

Lyles College of Engineering

Mechanical Engineering

Student Outcomes Assessment Plan (SOAP)

I. Mission Statement

The mission of the Department of Mechanical Engineering is to provide a broad-based, practice-oriented Mechanical Engineering education that enables graduates to become technically-proficient, professional leaders through engagement in the community and lifelong learning.

The Bachelor of Science in Mechanical Engineering (BSME) program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>. The program has been continuously accredited since 1965.

Each accreditation period is six years and requires submission of a self study and a site visit as part of the renewal process in the fifth year of the six-year cycle. For the BSME program, accreditation is based on successful maintenance of eight Engineering Accreditation Commission (EAC) criteria (1. Students, 2. PEOs, 3. SOs, 4. CQI, 5. Curriculum, 6. Faculty, 7. Facilities, and 8. Institutional Support) and two ASME professional criteria (1. Curricular preparation for professional practice and 2. Faculty remaining current). Continuous quality improvement (CQI) addressing assessment of student outcomes (SOs) is only one of multiple criteria for maintaining accreditation.

Note that following terms are used interchangeably: i) CSU, Fresno term Goal versus ABET term Program Educational Objective (PEO) and ii) CSU, Fresno term Student Learning Outcome (SLO) versus ABET term Student Outcome (SO).

II. Goals and Student Learning Outcomes

Goals (a.k.a., PEOs)

Alumni (within 3 to 5 years after graduation) of the BSME program will:

- 1 Be engaged in a professional career of graduate studies using knowledge and skills obtained in their ME education;
- 2 Become leaders and effective communicators actively involved in their community for the betterment of society.

Student Learning Outcomes (SLOs a.k.a., SOs)

Upon the successful completion of the Bachelor of Science in Mechanical Engineering program at

California State University, Fresno, students will have achieved the following:

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

III. Curriculum Map (Matrix of Courses X Student Learning Outcomes)

Table III-1 Contributions of ME courses to Student Learning Outcomes, SLO a) to SLO k) where (I = Introduced, R = Reinforced, E=Emphasized, M=Mastered).

Mechanical Engineering Courses		Student Learning Outcome (SLO)										
		<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>	<u>f</u>	<u>g</u>	<u>h</u>	<u>i</u>	<u>j</u>	<u>k</u>
ME 01	Introduction to Mechanical Engineering	I	I	I	I	I	I	I	I	I	I	I
ME 02	Computer Applications in ME	I										I
ME 26	Engineering Graphics			E		E						E
ME 31	Engineering Materials	E	E	E					E	R		E
ME 32	Engineering Materials Lab	E	E		E			E		R		E
ME 95	Product Development (Manuf Processes)	R	R	R	E	I	I	E	R		R	E

ME 112	Engineering Mechanics: Dynamics	E				E						E
ME 115	Instrumentation and Measurement Lab	E	E	R		E						E
ME 116	Fluid Mechanics.	E		E		E						E
ME 118	Fluid Mechanics Lab	E	E		E	E		E				E
ME 122	Dynamic Measurements & Controls (tech elective)	E				E						E
ME 125	Engineering Statistics and Experimentation	E	E	R	R	R						R
ME 134	Kinematics of Machinery	E		E		E			E		R	E
ME 135	Introduction to Design - Senior Capstone Design I	M		M	M	M	M	M	M	M	M	M
ME 136	Thermodynamics	E				E						E
ME 137	Turbomachinery (tech elective)	M		M		M						M
ME 140	Advanced Engineering Analysis	E				E						E
ME 142	Mechanical Vibrations (tech elective)	M				M						M
ME 144	Adv Mechanics of Materials (tech elective)	M		M		M						M
ME 145	Heat and Mass Transfer	M		M		M		M				M
ME 146	Air Conditioning (tech elective)	M	M	M	M	M	M	M	M	M	M	M
ME 154	Design of Machine Elements	M	M	M	M	M	M	M	M	M	M	M
ME 155	Senior Capstone Design II	M	E	M	M	M	M	M	M	M	M	M
ME 156	Advanced Thermodynamics-Fluid Mechanics	M		M		M		M	M			M
ME 159	Mechanical Engineering Lab	M	M	M	M	M	M	M	M	M	M	M
ME 162	Computer-Aided Design (tech elective)	M	M	M		M			M			M
ME 164	Mechanical Systems Engineering Design (tech elective)	M		M		M						M
ME 166	Energy Systems Design	M	M	M	M	M	M	M	M	M	M	M

