ANNUAL PROGRAM REPORT

College	Science
Department	Engineering
Program	B.S. Industrial Engineering
Reporting for Academic Year	2017-2018
Last 5-Year Review	09/2016
Next 5-Year Review	2022-2023
Department Chair	Saeid Motavalli
Date Submitted	10/12/2018

I. SELF-STUDY *(suggested length of 1-3 pages)*

A. Five-Year Review Planning Goals

1. The major change will be the transfer to a semester-based program. The Industrial Engineering curriculum has been transformed in such a way that it both satisfies the accreditation requirements and will produce stronger technical graduates. This has been accomplished by fundamental changes to courses, teaching methods and course requirements.

2. Faculty: As mentioned in the accreditation review report following the 2015 visit, we have to address their observation that the program needs additional faculty before the next visit.

3. Research: The Industrial Engineering faculty are active in research and are being successful in securing funds for their research. The faculty plan is to aggressively pursue funding opportunities, specifically in areas related to the advancement of engineering education.

4. Laboratory Development: Room SCS 247, Materials Testing Laboratory, has been remodeled to a lab-lecture room with a capacity of 36. Flexible furniture suitable for active learning practices have been installed.

5. Equipment: Through A2E2 annual funding and the normal refresh cycle of computers by IT, we are keeping the Industrial Engineering Laboratories current. We have purchased two new machine tools and a flexible robotic cell that has been installed in VBT 230. These would support the Manufacturing related courses.

6. Enrollment: Student enrollment in Industrial Engineering program has remained steady in recent years.

7. Excess credits: The program requires 181 credit hours to complete. The transformed curriculum just meets the minimum requirement in areas of basic science and engineering hours. No engineering electives could be added to the program.

B. Progress Towards Five-Year Review Planning Goals

1. Successfully transformed the curriculum to a semester-based program.

2. We are planning to request one tenure track position for the industrial engineering program as suggested in the findings of our last accreditation visit report. We will submit our request such that we have the new faculty by the time of the next accreditation visit in the Fall of 2021.
3. The remodeling of materials lab SSC 247 has been completed and it is used as a lab/active learning classroom.
4. The manufacturing laboratory has been upgraded with two new CNC machine tools and a robotics cell.
5. Enrollment in industrial engineering has remained steady during the past 3 years.

C. Program Changes and Needs

Overview: The industrial engineering program started in the year 2000 and has been steadily growing with the enrollment stabilizing in the past three years. Since 2004, we have not hired any faculty for this program. Our last accreditation review was conducted in the Fall quarter of 2015. Their findings included the fact that the program needs new faculty members to stay current. We are planning to request a faculty position for this program in this academic year.
Curriculum: The transformed curriculum is designed to include more active learning practices and includes courses and material that are in line with the employment trends for industrial engineers.
Students: Demand for industrial engineering graduates are relatively strong. Most of our graduates are employed in engineering positions, mainly in the Bay Area.
Faculty: Since 2004, we have had 3 faculty dedicated to the industrial engineering and M.S. in Engineering Management programs. These include Helen Zong, David Bowen and Farnaz Ganjeizadeh. The program needs one additional tenure-track position
Staff: We have two full time staff for the School of Engineering, Mrs. Lisa Holmstrom and a laboratory technician, Mr. Praveen Apparsamy.
Resources: We have upgraded our Manufacturing processes equipment.

Assessment: An extensive assessment process is in place for the industrial engineering program. Sample results are provided in the following section.

II. SUMMARY OF ASSESSMENT

A. Program Learning Outcomes (PLO)

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. (ILO 1)
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. (ILO 1 & 5)
3. An ability to communicate effectively with a range of audiences. (ILO 2)
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. (ILO 3, 4 & 5)
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. (ILO 3 & 4)
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. (ILO 1 & 2)
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies. (ILO 1, 2, & 4)

B. **Program Learning Outcome(S) Assessed**

We have assessed the following PLO for the Industrial Engineering program during the 2017-18 Academic Year:

(1) Year 5: 2017-2018	(2)
1. Which SLO(s) to assess	PLO 5 An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. (ILO 3 & 4)
2. Assessment indicators	c-Capstone project rubric
3. Sample (courses/# of students)	c-INDE 4260
4. Time (which quarter(s))	c-Spring 2018
5. Responsible person(s)	c-Prof. Bowen
6. Ways of reporting (how, to who)	The results will be reported by faculty to the department chair via completion of the course Faculty Self-Assessment form.
7. Ways of closing the loop	Interaction between chair, faculty and industrial advisory board

