2003-Present	Main Campus	Engineering Management	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Engineering Physics, BS	10/01/1986-Present	Main Campus	Engineering, Engineering Physics & Engineering Science Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada
University of the Pacific	Stockton, CA, US	http://www.pacific.edu/	Mechanical Engineering, BS	10/01/1986-Present	Main Campus	Mechanical Engineering	2012-2013	Engineering Accreditation Commission	Washington Accord | Bilateral Engineers Canada

All currently accredited programs met the ABET Accreditation Criteria that were in effect at the time of review.

Disclaimer: Information is accurate to the best of ABET's knowledge. Individuals should contact programs for confirmation. Database Last Updated: 10/1/2012

APPENDIX B

SURVEY QUESTIONS

Survey Questions:

Indicate your professional background. Check all that apply

___ Was employed in industry, now teach.
___ Currently employed in industry while teaching.
___ Never employed in industry.
___ Teaching less than 5 years.
___ Teaching between 5 and 10 years.
___ Teaching for over 10 years.

If your professional background is in industry, in which field is your primary experience?_____

Do you have any personal or industrial experience with ISO 9000 Quality Standards Management certification?

___ Yes ___ No

Have you been directly involved in the process of obtaining ISO 9000 certification?

___ Yes ___ No

Are you familiar with any studies regarding ISO 9000 certification?

___ Yes ___ No

Do you feel that ISO 9000 certification has value? Check all that apply.

___ Yes. It is a good and enduring standard.
___ Yes. It is important globally.
___ I don't know enough about it.
___ No. It is not important or applicable to US industry.
___ No. It is too expensive to obtain.
___ Other. _____

Are there other certifications you feel are more valuable than ISO 9000? If so, which? _____

Do undergraduate engineering courses taught on campus specifically offer ISO 9000 Quality Standards Management certification instruction?

___ Yes ___ No ___ Not sure

If no specific courses, how is ISO 9000 certification explained or explored? Check all that apply.

___ It is covered by another department.
___ It is not covered at all.
___ It is covered if a student asks.
___ It is covered on the graduate engineering level.
___ It is covered at an individual professor's discretion.
___ Not sure

Are there any courses taught which refer to quality issues in general, quality management systems, or historical quality advocates (e.g. Deming, Juran, Crosby, etc.)?

___ Yes ___ No ___ Not sure

Do you personally instruct students about ISO 9000 certification? Why or why not? Check all that apply.

___ Yes. They will need to know for a job.
___ Yes. They need to know in general.
___ Other. _____
___ No. They will learn on the job if they need to.
___ No. Not important on the undergraduate level.

Please provide any other explanations or comments you feel are pertinent. Thank you for your participation in this study. If you would like a summary of the results, please provide your contact information to jadamson5@toromail.csudh.edu.