IV. Assessment Methods

A. Direct Measures:

1. Fundamentals of Engineering (FE) Examination: Alumni and students (usually seniors in their last semester) of the BSME program routinely take the FE examination as the first step in obtaining a licensure as a Professional Engineer (PE). This FE exam is nationally-normed and is an excellent external measure of how well the BSME program prepares its graduates for industry and additional study. The FE examination is administered during specific periods during spring and fall of each year. Because the results from the FE exam are broken down by topic, these topics can be related to SLOs for direct measures of outcome attainment. The target for achieving an SLO is to meet or exceed the national percent correct for each section of the FE exam that applies to a particular SLO.
2. Student Performance in Courses: At the beginning of each semester, faculty are notified which courses for that semester will be required to have course worksheets completed, including student performance measures. Each faculty member teaching one of the targeted courses determines the student performance measure for the particular CLOs and the related SLOs for that course. Examples of performance measures include individual exam questions/problems, design projects, in-class activities, etc. At the end of each semester the individual faculty member completes the appropriate course worksheet for the appropriate course and reports the level of attainment of each SLO (mean, standard deviation and sample size) as appropriate. The completed course worksheet is forwarded to the ME department assessment coordinator for inclusion in the semester and annual assessment reports for subsequent evaluation by the all ME faculty at targeted faculty meetings and the annual department retreat.
3. Culminating Capstone Design Experience: The culminating capstone design experience is not only a requirement of ABET accreditation but also demonstrates the level of synthesis of all preceding coursework in the curriculum. A two-course sequence for the capstone design (i.e., ME135 in fall semester senior year and ME155 in spring semester senior year) often involves a sponsored, "real-world" problem in which teams of students work collaboratively to identify, articulate, design, analyze, prototype, test, refine and demonstrate a working version of their engineering solution to the client/sponsor. Since ME135 and ME155 reflect mastery (M) of the SLOs in the BSME program, the level of student success in obtaining and documenting a solution to an engineering problem is a strong indication of the success of the program.

B. Indirect Measures:

1. Junior Survey: Junior Surveys are administered in the fall and spring semesters of each academic year. Each semester, a junior-level course is chosen in which to administer the survey so as to

assess student attitudes and perceptions in the first year of the upper division part of the program. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of two questions, each with 12 parts. The first question is: “How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)? This is followed by a list of SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The second question is: “How satisfied are you with your education in the Mechanical Engineering Program at CSU, Fresno in regard to each of the following Program Student Outcomes (SOs)? This is followed by a list SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The results of this survey are important to understanding how well students understand the “tool box” of skills that the program has promised them (SLOs) as well as their perception of how well the program is delivering on that promise (albeit, as juniors, a work in progress). A copy of the Junior Survey is shown in the appendix.

2. Senior Survey: Senior Surveys are administered in the fall and spring semesters of each academic year. Each semester, a senior-level course is chosen in which to administer the survey so as to assess study attitudes and perceptions at the in the final year of the upper division part of the program. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of two questions, each with 12 parts. The first question is: “How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)? This is followed by a list of SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The second question is: “How satisfied are you with your education in the Mechanical Engineering Program at CSU, Fresno in regard to each of the following Program Student Outcomes (SOs)? This is followed by a list SLOs each with a multiple choice answer ranging from 0 (not applicable) to 5 (very strong). The results of this survey are important to understanding how well students understand the “tool box” of skills that the program has promised them (SLOs) as well as their perception of how well the program is delivering on that promise (now as seniors nearing the end of the degree program). A copy of the Senior Survey is shown in the appendix.
3. Course Survey: Course Surveys are administered in the fall and spring semesters of each academic year for every course offered in the Mechanical Engineering that semester. Up until AY2015-16, the survey had been on paper but currently the survey is web-based. The survey consists of one request for input, with 12 parts: “Please assess the contributions of this course to the Mechanical Engineering Program Student Outcomes (SOs) a) through k).” This is followed by a list of SLOs each with a multiple choice answer ranging from 1 (marginally) to 5 (very strong) as well as 0 (not applicable) if the course does not contribute to that SLO. The results of this survey are important to understanding how well students understand the “tool box” of skills that the program has promised them (SLOs) as well as their perception of how well the each course is delivering on that promise. A copy of the Course Survey is shown in the appendix.
4. Senior Exit Interview: The exit interview is an annual meeting of the graduating ME seniors with a retired ME faculty together with an alumnus of the ME program where comments are solicited from students on there educational experiences in the Department, College and University.

