2017 - 2018
Annual Program Assessment Report

The Office of Academic Program Assessment
California State University, Sacramento

For more information visit our **website**
or **contact us** for more help.

Please begin by selecting your program name in the drop down.
If the program name is not listed, please enter it below:

MS Mechanical Engineering

OR enter program name:

Section 1: Report All of the Program Learning Outcomes Assessed

Question 1: Program Learning Outcomes

Q1.1.
Which of the following Program Learning Outcomes (PLOs), Sac State Baccalaureate Learning Goals (BLGs), and emboldened Graduate Learning Goals (GLGs) **did you assess?** [**Check all that apply**]

- ☐ 1. **Critical Thinking**
- ☐ 2. **Information Literacy**
- ☑ 3. **Written Communication**
- ☐ 4. **Oral Communication**
- ☐ 5. Quantitative Literacy
- ☐ 6. **Inquiry and Analysis**
- ☐ 7. Creative Thinking
- ☐ 8. Reading
- ☐ 9. Team Work
- ☐ 10. Problem Solving
- ☐ 11. Civic Knowledge and Engagement
- ☐ 12. **Intercultural Knowledge, Competency, and Perspectives**
- ☐ 13. Ethical Reasoning
- ☐ 14. Foundations and Skills for Lifelong Learning
- ☐ 15. **Global Learning and Perspectives**
- ☐ 16. Integrative and Applied Learning
- ☐ 17. Overall Competencies for GE Knowledge
- ☐ 18. **Overall Disciplinary Knowledge**
- ☐ 19. **Professionalism**
- ☐ 20A. Other, specify any assessed PLOs not included above:

a. [ ]

b. [ ]

c. [ ]

- ☐ 20B. **Check here if your program has not collected any data for any PLOs**. Please go directly to Q6 (skip Q1.2 to Q5.3.1.)

Q1.2.
Please provide more detailed background information about **EACH PLO** you checked above and other information including how your specific PLOs are **explicitly** linked to the Sac State **BLGs**/**GLGs**:

The specific PLO we assessed in 2017-18 was closely aligned with the University "Writtem communication" and "Teamwork" and is specifically:

Communication: Write technical reports with specifying clear contributions, explanations, and conclusions. Publish reports (including thesis) following a standard professional format.

Q1.2.1.
Do you have rubrics for your PLOs?
○ 1. Yes, for all PLOs
◉ 2. Yes, but for some PLOs
○ 3. No rubrics for PLOs
○ 4. N/A
○ 5. Other, specify:

Q1.3.
Are your PLOs closely aligned with the mission of the university?
◉ 1. Yes
○ 2. No
○ 3. Don't know

Q1.4.
Is your program externally accredited (other than through WASC Senior College and University Commission (WSCUC))?
○ 1. Yes
◉ 2. No (skip to **Q1.5**)
○ 3. Don't know (skip to **Q1.5**)

Q1.4.1.
If the answer to Q1.4 is **yes**, are your PLOs closely aligned with the mission/goals/outcomes of the accreditation agency?
○ 1. Yes
○ 2. No
○ 3. Don't know

Q1.5.
Did your program use the ***Degree Qualification Profile*** ("DQP", see http://degreeprofile.org) to develop your PLO(s)?
○ 1. Yes
○ 2. No, but I know what the DQP is
◉ 3. No, I don't know what the DQP is
○ 4. Don't know

Q1.6.
Did you use action verbs to make each PLO measurable?
◉ 1. Yes
○ 2. No
○ 3. Don't know

(Remember: Save your progress)

Section 2: Report One Learning Outcome in Detail

Question 2: Standard of Performance for the Selected PLO

Q2.1.
Select **OR** type in **ONE(1)** PLO here as an example to illustrate how you conducted assessment (be sure you *checked the* **correct box** for this PLO in Q1.1):

Written Communication

If your PLO is **not listed, please enter it here**:

Q2.1.1.
Please provide more background information about the **specific PLO** you've chosen in Q2.1.

The specific PLO we assessed in 2017-18 was closely aligned with the University "Writtem communication" and "Teamwork" and is specifically:

Communication: Write technical reports with specifying clear contributions, explanations, and conclusions. Publish reports (including thesis) following a standard professional format.

This PLO is one of 4 PLOs we assess to ensure that our MS ME program remains technically strong and able to ensure graduates will be able to further their careers in significant ways.

Q2.2.
Has the program developed or adopted ***explicit program standards of performance/expectations*** for this PLO? (e.g. "We expect 70% of our students to achieve at least a score of 3 or higher in all dimensions of the Written Communication VALUE rubric.")
- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know
- ○ 4. N/A

Q2.3.
Please **1) provide and/or attach the rubric(s) AND 2) the standards of performance/expectations** that you have developed for *the selected PLO* here:

We focused on ME 209 Research Methodology which is a GWI course in our program. The rubric attached is used for written reports including the final report for this course. We aim all students to reach the "Satisfactory" level or above.

📎 ME 209paper rubric (1).docx 16.1 KB	📎 No file attached

Q2.4. **PLO**	**Q2.5.** **Stdrd**	**Q2.6.** **Rubric**	Please indicate where you have published the **PLO**, the **standard (stdrd)** of performance, and the **rubric** that was used to measure the PLO:
☑	☑	☑	1. In **SOME** course syllabi/assignments in the program that address the PLO

☑	☐	☐	2. In **ALL** course syllabi/assignments in the program that address the PLO
☐	☐	☐	3. In the student handbook/advising handbook
☐	☐	☐	4. In the university catalogue
☐	☐	☐	5. On the academic unit website or in newsletters
☑	☑	☑	6. In the assessment or program review reports, plans, resources, or activities
☐	☐	☐	7. In new course proposal forms in the department/college/university
☐	☐	☐	8. In the department/college/university's strategic plans and other planning documents
☑	☑	☐	9. In the department/college/university's budget plans and other resource allocation documents
☐	☐	☐	10. Other, specify:

Question 3: Data Collection Methods and Evaluation of Data Quality for the Selected PLO

Q3.1.
Was assessment data/evidence **collected** for the selected PLO?

- ⦿ 1. Yes
- ○ 2. No (skip to **Q6**)
- ○ 3. Don't know (skip to **Q6**)
- ○ 4. N/A (skip to **Q6**)

Q3.1.1.
How many assessment tools/methods/measures **in total** did you use to assess this PLO?

```
1
```

Q3.2.
Was the data **scored/evaluated** for this PLO?