C. Summary of Assessment Process:

PLO 5 was assessed in INDE 4620 (INDE492) in Spring of 2018. In this course, students work on industry based design projects. Typical team size consists of 3 students that are selected by the instructor based on capabilities. Students visit industry sites and collect data, acquire information and write a proposal that is evaluated both by industry sponsor and the faculty. If the proposal is accepted, they work on their methods and document the results in a report and present it to faculty, industry advisory board and the sponsor. The evaluation rubric that is depicted below is used to grade the projects and presentations.

SENIOR PROJECT EVALUATION

Project Name: _____ **Evaluator Name:** _____

Circle the number representing level of competence demonstrated by the project team's presentation.

Criterion	Competence Level							
System Design/Redesign	System was not designed & no standards or constraints were considered		Design was minor with unclear impact w/mention of engineering standards or constraints		Significant system design w/ positive impact & adequate use of engineering standards & constraints		Substantial system design w/clearly positive impact & accurate use of multiple engineering standards and realistic constraints	
	1	2	3	4	5	6	7	8
Ability to Work in Teams	Group did not exhibit any ability to work as a team		Group did some work as a team, but mostly seem unaware/		Group did most work as a team and are		Group did all work as a team and are	

SENIOR PROJECT EVALUATION

Project Name: _____ **Evaluator Name:** _____

Circle the number representing level of competence demonstrated by the project team's presentation.

Criterion	Competence Level							
			uninvolved in some aspects of the project		knowledgeable in most aspects of the project		knowledgeable in all aspects of the project	
	1	2	3	4	5	6	7	8
Analyzing and Solving Engineering Problems	Minimal analysis was performed.		Analysis tools were used but incorrectly applied or interpreted.		Analysis was performed, but opportunities for increased insight were missed.		The problem and information were effectively analyzed using multiple engineer-ing analysis tools.	
	1	2	3	4	5	6	7	8
Professionalism & Ethics	Group displayed unethical and unprofessional behavior		Group exhibited some degree of professionalism and did not explicitly address ethical issues		Most group members exhibited professional - ism and mentioned at least one relevant ethical issue		All group members exhibited professionalism and awareness of relevant ethical issues	
	1	2	3	4	5	6	7	8
Oral Communicatio n	Little of the oral presentation was clear, and it was generally confusing.		Some of the oral presentation was clear, but there were significant lapses.		Most of the oral presentation was clear and added significant content.		All of the oral presentation was clear and added significant content.	
	1	2	3	4	5	6	7	8
Graphical Communicatio n	Many slides, charts, and graphs were not legible or were misleading.		Some slides, charts, and graphs were clear but did not add significant content.		All slides, charts, and graphs were clear but did not add significant content.		All slides, charts, and graphs were clear and added significant content.	
	1	2	3	4	5	6	7	8
Global/Societal Context	Group exhibited no understanding of project's global or societal context		Group exhibited very limited understanding of project's global or societal context		Group exhibited informed understanding of project's global or societal context		Group exhibited very complete and insightful understanding of project's global or societal context	
	1	2	3	4	5	6	7	8
Life Long Learning	Group did not use any resources beyond those learned in previous classes		Group sought and utilized at least one resource		Group sought and utilized multiple resources		Group sought and utilized multiple resources from multiple sources (e.g., library, professors, web, professional or trade organizations, etc.)	
	1	2	3	4	5	6	7	8
Ability to Apply Engineering Techniques Tools, and Skills (Engineering Practice)	No engineering tools, techniques or skills were applied by the group		Some engineering tool, technique or skill was applied by the group at an elementary level		Some engineering tools, techniques or skills were appropriately applied by the group		Multiple engineering tools, techniques and skills were appropriately applied by the group	
	1		2	3	4	5	6	7

C. Summary of Assessment Results: Main Findings:

The following Table shows the evaluation results for various PLOs in the Spring quarter of 2018.

According to this result the PLO " Ability to work in teams" had an average rating of 6.7 which according to the rubric shows that the "Group did most work as a team and are knowledgeable in most aspects of the project". Except two groups that had a rating of 4 and 5 the rest were all achieving this outcome.