Comments by graduating students are important to faculty and provide valuable input on how well the SLOs are being attained. They also point out strengths as well as shortcomings in the program that are addressed as part of the CQI process. A copy of the topical area addressed in the senior exit interview is contained in the appendix.

5. Co-op internship Survey: A formal internship/cooperative education program was initiated beginning in Spring 2007. As the program matures, it is the intent of the department and the college to provide this opportunity to as many students as possible. Students complete an appraisal of their experience in the middle of their internship and following completion of an internship program with a company. A copy of the questions relating to students' perceptions of the impact of specific areas of their co-op experience is contained in the appendix.

V. Student Learning Outcomes X Assessment Methods Matrix

Table V-1 Matrix of SLOs mapped onto assessment methods

Assessment Method	Student Learning Outcome (SLO)										
	<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>	<u>f</u>	<u>g</u>	<u>h</u>	<u>i</u>	<u>j</u>	<u>k</u>
Direct Methods											
Fundamentals of Engineering (FE) Examination	X	X	X		X	X		X			X
Student Performance in Courses	X	X	X	X	X	X	X	X	X	X	X
Culminating Capstone Design Experience	X	X	X	X	X	X	X	X	X	X	X
Indirect Methods											
Junior Survey	X	X	X	X	X	X	X	X	X	X	X
Senior Survey	X	X	X	X	X	X	X	X	X	X	X
Course Survey	X	X	X	X	X	X	X	X	X	X	X
Senior Exit Survey	X	X	X	X	X	X	X	X	X	X	X
Co-op internship Survey	X	X	X	X	X	X	X	X	X	X	X

VI. Timeline for Implementation of Assessment Methods and Summary Evaluations

Tabular (Figure VI-1) and graphical representation (Figures VI-2 and VI-3) of the timelines for implementation of both direct and indirect assessment methods as well as evaluation methods are shown in the following.

	Type	Technique	Timeline (Year)							Frequency	
			2015	2016	2017	2018	2019	2020	2021		
Goals =Program Educational Outcomes	"Indirect"	Alumni Survey			<input checked="" type="checkbox"/> (S)			<input checked="" type="checkbox"/> (S)		Two periods in six years	
		Employer Survey		<input checked="" type="checkbox"/> (F)			<input checked="" type="checkbox"/> (F)			Two periods in six years	
		IAC Feedback		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		Three periods in six years	
Student Learning Outcomes	"Direct"	FE Exam Results	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester	
		Student Performance in Courses	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Culminating Capstone Design Experience	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	Annual
	"Indirect"	Jr Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Sr Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Course Survey	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (F) <input checked="" type="checkbox"/> (S)	Semester
		Sr Exit Interview	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	<input checked="" type="checkbox"/> (S)	Annual
		Co-op/Intern Survey		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)		<input checked="" type="checkbox"/> (F)	Three periods in six years

Figure VI-1 Tabular presentation of assessment timeline for PEOs and SLOs

Mechanical Engineering Program
California State University, Fresno
Annual Assessment and Evaluation Events for
Direct Measures of Student Performance



	Fall Semester	Spring Semester	Summer Semester
What? Annual Faculty Evaluation+ Continuous Improvement	Courses: Student Performance Assessments	FE Exam	Complete Course Worksheets Fall Assessment Report Courses: Student Performance Assessments FE Exam Capstone Design Culmination
Who? All faculty led by Dept Chair & Dept Assessment Coordinator	Instructor of record for each course as appropriate	Students take but Dept Chair facilitates (publicity, review, etc)	Each course coordinator, as appropriate w/ instructors of record Dept Assessment Coordinator Instructor of record for each course as appropriate Students take but Dept Chair + faculty facilitates (publicity, review, etc)
When? Beginning of Fall Semester before classes begin for Fall - at Annual Dept Retreat	Throughout semester as appropriate for SOs mapped to CLOs for each course	Per national/ state schedule usually Fall	As soon as grades are complete for Fall- due late Jan before classes begin for Spring- discuss at mid year Dept Retreat Late Feb/ early March Throughout semester as appropriate for SOs mapped to CLOs for each course Per national/ state schedule usually Spring End of Spring when project is complete
			Complete Course Worksheets Spring Assessment Report Annual Assessment Report
			Department Course Coordinator and Department Chair
			Late June Late Jul