- ⦿ 1. Yes
- ○ 2. No (skip to **Q6**)
- ○ 3. Don't know (skip to **Q6**)
- ○ 4. N/A (skip to **Q6**)

Q3.2.1.
Please describe how you collected the assessment data for the selected PLO. For example, in what course(s) or by what means were data collected:

The attached rubric was used to evaluate performances of writing repots in ME 209 Research Methodology.

(Remember: Save your progress)

Question 3A: Direct Measures (key assignments, projects, portfolios, etc.)

Q3.3.

Were direct measures (key assignments, projects, portfolios, course work, student tests, etc.) used to assess this PLO?

⦿ 1. Yes
◯ 2. No (skip to **Q3.7**)
◯ 3. Don't know (skip to **Q3.7**)

Q3.3.1.
Which of the following direct measures (key assignments, projects, portfolios, course work, student tests, etc.) were used? [**Check all that apply**]

☐ 1. Capstone project (e.g. theses, senior theses), courses, or experiences
☑ 2. Key assignments from required classes in the program
☐ 3. Key assignments from elective classes
☑ 4. Classroom based performance assessment such as simulations, comprehensive exams, or critiques
☐ 5. External performance assessments such as internships or other community-based projects
☐ 6. E-Portfolios
☐ 7. Other Portfolios
☐ 8. Other, specify:

[   ]

Q3.3.2.
Please **1) provide and/or attach the direct measure** (key assignments, projects, portfolios, course work, student tests, etc.) you used to collect data, **THEN** **2) explain here** how it assesses the PLO:

Students reports research activities conducted (significance of the proposed thesis topic, literature reviews, proposed research work, etc.) for their proposed thesis work in the final report of ME 209. One sample report is attached. The rubric preented in Q2.3 is used to assess the report and the PLO.

📎 **Josh_Cohen_ME209_Paper-Final.docx**
266.65 KB   📎 **No file attached**

Q3.4.
What tool was used to evaluate the data?
◯ 1. **No** rubric is used to interpret the evidence (skip to **Q3.4.4.**)
⦿ 2. Used rubric developed/modified by the faculty who teaches the class (skip to **Q3.4.2.**)
◯ 3. Used rubric developed/modified by a group of faculty (skip to **Q3.4.2.**)
◯ 4. Used rubric pilot-tested and refined by a group of faculty (skip to **Q3.4.2.**)
◯ 5. The VALUE rubric(s) (skip to **Q3.4.2.**)
◯ 6. Modified VALUE rubric(s) (skip to **Q3.4.2.**)
◯ 7. Used other means (Answer **Q3.4.1.**)

Q3.4.1.
If you used other means, which of the following measures was used? [**Check all that apply**]
☐ 1. National disciplinary exams or state/professional licensure exams (skip to **Q3.4.4.**)
☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.) (skip to **Q3.4.4.**)
☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.) (skip to **Q3.4.4.**)
☐ 4. Other, specify:

[   ]

(skip to **Q3.4.4.**)

Q3.4.2.
Was the **rubric** aligned directly and explicitly **with the PLO**?
- ◉ 1. Yes
- ◯ 2. No
- ◯ 3. Don't know
- ◯ 4. N/A

Q3.4.3.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the rubric**?
- ◉ 1. Yes
- ◯ 2. No
- ◯ 3. Don't know
- ◯ 4. N/A

Q3.4.4.
Was the **direct measure** (e.g. assignment, thesis, etc.) aligned directly and explicitly **with the PLO**?
- ◉ 1. Yes
- ◯ 2. No
- ◯ 3. Don't know
- ◯ 4. N/A

Q3.5.
Please enter the number (#) of faculty members who participated in planning the assessment data **collection** of the selected PLO?

2

Q3.5.1.
Please enter the number (#) of faculty members who participated in the **evaluation** of the assessment data for the selected PLO?

2

Q3.5.2.
If the data was evaluated by multiple scorers, was there a norming process (a procedure to make sure everyone was scoring similarly)?
- ◯ 1. Yes
- ◉ 2. No
- ◯ 3. Don't know
- ◯ 4. N/A

Q3.6.
How did you **select** the sample of student work (papers, projects, portfolios, etc.)?

All student final reports were evaluated – there are less than 20 students per term in ME 209.

Q3.6.1.
How did you **decide** how many samples of student work to review?

See the answer above.

Q3.6.2.
Please enter the number (#) of students that were in the class or program?

17

Q3.6.3.
Please enter the number (#) of samples of student work that you evaluated?

17

Q3.6.4.
Was the sample size of student work for the direct measure adequate?
- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

(Remember: Save your progress)

Question 3B: Indirect Measures (surveys, focus groups, interviews, etc.)

Q3.7.
Were indirect measures used to assess the PLO?
- ○ 1. Yes
- ◉ 2. No (skip to **Q3.8**)
- ○ 3. Don't Know (skip to **Q3.8**)

Q3.7.1.
Which of the following indirect measures were used? [**Check all that apply**]
- ☐ 1. National student surveys (e.g. NSSE)
- ☐ 2. University conducted student surveys (e.g. OIR)
- ☐ 3. College/department/program student surveys or focus groups
- ☐ 4. Alumni surveys, focus groups, or interviews
- ☐ 5. Employer surveys, focus groups, or interviews
- ☐ 6. Advisory board surveys, focus groups, or interviews
- ☐ 7. Other, specify:

Q3.7.1.1.
Please explain and attach the indirect measure you used to collect data:

📎 **No file attached**   📎 **No file attached**

Q3.7.2.
If surveys were used, how was the sample size **decided**?

Q3.7.3.
If surveys were used, how did you **select** your sample:

Q3.7.4.
If surveys were used, please enter the response rate:

Question 3C: Other Measures (external benchmarking, licensing exams, standardized tests, etc.)

Q3.8.
Were external benchmarking data, such as licensing exams or standardized tests, used to assess the PLO?
- ○ 1. Yes
- ◉ 2. No (skip to **Q3.8.2**)
- ○ 3. Don't Know (skip to **Q3.8.2**)

Q3.8.1.
Which of the following measures was used? [**Check all that apply**]
- ☐ 1. National disciplinary exams or state/professional licensure exams
- ☐ 2. General knowledge and skills measures (e.g. CLA, ETS PP, etc.)
- ☐ 3. Other standardized knowledge and skill exams (e.g. ETC, GRE, etc.)
- ☐ 4. Other, specify:

Q3.8.2.
Were other measures used to assess the PLO?
- ○ 1. Yes
- ○ 2. No (skip to **Q4.1**)
- ○ 3. Don't know (skip to **Q4.1**)

Q3.8.3.
If other measures were used, please specify:

> [No file attached]   [No file attached]

(Remember: Save your progress)

Question 4: Data, Findings, and Conclusions

Q4.1.
Please provide tables and/or graphs to summarize the assessment data, findings, and conclusions for the selected PLO in **Q2.1** (see Appendix 12 in our Feedback Packet Example):

> See the attachment in Q2.3.

> [No file attached]   [No file attached]

Q4.2.
Are students doing well and meeting the program standard? **If not**, how will the program work to improve student performance of the selected PLO?

> Based on the five levels of performances (Poor, Fair, Satisfactory, Good, Exceptional) on the rubric, 10 students (62.5%) demonstrated "Exceptional," 5 students (31.25%) demonstrated "Good" and 1 student (6.25%) scored "Poor."

> [No file attached]   [No file attached]

Q4.3.
For the selected PLO, the student performance:
- ○ 1. **Exceeded** expectation/standard
- ◉ 2. **Met** expectation/standard
- ○ 3. **Partially** met expectation/standard

○ 4. Did not meet expectation/standard
○ 5. No expectation/standard has been specified
○ 6. Don't know

Question 4A: Alignment and Quality

Q4.4.
Did the data, including the direct measures, from all the different assessment tools/measures/methods directly align with the PLO?
○ 1. Yes
◉ 2. No
○ 3. Don't know

Q4.5.
Were **all** the assessment tools/measures/methods that were used good measures of the PLO?
○ 1. Yes
◉ 2. No
○ 3. Don't know

Question 5: Use of Assessment Data (Closing the Loop)

Q5.1.
As a result of the assessment effort and based on prior feedback from OAPA, do you anticipate *making any changes* for your program (e.g. course structure, course content, or modification of PLOs)?
○ 1. Yes
○ 2. No (skip to **Q5.2**)
◉ 3. Don't know (skip to **Q5.2**)

Q5.1.1.
Please describe *what changes* you plan to make in your program as a result of your assessment of this PLO.

Q5.1.2.
Do you have a plan to assess the *impact of the changes* that you anticipate making?
○ 1. Yes, describe your plan:

○ 2. No
○ 3. Don't know

Q5.2.

To what extent did you apply **previous assessment results** collected through your program in the following areas?	1. Very Much	2. Quite a Bit	3. Some	4. Not at All	5. N/A
1. Improving specific courses	○	○	⦿	○	○
2. Modifying curriculum	○	○	⦿	○	○
3. Improving advising and mentoring	○	○	○	⦿	○
4. Revising learning outcomes/goals	○	○	○	⦿	○
5. Revising rubrics and/or expectations	○	○	○	⦿	○
6. Developing/updating assessment plan	○	○	○	⦿	○
7. Annual assessment reports	○	○	⦿	○	○
8. Program review	○	○	○	⦿	○
9. Prospective student and family information	○	○	○	○	⦿
10. Alumni communication	○	○	○	○	⦿
11. WSCUC accreditation (regional accreditation)	○	○	⦿	○	○
12. Program accreditation	○	○	○	⦿	○
13. External accountability reporting requirement	○	○	○	⦿	○
14. Trustee/Governing Board deliberations	○	○	○	⦿	○
15. Strategic planning	○	○	⦿	○	○
16. Institutional benchmarking	○	○	○	⦿	○
17. Academic policy development or modifications	○	○	○	○	⦿
18. Institutional improvement	○	○	○	○	⦿
19. Resource allocation and budgeting	○	○	○	○	⦿
20. New faculty hiring	○	○	○	⦿	○
21. Professional development for faculty and staff	○	○	○	⦿	○
22. Recruitment of new students	○	○	○	⦿	○
23. Other, specify:	○	○	○	○	⦿

Q5.2.1.
Please provide a detailed example of how you used the assessment data above:

Q5.3.

To what extent did you apply **previous assessment feedback** from the Office of Academic Program Assessment in the following areas?

	1. Very Much	2. Quite a bit	3. Some	4. Not at All	5. N/A
1. Program Learning Outcomes	○	○	◉	○	○
2. Standards of Performance	○	○	○	◉	○
3. Measures	○	○	○	◉	○
4. Rubrics	○	○	○	◉	○
5. Alignment	○	○	◉	○	○
6. Data Collection	○	○	○	◉	○
7. Data Analysis and Presentation	○	○	○	◉	○
8. Use of Assessment Data	○	○	○	◉	○
9. Other, please specify:	○	○	○	○	◉

Q5.3.1.

Please share with us an example of how you applied **previous feedback** from the Office of Academic Program Assessment in any of the areas above:

(Remember: Save your progress)

Section 3: Report Other Assessment Activities

Other Assessment Activities

Q6.

If your program/academic unit conducted assessment activities that are **not directly related to the PLOs** for this year (i.e. impacts of an advising center, etc.), please provide those activities and results here:

📎 No file attached   📎 No file attached

Q6.1.

Please explain how the assessment activities reported in **Q6** will be linked to any of your PLOs and/or PLO assessment in the future and to the mission, vision, and the strategic planning for the program and the university:

Q7.
What PLO(s) do you plan to assess next year? [**Check all that apply**]

- ☐ 1. **Critical Thinking**
- ☐ 2. **Information Literacy**
- ☑ 3. **Written Communication**
- ☑ 4. **Oral Communication**
- ☐ 5. Quantitative Literacy
- ☐ 6. **Inquiry and Analysis**
- ☐ 7. Creative Thinking
- ☐ 8. Reading
- ☐ 9. Team Work
- ☐ 10. Problem Solving
- ☐ 11. Civic Knowledge and Engagement
- ☐ 12. **Intercultural Knowledge, Competency, and Perspectives**
- ☐ 13. Ethical Reasoning
- ☐ 14. Foundations and Skills for Lifelong Learning
- ☐ 15. **Global Learning and Perspectives**
- ☐ 16. Integrative and Applied Learning
- ☐ 17. Overall Competencies for GE Knowledge
- ☐ 18. **Overall Disciplinary Knowledge**
- ☐ 19. **Professionalism**
- ☐ 20. Other, specify any PLOs not included above:

a. _____

b. _____

c. _____

Q8.
Please explain how this year's assessment activities help you address recommendations from your department's last program review?