Figure VI-2 Academic year illustration of SLO assessment timeline for direct measures of student performance

Mechanical Engineering Program
California State University, Fresno
Annual Assessment and Evaluation Events for
Indirect Measures of Student Performance

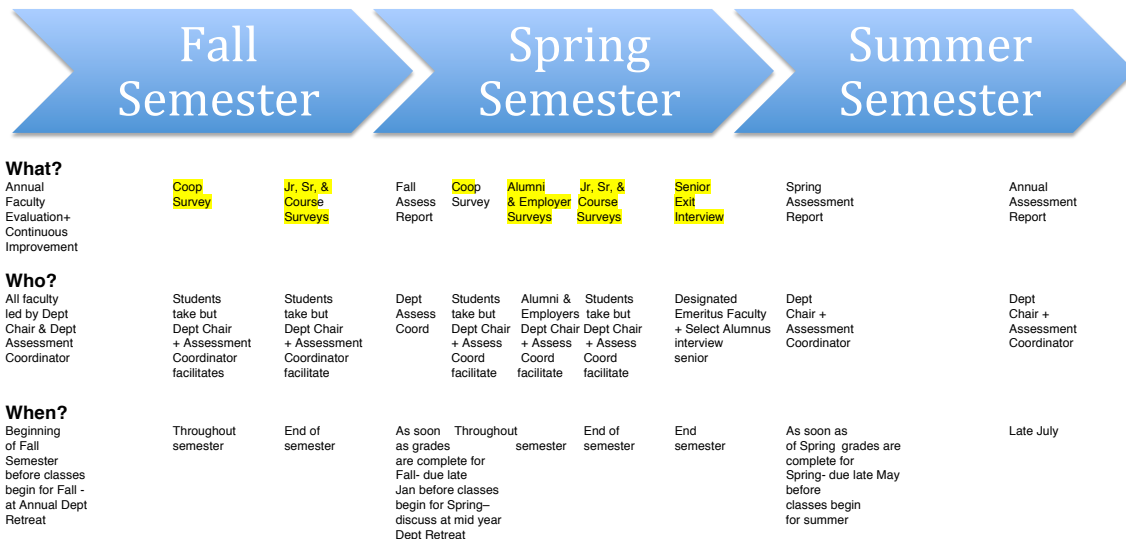


Figure VI-3 Academic year illustration of SLO assessment timeline for indirect measures of student performance

VII. Process for Closing the Loop

The BSME program at California State University, Fresno is a robust, albeit somewhat traditional, mechanical engineering curriculum, well-grounded in the fundamentals but replete with modern engineering practice and tools as well as significant hands-on, design content. It is notable that the curriculum is continuously evolving and changing over a range of levels, often from assessment of student learning outcomes combined with feedback to individual faculty and instructors. However, major programmatic changes are less common and often involve changing topical emphasis rather than major changes in philosophy.

The BSME program seeks to attain programmatic SLOs as an integral part of the curriculum. Course learning objectives (CLOs) have been established for each ME course and these CLOs have been mapped to SLOs for all courses.

Continuous improvement of attainment of SLOs takes place through a spectrum of assessment and implementation strategies. Figure VII-1 shows that the SLOs are assessed each semester by the direct measures such as performance measures in selected courses. In addition, SLOs are assessed twice a year through the FE exam and once a year in the spring semester using the Culminating Capstone Design Experience. Indirect measures such as course surveys of juniors and seniors along with surveys of all students in all courses are administered each semester and are used to augment the direct measures. Other indirect measures include senior exit interviews and co-op surveys. Each semester, data from direct and indirect measures are compiled and summarized by the ME department assessment coordinator under the direction of the ME department chair before being presented and examined by the ME faculty (full-time tenure/tenure track and lecturers) with feedback provided to course coordinators and instructors as appropriate. An annual assessment report is completed in the summer by the ME department assessment coordinator under the direction of the ME department chair for discussion by the ME faculty during its annual retreat at the beginning of the fall semester. Pursuant to subsequent discussions of ME faculty, proposed changes in the program, including curricular, that address weaknesses or add strength are presented to various constituents (e.g., students, alumni, employers, industrial advisory board) for feedback before being implemented.