Q9. Please attach any additional files here:

📎 No file attached	📎 No file attached
📎 No file attached	📎 No file attached

Q9.1.
If you have attached **any** files to this form, please list **every** attached file here:

Section 4: Background Information about the Program

Program Information (**Required**)

Program:

(If you typed in your program name at the beginning, please skip to **Q11**)

Q10.
Program/Concentration Name: [skip if program name is already selected or appears above]
MS Mechanical Engineering

Q11.
Report Author(s):
Akihiko Kumagai

Q11.1.
Department Chair/Program Director:
Akihiko Kumagai

Q11.2.
Assessment Coordinator:

Q12.
Department/Division/Program of Academic Unit (select):
Mechanical Eng.

Q13.
College:
College of Engineering and Computer Science

Q14.
What is the total enrollment (#) for Academic Unit during assessment (see Departmental Fact Book):
46 as of Fall 2016

Q15.
Program Type:
- ○ 1. Undergraduate baccalaureate major
- ○ 2. Credential
- ● 3. Master's Degree
- ○ 4. Doctorate (Ph.D./Ed.D./Ed.S./D.P.T./etc.)
- ○ 5. Other, specify:

Q16. Number of **undergraduate degree programs** the academic unit has?

1

Q16.1. List all the names:

BS in Mechanical Engineering

Q16.2. How many concentrations appear on the diploma for this undergraduate program?

0

Q17. Number of **master's degree programs** the academic unit has?

1

Q17.1. List all the names:

MS in Mechanical Engineering

Q17.2. How many concentrations appear on the diploma for this master's program?

0

Q18. Number of **credential programs** the academic unit has?

0

Q18.1. List all the names:

Q19. Number of **doctorate degree programs** the academic unit has?

0

Q19.1. List all the names:

When was your **Assessment Plan**...	1. Before 2012-13	2. 2013-14	3. 2014-15	4. 2015-16	5. 2016-17	6. 2017-18	7. No Plan	8. Don't know
Q20. Developed?	●	○	○	○	○	○	○	○
Q20.1. Last updated?	○	○	○	○	○	○	○	●

Q20.2. (Required)
Please **obtain** and **attach** your latest **assessment plan**:

> 📎 **ME_Grad_Program_Self_Study.pdf**
> **128.47 KB**

Q21.
Has your program developed a **curriculum map?**
- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know

Q21.1.
Please **obtain** and **attach** your latest **curriculum map**:

📎 No file attached

Q22.
Has your program indicated explicitly in the curriculum map where assessment **of student learning** occurs?
- ○ 1. Yes
- ◉ 2. No
- ○ 3. Don't know

Q23.
Does your program have a capstone class?
- ◉ 1. Yes, specify:

ME 500 Thesis

- ○ 2. No
- ○ 3. Don't know

Q23.1.
Does your program have a capstone project(s)?
- ◉ 1. Yes
- ○ 2. No
- ○ 3. Don't know

(**Remember**: **Save your progress**)
Save When Completed!

ver. 10.**31**.17

ME 209 Research Paper Grading Rubric   **Student:_____**

Addresses Assignment: Is the paper on topic, focused, and relevant to the research area?				
Poor (0-7)	Fair (8-11)	Satisfactory (12-14)	Good (15-17)	Exceptional (18-20)
Comments:				

Development: Have the concepts of relevant intellectual value been explored to appropriate depth?				
Poor (0-7)	Fair (8-11)	Satisfactory (12-14)	Good (15-17)	Exceptional (18-20)
Comments:				

Research: Does the paper demonstrate investigation and understanding of relevant research?				
Poor (0-7)	Fair (8-11)	Satisfactory (12-14)	Good (15-17)	Exceptional (18-20)
Comments:				

Organization: Do the structure and layout make logical sense?				
Poor (0-7)	Fair (8-11)	Satisfactory (12-14)	Good (15-17)	Exceptional (18-20)
Comments:				

Mechanics: Does the paper show evidence of revision with polished grammar, editing, and format?				
Poor (0-7)	Fair (8-11)	Satisfactory (12-14)	Good (15-17)	Exceptional (18-20)
Comments:				

Paper Overall: Overall grade for paper.				
F	D	C	B	A
Paper Comments:				
		Total:		

2009 – 2010
Graduate Program
Self-study Report

Department of Mechanical Engineering
California State University, Sacramento

June 1, 2010

<p align="center">**Self Study**</p>

Master of Science Program
Department of Mechanical Engineering
June 1, 2010

The Department of Mechanical Engineering has chosen to conduct the Self Study of the M.S. program in accordance with Option C: Focused Inquiry, as described in the "Program Review Self Study Guidelines."

Following the Option C format, our Self Study includes three main sections:

i.   General information about the program, e.g., data on students, faculty, staff, facilities, etc. (most of which is supplied by the Office of Institutional Research)

Program History

The Department of Mechanical Engineering at California State University, Sacramento was established in 1958. There has been consistently strong enrollment in the Department's B.S. and M.S. programs with a steady increase in the last decade. The M.S. program is designed to provide students with a strong theoretical background and an opportunity to apply their knowledge in a focused manner in the thesis/project component of the degree program.

Program Requirements

Required Core Courses (7 units)
> Engr. 201 Engineering Analysis I (3)
> Engr. 202 Engineering Analysis II (3) or M.E. 206 Stochastic Modeling for Engineers (3)
> M.E. 209 Research Methodology (1)

Specialty Areas (9 units)
Three courses must be selected from the following three areas of study.
> Design and Dynamic Systems
> Manufacturing
> Thermal Energy Systems

Electives (9-12 units)
Select nine or twelve units of courses, in consultation with the student's faculty advisor. A maximum of two undergraduate courses may be used as elective courses. However no course can be used for both undergraduate and graduate credit. Student choosing the thesis option must take 9 units of electives, and students taking the project option must take 12 units of electives.

Culminating Requirement (2 - 5 units)
Two options:
> Plan A: Master's Thesis (5 units)
> Plan B: Master's Project (2 units)

Enrollment and Graduation Trends

The enrollment and graduation trends for the last five years are summarized in Tables 1 through 5. The program has seen an increase in enrollment in the past few years. There were so many qualified applicants for Fall 2010 that only about one-third of the qualified applicants were admitted (16 were admitted). The MS degree in engineering is becoming more desired by industry across the country; our demand reflects this trend and local industry needs.

Most of our students are California residents although we are enrolling increasing numbers of international students. Most of the students are enrolled in 6 units per term and take about 3 years to finish the program. The Department of Mechanical Engineering has awarded 59 MS degrees in the past 5 years.

TABLE 1: New Graduate Student Background

MS Students	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009
Institution of Origin					
Sacramento State	1	1	7	1	6
Out of State	1	4	4	6	4
State College	1	1	1		2
University of California	1	2	5	1	1
Private				1	
Total	**4**	**8**	**17**	**9**	**13**
Graduate Transfers					
Master's Degree	1			1	

Table 2: MS Degrees Awarded

Graduating Year	2004-05	2005-06	2006-07	2007-08	2008-09
MS Degrees	20	16	9	5	9
Average Years to MS Degree					
ME Dept	3.3	2.8	3.3	2.9	2.3
ECS	2.9	3.0	3.0	2.8	2.3
University	3.0	3.3	3.0	2.8	2.3

Table 3: Graduate Student Diversity

Total Enrolled	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009
Department Total	30	26	38	50	58
College total	405	401	465	550	581
Ethnicity					
African American			1	4	4
American Indian					
Asian	8	6	8	8	11
Latino	3	2	4	4	7
All Minority	11	8	13	16	22
White/Caucasian	9	11	12	13	16
Foreign	5	4	8	15	17
Other/Unreported	5	3	5	6	3
Minority (College)	109	106	115	106	112
Minority (College)	1,438	1,434	1,457	1,448	1,417
Gender					
Female	1	2	2	2	2
Male	29	24	36	48	56
College-Female	87	93	104	104	112
College-Male	318	308	361	446	469
University-Female	3,350	3,393	3,456	3,284	3,164
University-Male	1,554	1,521	1,649	1,693	1,689

Table 4: Graduate Student Profile

Enrollment Status	Fall 2005	Fall 2006	Fall 2007	Fall 2008	Fall 2009
New	5	8	17	10	13
Continuing	25	18	21	38	44
Returning				2	1
Residence					
California Resident	24	22	30	35	42
Outside California	1		1	1	1
Foreign	5	4	7	14	15

TABLE 5: Student Course Load

	Fall 2005	Spring 2006	Fall 2006	Spring 2007	Fall 2007	Spring 2008	Fall 2008	Spring 2009	Fall 2009	Spring 2010
# Full-Time	10	6	9	9	17	15	27	25	21	12
# Part-Time	20	19	17	16	21	31	23	27	37	32
Dept. Mean Units	6.4	6.12	6.462	6.68	6.974	7.065	7.66	7.558	6.586	6.364
College Mean	7.047	7.203	7.648	7.767	7.787	7.673	7.833	7.387	6.869	6.211
University Mean	9.498	9.59	9.601	9.801	9.464	9.599	9.608	9.475	9.597	9.781

Program Constituencies

Constituencies of CSU, Sacramento's M.S. in Mechanical Engineering are:
- Prospective students
- Students
- Graduates of the program
- Graduate schools
- Employers hiring our graduates
- Faculty
- Industry Advisory Council.

Faculty Competencies

The Mechanical Engineering faculty have widely varied backgrounds, ranging from mechanical, aeronautical and industrial engineering, to engineering mechanics, manufacturing and materials science. Many have had significant industrial experience prior to joining our faculty. All have earned doctorates.

The following is a list of full-time faculty, by curriculum areas, with their highest degrees and areas of technical interest.

Applied Mechanics and Design

Eke, Estelle, Ph.D., Aero/Astronautics, Rice University
    Controls, optimization, modeling of dynamic systems

Granda, Jose J., Ph.D., Mechanical Engineering, University of California, Davis
    System dynamics, finite-element analysis, Bond-graphs

Sprott, Kenneth, Ph.D., Mechanical Engineering, University of California, Davis Dynamics,
    Mechanical Design, Automation, Robotics, Mechatronics

Suh, Yong, Ph.D., Mechanical Engineering, Renssalaer Polytechnic Institute
    Computer-aided design, Rapid Proto-typing

Tuzcu, Ilhan, Ph.D., Mechanical Engineering, Virginia Tech
    Aircraft design, controls

Manufacturing

Liu, Tien-I, Ph.D., Mechanical Engineering, University of Wisconsin, Madison Computer-integrated manufacturing, intelligent and precision manufacturing

Kumagai, Akihiko, Ph.D., Mechanical Engineering, Univ. of Wisconsin, Milwaukee
Manufacturing, automation, mechanism design, mechatronics, kinematics, robotics

Materials Science

Bandy, Rabindranath, Ph.D., Metallurgical Science, University of Manitoba
Corrosion, fracture mechanics, composite materials

Holl, Susan L., Ph.D., Material Science and Engineering, Univ. of California, Berkeley High-temperature chemistry, ceramics, semiconductors, silicon bonding

Thermal Sciences

Bergquam, James B., Ph.D., Mechanical Engineering, University of California, Berkeley Heat transfer, solar energy, HVAC

Marbach, Timothy, Ph.D., Oklahoma University
Combustion, biomass conversion

Noren, Dan, Ph.D., University of California, Davis
Fuel cells, engine design, modern power plant design

Zhou, Dongmei, Ph.D., University of Texas, Austin
Computational fluid dynamics, fuel cells

ii. **A statement of intended student learning outcomes at the program level; methods for assessing them, including the use of direct measures; assessment results to date; and documentation of the use of assessment results in efforts to achieve program improvement (assistance with the preparation of which is available from the University Assessment Coordinator).**

The objectives and student learning outcomes of the M.S. in Mechanical Engineering are as follows:

Graduates of the M.S. Program in Mechanical Engineering:

Objective	Student Learning Outcome
Will enter professional employment and/or Ph.D. programs in the following areas of mechanical engineering practice: machine design, thermal and fluids systems, and manufacturing	Will enter professional employment and/or Ph.D. program in a related field
Will use knowledge of the principles of science, mathematics, and engineering, to identify, formulate, and solve problems in mechanical engineering	Demonstrates knowledge of the principles of science, mathematics, and engineering, to identify, formulate, and solve problems in mechanical engineering
Will apply creativity in the design of systems, components, processes, and/or experiments and in the application of experimental results to independently address a focused research question	Demonstrate creativity in the design of systems, components, processes, and/or experiments and in the application of experimental results to independently address a focused research question
Will communicate effectively through speaking, writing, and graphics	Demonstrate effective written and oral communication using technical standards

These objectives and learning outcomes are consistent with the CSUS graduate learning goals which include pursuit of excellence, collaborative efforts, community and global engagement, ethics and social responsibility, and diversity and access.