It is worthy of note that the Bachelor of Science in Mechanical Engineering (BSME) program is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>. The program has been continuously accredited since 1965. Each accreditation period is six years and requires submission of a self study and a site visit as part of the renewal process in the fifth year of the six-year cycle. For the BSME program, accreditation is based on successful maintenance of eight Engineering Accreditation Commission (EAC) criteria (1. Students, 2. PEOs, 3. SOs, 4. CQI, 5. Curriculum, 6. Faculty, 7. Facilities, and 8. Institutional Support) and two ASME professional criteria (1. Curricular preparation for professional practice and 2. Faculty remaining current). Continuous quality improvement (CQI) addressing assessment of student outcomes (SOs) is only one of multiple criteria for maintaining accreditation.

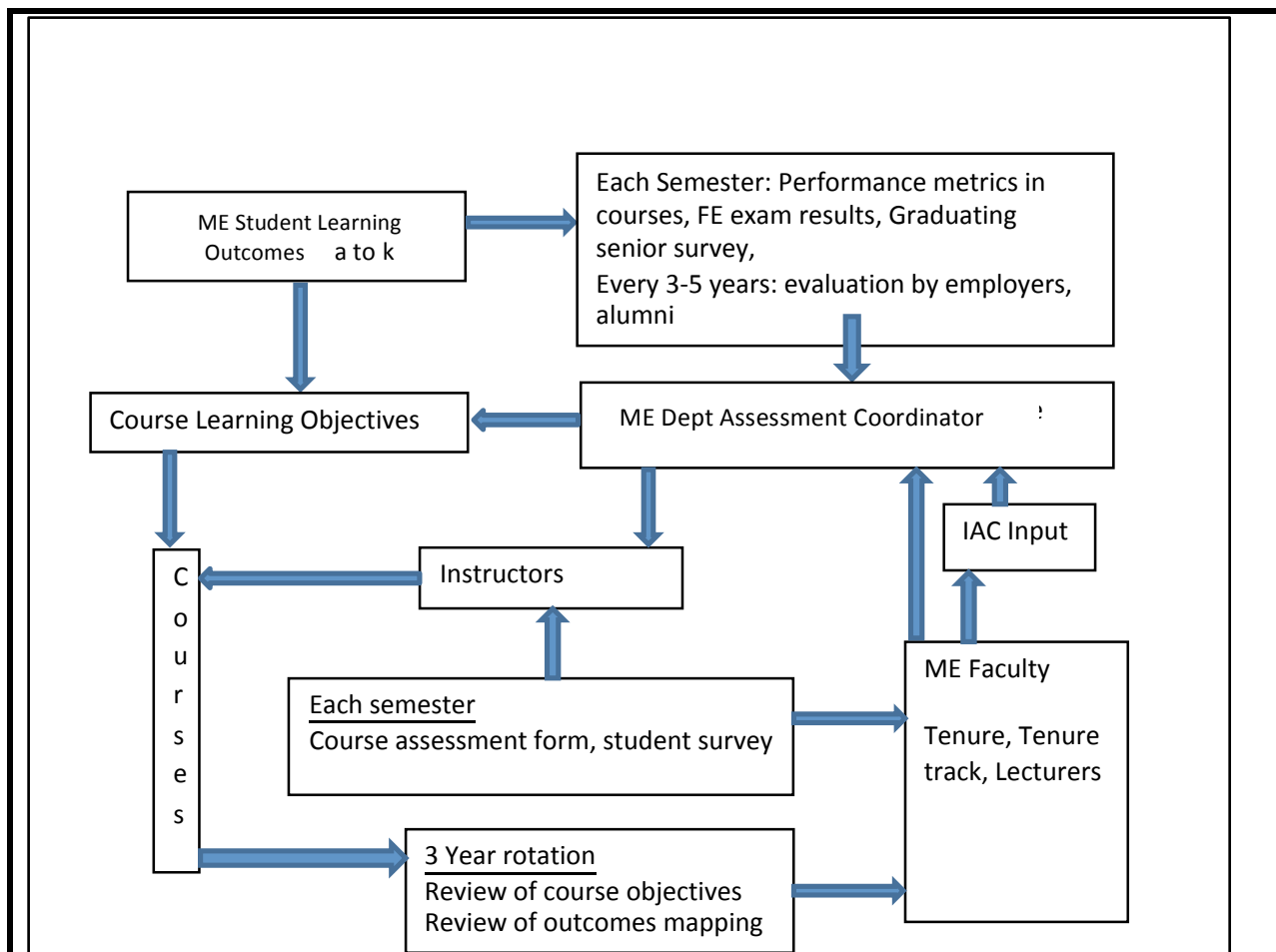


Figure VII-1 Diagram showing process of continuous quality improvement for SLO's and PEO's

Appendices

Faculty Course Worksheet

Junior Survey

Senior Survey

Course Survey

Alumni Survey

Employer Survey

VIP Coop Survey

Mechanical Engineering
California State University, Fresno

Direct Assessment
Course Worksheet

Course number and name: _____

Term taught: _____

Number of students completing course: _____

Name - Instructor of Record: _____

Name - Course Coordinator: _____

- 1) List CLO and corresponding SO that is being assessed, describe how each outcome was assessed, and state the degree to which each was satisfied. Attach supporting information including the course syllabus that including mapping of CLOs and SOs. [add rows as needed]

CLO	SO	Assessment method	Degree of achievement mean \pm 1 s.d., n=sample size

2) Discuss plans for subsequent offerings of this course based on assessment results.
3) Describe progress on action items from previous worksheet(s).
4) Describe any modifications to objectives and outcomes – deletions, additions, and revisions.
5) Comment on student evaluations (attach, if appropriate, copies of student evaluation forms).
6) Are assessment methods appropriate for gauging student achievement of outcomes and objectives? Describe recommended changes.
7) Comment on linkages between course and program outcomes. Should specific linkages be added or deleted?
8) State whether the course has significant design content. If so, state what percentage of student grade is assigned to design-related material. Describe the project(s), including how the project addresses economic, environmental, sustainability, manufacturability, ethical, health and safety, social, and political considerations. Also, state whether and to what extent teamwork and communication were addressed.

MAJOR: Mechanical Engineering

DATE: _____

Mechanical Engineering Program Junior Survey of Student Outcomes (SOs)

Semester: _____

There are two parts to this survey regarding Mechanical Engineering Program Student Outcomes (SOs) a) through k).

Note: This survey does not apply to a particular course or instructor but to the BSME and the Mechanical Engineering Program at CSU, Fresno.

Part 1) Please provide your interpretation of each of the following Program Student Outcomes in answering the following question:						