The Department of Mechanical Engineering has developed a comprehensive assessment plan for the M.S. program modeled on our undergraduate assessment plan which has been endorsed by our accrediting body, ABET. Both the University Graduate Learning Goals and the M.S. in Mechanical Engineering objectives will be assessed.

The methods we will use to measure our progress toward these goals include developing a rubric for assessing the graduate learning goals; developing a rubric for assessing the educational objectives; developing a rubric for assessing writing; developing rubrics to assess each core course in the graduate curriculum; alumni surveys; and industry surveys. These assessment tools mirror the assessment tools developed for the undergraduate curriculum and used for our ABET evaluation.

In addition to the objectives and goals stated above, the Mechanical Engineering program is committed to assessing the ability of our students to meet the university graduate writing requirement.

Achievement of Program Outcomes
The plan involves both direct and indirect assessment methods to evaluate the learning outcomes.

Methods
The program outcomes are assessed using a variety of methods. The direct assessment methods include:

1. Faculty and Student assessment of success for each of the course outcomes which are associated with the program outcomes and objectives.
2. Evaluation of thesis/project reports using a standardized rubric. The reports will be evaluated for composition, technical content, and completeness.
3. Evaluation of the thesis/project presentations. The evaluation is based on content, presentation material, and completeness.
4. Evaluation of technical competence using targeted exam questions in key classes. Courses have been selected within each area of expertise to be used as indicators of technical competence within that area. Targeted exam questions will be used to quantify the level of understanding from each of the classes.

Indirect assessment methods include:

1. Student and alumni surveys.
2. Targeted surveys of students at different levels of the program.
3. Interviews with local employers.
4. Employer surveys.

Tables 6 and 7 provide a five year plan for MS program assessment including direct and indirect methods.

Table 6. MS Program Assessment Plan

	2009-10	2010-11	2011-12	2012-13	2013-14
Develop/ Review MS Program Outcomes	X			X	
Review of Performance Criteria evaluated for outcomes	X			X	
Review of mapping of course content to area and program outcomes	X			X	
Develop/Review assessment methods	X			X	
Evaluate Assessment Data and Processes		X	X	X	X
Take Action for improvement		X	X	X	X

Table 7. Indirect Assessment Plan

	2009-10	2010-11	2011-12	2012-13	2013-14
Student Survey	X	X	X	X	X
Alumni Survey	X			X	
Writing/Documentation Review	X	X	X	X	X
Thesis/Project Presentations	X	X	X	X	X
Targeted Surveys	X			X	
Employer Surveys		X		X	
Interviews with Employers	X	X	X	X	X
Evaluate Assessment Data and Processes		X	X	X	X
Take Action for improvement		X	X	X	X

iii. **The results of a focused inquiry addressing issues of particular interest/concern to the program itself, in the context of what is currently important to the college and university.**

The graduates of the M.S. program in Mechanical Engineering will either be employed in industry or government, or continue graduate school in a Ph.D. program. In all cases the graduates must be able to undertake and complete independent work and be able to effectively communicate the important aspects of their work.

Specifically we are interested in the following specific questions:

1. **How well does the curriculum and thesis/project component prepare students for industry employment or further graduate study?**

To address this question we propose to
a. *inventory the completed theses and projects over the last five years and evaluate these for effectiveness in providing an appropriate culminating experience, effective written and graphical communication, and consistency between various thesis advisors.*

There have been 59 theses/projects completed in the last five years. The quality of completed theses and project reports has continued to improve during the last few years. A major impetus for this increased quality has been the addition to our faculty of a number of new faculty who have served as advisors to the many MS students. Development of a published rubric for both faculty and students will ensure high quality and consistency in the theses submitted. In evaluating completed project reports and theses we have learned that most 'project reports' became similar to theses. The Department is now considering requiring every student to complete a thesis.

b. *survey graduates of the program to determine the effectiveness of the experience, and we will assess the importance of this component by surveying employers.*

We have not yet received many responses to our survey regarding the effectiveness of the thesis/project experience. We will continue to solicit responses and will evaluate data during the 2010-11 academic year.

Most of our MS students are working professionals. Many have projects influenced by their employment. We have not yet received many responses to our employer survey regarding the effectiveness of the thesis/project experience. We will continue to solicit responses and will evaluate data during the 2010-11 academic year.

c. survey current M.S. students to determine how well this component is integrated into the M.S. program.

We have not yet received many responses to our survey regarding the how effectively the thesis/project component is integrated into the M.S. program. We will continue to solicit responses and will evaluate data during the 2010-11 academic year.

2. How well does the content and structure of the program meet the workforce needs of the region and California?

To address this question we will
a. compare our M.S. curriculum and requirements to other programs in California, especially in the CSU system.

MS programs in Mechanical Engineering and Engineering (Mechanical Option) in the CSU system were surveyed to determine degree requirements. All CSU programs have core requirements, elective requirements, and culminating experience requirements. Our program is structured similarly to others in the CSU requiring core engineering mathematics, courses toward a specific discipline, and elective courses. A few programs offer an exam option, but most require a thesis or project. Programs in the UC are more flexible, with no required core but requiring courses be approved by an advisor.

b. survey our graduates' employment status with particular focus on the assignments they have that require the M.S. degree.

We have not yet received many responses to our employer survey regarding the effectiveness of the thesis/project experience. We will continue to solicit responses and will evaluate data during the 2010-11 academic year.

c. survey employers regarding their projected needs and their satisfaction with graduates of our program.

We have not yet received many responses to our employer survey regarding the effectiveness of the thesis/project experience. We will continue to solicit responses and will evaluate data during the 2010-11 academic year. These results will be evaluated by the ME faculty and the ME Industry Advisory Council to determine areas of program improvement.

3. How well does the content and structure of the program meet the needs of our faculty in maintaining fulfilling professional lives?