How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)?	Very Strong (5)	Strongly (4)	Moderately (3)	Limited (2)	Marginally (1)	Not Applicable(0)
a) This course has enhanced my ability to apply knowledge of mathematics, science, and engineering.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) This course has enhanced my ability to design and conduct experiments, as well as to analyze and interpret data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) This course has enhanced my ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) This course has enhanced my ability to function on multidisciplinary teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) This course has enhanced my ability to identify, formulate, and solve engineering problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) This course has enhanced my understanding of professional and ethical responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) This course has enhanced my ability to communicate effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) This course has helped provide me with a broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) This course has enhanced my recognition of the need for, and an ability to engage in life-long learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) This course has enhanced my knowledge of contemporary issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) This course has enhanced my ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[OVER]

Part 2) Please provide your interpretation of each of the following Program Student Outcomes in answering the following question: How satisfied are you with your education in the Mechanical Engineering Program at CSU, Fresno in regard to each of the following Program Student Outcomes (SOs)?	Very Strong (5)	Strongly (4)	Moderately (3)	Limited (2)	Marginally (1)	Not Applicable(0)
a) This course has enhanced my ability to apply knowledge of mathematics, science, and engineering.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) This course has enhanced my ability to design and conduct experiments, as well as to analyze and interpret data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) This course has enhanced my ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) This course has enhanced my ability to function on multidisciplinary teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) This course has enhanced my ability to identify, formulate, and solve engineering problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) This course has enhanced my understanding of professional and ethical responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) This course has enhanced my ability to communicate effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) This course has helped provide me with a broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) This course has enhanced my recognition of the need for, and an ability to engage in life-long learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) This course has enhanced my knowledge of contemporary issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) This course has enhanced my ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

MAJOR: Mechanical Engineering

DATE: _____

Mechanical Engineering Program Senior Survey of Student Outcomes (SOs)

Semester: _____

There are two parts to this survey regarding Mechanical Engineering Program Student Outcomes (SOs) a) through k).

Note: This survey does not apply to a particular course or instructor but to the BSME and the Mechanical Engineering Program at CSU, Fresno.

Part 1) Please provide your interpretation of each of the following Program Student Outcomes in answering the following question:						
How important is each of the following Program Student Outcomes (SOs) to the Bachelor of Science in Mechanical Engineering (BSME)?	Very Strong (5)	Strongly (4)	Moderately (3)	Limited (2)	Marginally (1)	Not Applicable(0)
a) This course has enhanced my ability to apply knowledge of mathematics, science, and engineering.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) This course has enhanced my ability to design and conduct experiments, as well as to analyze and interpret data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) This course has enhanced my ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) This course has enhanced my ability to function on multidisciplinary teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) This course has enhanced my ability to identify, formulate, and solve engineering problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) This course has enhanced my understanding of professional and ethical responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) This course has enhanced my ability to communicate effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) This course has helped provide me with a broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) This course has enhanced my recognition of the need for, and an ability to engage in life-long learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) This course has enhanced my knowledge of contemporary issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) This course has enhanced my ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[OVER]

MAJOR: _____

DATE: _____

Mechanical Engineering Program Student Course Assessment Form

Course: _____

Semester: _____

Please assess the contributions of this course to the Mechanical Engineering Program Student Outcomes (SOs) a) through k). If the course does not address a specific outcome, choose "Not Applicable."	Very Strong (5)	Strongly (4)	Moderately (3)	Limited (2)	Marginally (1)	Not Applicable(0)
a) This course has enhanced my ability to apply knowledge of mathematics, science, and engineering.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) This course has enhanced my ability to design and conduct experiments, as well as to analyze and interpret data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) This course has enhanced my ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) This course has enhanced my ability to function on multidisciplinary teams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) This course has enhanced my ability to identify, formulate, and solve engineering problems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f) This course has enhanced my understanding of professional and ethical responsibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g) This course has enhanced my ability to communicate effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h) This course has helped provide me with a broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i) This course has enhanced my recognition of the need for, and an ability to engage in life-long learning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j) This course has enhanced my knowledge of contemporary issues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k) This course has enhanced my ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Form MGJ-April 2015

**Mechanical Engineering
California State University, Fresno**

Alumni Survey

Alumni survey provides valuable feedback information on the quality of education received by our graduates and their performance on the job. Alumni of the ME program, three to five years after graduation, are targeted. These responses are very significant since attainment of the Program Educational Outcomes (PEOs) is a critical indicator how well these alumni have progressed in the profession using the toolbox of Student Outcomes (SOs) they graduated with.

The alumni survey questions for Program Educational Outcomes (PEOs) are as follows.

Alumni Survey questions: Your Alma Mater, California State University, Fresno, would like your opinion on whether you have achieved the objectives for graduates of the Mechanical Engineering program. (Note: 1 = Not at all; 2 = Slightly; 3 = Adequately; 4 = Very; 5 = Extremely)

Answer both 1a and 1b

1a. Are you currently employed professionally (e.g., engineer, business, etc.)?
(radio button: Yes/No)

AND

1b. Are you currently enrolled in a graduate program? (radio button: Yes/No)

Answer questions 2, 3, 4, and 5 with on a scale of 1 to 5

2. To what extent has the have you exercised leadership (e.g., group leader, manager, etc.) in her/his current position?
(radio button, 1 thru 5)

3. To what extent do you (or have you) published articles or other written works?
(radio button, 1 thru 5)

4. To what extent do you make oral presentations?
(radio button, 1 thru 5)

5. To what extent do you that you are actively involved in the betterment of society?
(radio button, 1 thru 5)

Answer questions 6, 7, 8, 9, and 10 with explanation and/or narrative

6. Do you think any aspect of the ME program you studied at CSU, Fresno should be modified?

(radio button: Yes (Explain)/No (Explain))

7. What changes do you foresee in your field in the next 10 years and how can CSU, Fresno address these changes?

(Free response)

8. Please identify the areas in your program of study that contributed THE LEAST to your professional preparation (such areas may include a specific course, lab, instructional equipment, etc.)