To address this question we will

a. survey our faculty's scholarly productivity over the last five years. The data for 2004 to Spring 2009 were included in our ABET report and we will add the subsequent years' data.

The Mechanical Engineering faculty have produced over 50 publications in journals and conferences over the last 5 years. Many of these involve students as co-authors. A partial listing of recent publications is provided in Appendix A (three of our faculty are on sabbatical until August 2010 and have not provided updated vitae for this self-study yet.)   A list of recent theses and project reports archived in the CSUS Library is provided in Appendix B.

b. survey the faculty regarding their perception of workload, job satisfaction, and the direction of the program.

Faculty Survey	
On a scale from 0 to 4 (4 being an A and 0 being an F) please rate the following:	
Factor	**Ranking**
1. your satisfaction with the course offerings for the M.S. Program	2.33
2. your satisfaction with the quality of the M.S. Students	3.67
3. your satisfaction with the final thesis quality produced	3.67
4. your satisfaction with the professional development opportunities provided by offering the ME MS program	2.5

The faculty seem satisfied with the student quality and the quality of the theses and project reports produced. They are not as satisfied with the course offerings and the opportunities for professional development. We will collect more information to determine if there are ways to increase faculty satisfaction in these areas. Additionally we will take this opportunity to compare results from other surveys, including employer surveys, to identify areas for improvement and to evaluate program direction.

c. survey students to assess their view of their research opportunities and faculty engagement in the program.

Student Survey	
On a scale from 0 to 4 (4 being an A and 0 being an F) please rate the following:	
Factor	**Ranking**
1. your satisfaction with the research choices in the M.S. Program	
2. your satisfaction with choice of faculty advisors for M.S. Students	
3.your satisfaction with the research you conducted	
4. your satisfaction with your interaction with your research advisor	

We have not yet received many responses to our survey regarding the research opportunities. We will continue to solicit responses and will evaluate data during the 2010-11 academic year.

Concluding Remarks

The Department of Mechanical Engineering welcomes the opportunity to systematically and comprehensively evaluate the curriculum and culminating experience component of our M.S. program. We believe that our strong MS program can be enhanced by this focused inquiry. We believe that our culminating experience is especially strong and, coupled with appropriate strong course offerings, our MS program will continue to provide quality education for our region.

APPENDIX A

Publications and Thesis/Project Listing

(Partial)

PUBLICATIONS

Eke, E.M. (2009). _Computer Applications in Mechanical Engineering_. Proceedings of the 2009 American Society for Engineering Education Pacific Southwest Regional Conference. PSW#112, Vol.1.

Granda J.J. Teaching Virtual Product Design Using Dynamic Models at the Undergraduate and Graduate Levels . Virtual Product Development Conference. Phoenix, Arizona, April 2009

J. J. Granda and F. E. Cellier, eds. "Proceedings of ICBGM'2007. 8th International Conference on Bond Graph Modeling and Simulation" Simulation Series, Vol 39 Nr 1, SCS Publishing, ISBN: 1-56555-310-1 January 2007.

Granda J. J., Nguyen L, Raval M, "Simplified Dynamic Model Generation and Vibration Analysis, of the International Space Station Mission 12A". AIAA InfoTech Aerospace Conference, May 2007, Rohnert Park, California

Granda J. J. "S-Domain Bond Graph Models Computer Generated Transfer Functions for Electrical Circuits and Operational Amplifiers " Proceedings of the 2007 Internatinal Conference on BondGraph Modeling and Simulation. San Diego. January 2007.

Nguyen L, Ramakrishnan J, **Granda J**, "International Space Station Centrifuge Rotor Models: A Comparison of the Euler-Lagrange and the Bond Graph Modeling Approach. Proceedings of the 2007 Internatinal Conference on Bond Graph Modeling and Simulation. San Diego. January 2007

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Conference on Artificial Intelligence and Applications (AIA), Innsbruck, Austria, February 15-17, 2010, Paper No. 674-020.

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Advisor: **James Bergquam**

Romani, Marcus, "Integrating a Night Sky Radiator into a Ground Source Heat Pump System", Spring, 2005.

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Advisor: **Akihiko Kumagai**

Kosuke Naritomi, "Design and Production of a Tremor Pen," Fall 2009.

Dongun Sul, "Neuro-Fuzzy RF Fuel Gauging of Cryogenic Tank Under Low-Gravity Environment," Summer 2009.

Tyrone Tracy, " Vibration Reducing Pen for People with Tremors," Summer 2009.

Weylon M. Malek, "Effects of Implementing a Predictive Maintenance Program into the Maintenance Division of the Environmental Utilities Department for The City of Roseville," Spring 2009.

David Carrera, "Optimizing Glue and Heat Application for RTF Cabinet Doors," Spring 2006.

Minhaj Khan, "Design of Experiments for Water Pasteurizing Indicator (WAPI) Manufacturing," Fall 2005.

Kohi Le, "Finite Element Modeling of the Human Skin to Investigate Water Jet Cutting Parameters," Spring 2005.

Yasuhisa Komura, "Analysis, Manufacturing, Testing of Automated Liquid Handling System for Bio-Medical Applications," Spring 2004.

Mehdi Naqvi, "Improving the time response of a motion controller for SMA actuator using forced air cooling system," Spring 2004.

Advisor: **Timothy Marbach**

Yuk Cheung, "Utilization of Solar Energy to Supplement a Combined Cycle Power Plant", Spring 2010

Chandan Sohi, "Microalgae Biodiesel as a Substitute for Jet Fuel" Spring 2010

Manuel Leija, "Space Heating Design Options for Anheuser Busch's Storage Facility Using Solar Wall and Evacuated Tube Collectors" Summer 2009

Josh Perron, "Mobile Vehicle Shower System" Summer 2009

Rupal Prajapati, "Computational Study of Methane and Air Combustion" 2008

Hosung Kim, "Biomass Combustor" 2008

Ben Deal, "Optimization of Porous Inert Media Mesoscale Combustor" 2007

Andrew Mrowka, "Wind Flow in the Urban Environment: Optimizing the Location of Wind Turbines on Buildings" 2006