(Free response)

9. Identify the areas in your program of study that contributed THE MOST to your professional preparation (such areas may include a specific course, lab, instructional equipment, etc.).

(Free response)

10. Do you want to give us a better email to reach you?

(Free response)

**Mechanical Engineering
California State University, Fresno**

Employer Survey

Employer survey provides valuable feedback information on the quality of education received by our graduates and their performance on the job. Local companies who employ ME graduates are targeted. These responses are very significant since these are small companies and the quality of each of their employees, especially engineering, is critical to their success.

The employer survey questions for Program Educational Outcomes (PEOs) are as follows.

Employer Survey questions: For each employee who holds a BSME degree from California State University, Fresno, please provide your opinion on whether the employee has achieved the objectives for graduates of the Mechanical Engineering program. (Note: 1 = Not at all; 2 = Slightly; 3 = Adequately; 4 = Very; 5 = Extremely)

Answer both 1a and 1b

1a. Is employee currently working professionally (e.g., engineer, business, etc.)?
(radio button: Yes/No)

AND

1b. Is employee currently enrolled in a graduate program? (radio button: Yes/No)

Answer 2, 3, 4, and 5

2. To what extent has the employee exercised leadership (e.g., group leader, manager, etc.) in her/his current position? (radio button, 1 thru 5)

3. To what extent has the employee published articles or other written works?
(radio button, 1 thru 5)

4. To what extent does the employee make oral presentations?
(radio button, 1 thru 5)

5. To what extent do you feel the employee is actively involved in the betterment of society?
(radio button, 1 thru 5)

**Mechanical Engineering
California State University, Fresno**

Senior Exit Interview

An exit interview of Mechanical Engineering graduating seniors is conducted at the toward the end of Spring semester every academic year by a designated ME emeritus faculty and/or selected alumnus of the ME program.. The purpose of the interview is to assess the educational experiences of graduating mechanical engineering majors received, at the California State University, Fresno. The format of the interview is to cover specific topical areas along with follow questions depending on student response (or non response).

- **Participation in professional organizations:**
- **Work experience** (including *VIP Program, University Placement Center, Career Center, etc*)
- **Preparedness for professional licensure:** (including FE exam preparation)
- **Academic advising:**
- **Educational experience at the University, as a whole:**
- **Educational experience in the ME program:**
- **Courses taken from other engineering disciplines (e.g., Civil Engineering and Electrical/Compute Engineering), relevant to ME curriculum:**
- **Preparation in Math, Physics, and Chemistry courses:**
- **General Education courses:**
- **Computing facilities:**
- **Mechanical Engineering Labs:**
- **Workshop facilities:**
- **Library facilities:**
- **Preparedness for entry-level jobs:**
- **Other comments and suggestions:**

MAJOR: _____

DATE: _____

**Valley Industry Partnership for Cooperative Education
Internship Experience Survey**

Internship Company: _____

Semesters: _____

<p>Please rate the following regarding the value to your VIP internship experience.</p> <p>If an area does not apply, choose "Not Applicable."</p>	Very Strong (5)	Strong (4)	Moderate (3)	Limited (2)	Marginal (1)	Not Applicable(0)
Your academic preparation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your preparation for work environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Executive Director's involvement with your internship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VIP program support of internship and company	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
University/College support of internship and/or VIP program	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VIP program communications (verbal, written)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VIP program cooperation (attitude, willingness)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
VIP program organization and structure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mentor involvement with your internship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would you recommend VIP program to other students	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Company internship assignments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Company work environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your attitude about working for the <i>Company</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Would you recommend this <i>Company</i> to another VIP student	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>