Appendix B

Mechanical Engineering MS Theses and Projects

Mechanical Engineering MS Theses and Projects

Fleshman, Joseph Tyler	Solar thermal heat rejection / Joseph Tyler Fleshman	Project (M.S., Mechanical Engineering) -- California State University, Sacramento, 2009	2009
Maazouddin, Amarddin Zerguy	Reducing drag for SUVs by wake control / Amarddin Zerguy Maazouddin	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2009	2009
Storm, Matthew Mark	Active nocturnal cooling in a low humidity climate / Matthew Mark Storm	Project (M.S., Mechanical Engineering) -- California State University, Sacramento, 2009	2009
Gao, Zhiyu	On-line detection and measurements of drill wear using neuro-fuzzy systems / Zhiyu Gao	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Hundal, Sukhbir	Building the space station to 2010 : a three dimensional dynamic model to predict modes of vibration, stress analysis and tracking of the sun ISS mission ULF5, shuttle mission STS 133 / Sukhbir Hundal	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Kim, Hosung	Biomass combustor / Hosung Kim	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Lindsey, Joseph Edward	Optimization of a liquid rocket engine's thermal protection system for weight savings / Joseph Edward Lindsey	Project (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Prajapati, Rupal G	Computational study of methane and air combustion / Rupal G. Prajapati	Project (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Sagar, Pawan	Comparison of 3D scan with the actual design / Pawan Sagar	Project (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Stachniuk, Waldemar	Advanced insulation concrete from design / Waldemar Stachniuk	Thesis (M. S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008

Mechanical Engineering MS Theses and Projects

Thao, Bee	The International Space Station: three dimensional computer model where technologies of multi-body dynamics, finite element modeling, and control system design meet ISS Mission 1J Shuttle Mission STS-126 / Bee Thao	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2008	2008
Dabel, Jeremy William	A study of a self-hydrating PEM fuel cell design using a computational fluid dynamics model / Jeremy William Dabel	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2007	2007
Deal, Benjamin Michael	Optimization of porous inert media mesoscale combustor	Thesis (M. S., Mechanical Engineering) -- California State University, Sacramento, 2007	2007
Gibbons, Luke J	Modeling cosiderations of nano-systems using bond graphs / Luke J. Gibbons	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2007	2007
Jefferson, Albert	Hydrodynamic analysis of propeller-induced vibration / Albert Jefferson	Thesis (M.S., Mechanical Engineering) -- California State University, Sacramento, 2007	2007
Arjomand-Kermani, Hamid Reza	Design and analysis of a Solar HVAC System in Palm Springs, CA. / Hamid Reza Arjomand-Kermani	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Bal, Harjot Singh	Redesigning the sprinkler valve using a float valve / Harjot Singh Bal	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Carrera, David	Optimizing adhesive and heat application process for RTF cabinet doors / David Carrera	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Joshi, Parth	Comprehensive analysis of building HVAC systems using TRACE-700 / Parth Joshi	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Lee, Junyi	Applications of intelligent technique in manufacturing / Junyi Lee	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Mrowka, Andrew L.	Wind flow in the urban environment optimizing the location of wind turbines on buildings / Andrew L. Mrowka	Project (M.S., Mechanical Engineering)--California State University,	2006

Mechanical Engineering MS Theses and Projects

		Sacramento, 2006	
Ngo, Bao A.	Evacuated-tube heat pipe solar collector simulation using Computational Fluid Dynamics (CFD) / Bao A. Ngo	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Raval, Montu J.	Vibration analysis, orbiter repair maneuvers and alternative methods for computer modeling of the International Space Station Mission 12A / Montu J. Raval	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Sabherwal, Manu	Computer aided design of vertical drilling machine tool utilizing solid modeling and finite element analysis concepts / Manu Sabherwal	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Silva, Aaron Joseph	Design and analysis of an asphalt solar collector / Aaron Joseph Silva	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Yang, John	Thermal analysis of a camera system / John Yang	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2006	2006
Anderson, Kevin	Predicting performance of curved blade axi-symmetric swirlers / Kevin Anderson	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Buske, Scott	Automated design and manufacture of a labeling machine / Scott Buske	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Chana, Barjinder Singh	Auto drain system for an evaporative cooler / Barjinder Singh Chana	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Chandra, Alfred	Analysis of a solar HVAC system for Los Angeles Valley Community College / Alfred Chandra	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Farooqi, Rizwan H	Design of a gear assembly using solid works API programming / Rizwan H. Farooqi	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005

Mechanical Engineering MS Theses and Projects

Gill, Gurinder Singh	Monitoring and diagnosis tapping processes using neural network and soft computing / Gurinder Singh Gill	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Hussain, Syed Raheel	Modeling of a steam jet ejector for a compression assisted absorption chiller cycle / Syed Raheel Hussain	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Immeker, Shaun Gerrit	Heat transfer augmentation by ribs and grooves for electronics cooling / Shaun Gerrit Immeker	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Kalyankar, Dilip M.	Dynamic modeling of the space station remote manipulator system to study its stress analysis, modes of vibration and manuevers [sic] with the space shuttle / Dilip M. Kalyankar	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Keen, Quentin A	Analysis of absorber plates in evacuated tube heat-pipe solar collectors / Quentin A. Keen	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Khan, Minhaj	Design of experiments for Water Pasteurizing Indicator (WAPI) manufacturing / Minhaj Khan	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Le, Khoi (Jay)	Finite element modeling of the human skin to investigate water jetcutting parameters / Khoi (Jay) Le	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Parmar, Nainesh Mansukhbhai	Design and analysis of suspension system using Solidworks / Nainesh Mansukhbhai Parmar	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Rickard, Jason William	Stochastic investigation of manufacturing failures through analysis of on-line measurement data / Jason William Rickard	Project (M. S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Romani, Marcus	Integrating a night sky radiator into a ground source heat pump system / Marcus Romani	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Sandoval, Ignacio Quispe	Development of morphing airplane wing concept evaluation and selection matrix criteria / Ignacio Quispe Sandoval	Thesis (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005

Mechanical Engineering MS Theses and Projects

Sharma, Ravi	HVAC with eQuest / Ravi Sharma	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Siddiqui, Farhan Ahmed	Design, modeling & structural analysis of a solar powered lawn mower / Farhan Ahmed Siddiqui	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Singh, Palvinder	Intelligent detection of ball bearing failures / Palvinder Singh	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Toure, Sie	Design of a computer cooling system using Stirling engine technology / Sie Toure	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005
Werlinich, Michael Stuart	Stormwater drain inlet insert / Michael Stuart Werlinich	Project (M.S., Mechanical Engineering)--California State University, Sacramento, 2005	2005