Criterion	Cork Supply	ERI PM&E	Grund-fos	Kortick Shipping	ERI Acctng	GDCA	Safeway	Repurposed Rose	UPS Hub	Kortick Qual Mgmt	UPS Bypass
System Design/Redesign	7	5	4.5	6.5	5	7	6	7	8	6.5	7.5
Ability to Work in Teams	8	8	6	7	6	8	7	8	4	5	7
Analyzing and Solving Engineering Problems	7	6	5	6.5	5	7	6.5	7	7	6	7
Professionalism & Ethics	8	7	6	7	5.5	7	6	6.5	5	6	6
Oral Communication	7	7	6	7	6	7	7	6	6	7	6
Graphical Communication	6	8	6	7	7	8	7	7	5.5	7	6.5
Global/Societal Context	5	6	6	6	6	7	7	8	6	7	7
Life Long Learning	6	7	5	6	6	8	6	7	8	7	7.5
Ability to Apply Engineering Techniques Tools, and Skills (Engineering Practice)	7	6	5	7	5	7	6	7	7	7	7

Recommendation for Program Improvement:

The quality of some of the assigned projects were not high. We are planning to evaluate more carefully the projects that the industry suggests. This consideration will be done before assigning the projects to the teams. We also plan to request that every company that participates in these projects, assign a designated contact person for the team to ease the challenges students had on acquiring data and communicating with the company.

Next Steps for Closing the Loop:

This outcome will again be assessed in the Spring semester of 2019. The results will be discussed with IE faculty and will be presented in our next Advisory Board meeting. The continuous improvement process will continue on an annual basis.

Assessment Plan for Next Year

According to our proposed assessment plan for the semester curriculum the following PLOs will be assessed:

Year 1: 2018-2019	
1.Which SLO(s) to assess	SLO a - Ability to apply knowledge of mathematics, science, and engineering. SLO f - Understanding of professional and ethical responsibility.
2.Assessment indicators	a-Queuing midterm exam question; f-Ethics final exam question
3.Sample (courses/# of students)	a-INDE 420; f-ENG100
4.Time (which quarter(s))	a-Fall 2018 -Spring 2019
5.Responsible person(s)	a-Prof. Zong; f-Prof. Bowen
6.Ways of reporting (how, to who)	The results will be reported by faculty to the department chair via completion of the course Faculty Self-Assessment form.
7.Ways of closing the loop	Interaction between chair, faculty and industrial advisor

III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS

The industrial engineering program started in the Fall of 2000 and has been steadily growing with the enrollment stabilizing in the past three years. Since 2004, we have not hired any faculty for this program. Our last re-accreditation review by ABET was conducted in the fall quarter of 2015. Their findings included a program observation cited below, indicating that the program needs new faculty members to

stay current. We have not requested tenure track positions since the accreditation visit. We have to address this observation well before the next accreditation visit in the fall of 2021.

Discussion of Trends & Reflections

The following table is enrollment data extracted from Pioneer Data Warehouse. This data indicates that the Industrial Engineering enrollment has stabilized at around 120 students. The Enrollement as of Fall 2017 was 121 undergraduate students. The current faculty of Industrial Engineering are; David Bowen, Farnaz Ganjiezadeh and Helen Zong. The program is accredited by ABET until the Fall of 2022. We are planning to request a faculty position for industrial engineering and engineering management programs such that he/she is in place by the Fall quarter of 2021, which is the time for our next accreditation visit.

Term	College	School	Computer Engineering	Industrial Engineering	Engineering Management	Total	Minor
Fall Quarter 2012	Total	Engineering	24	18	36	78	0
Fall Quarter 2013	Total	Engineering	64	54	49	167	0
Fall Quarter 2014	Total	Engineering	103	78	98	279	0
Fall Quarter 2015	Total	Engineering	130	109	103	212	0
Fall Quarter 2016	Total	Engineering	140	119	89	342	0
Fall Quarter 2017	Total	Engineering	151	121	76	348	0

Notable Trends:

1. Stabilization of the enrollment

2. Strong industry demand for the graduates

3. Active Advisory Board Council

4. Maintaining accreditation

Reflections on Trends and Program Statistics:

A proposal to add an undergraduate Civil Engineering program. The addition of this program will improve the School of Engineering statistics and lower per FTES costs in Engineering.

Request for Resources*:* We have upgraded the manufacturing laboratory and are in discussion with the IT Department to upgrade the Engineering Computer Lab.

Request for Tenure-Track Hires: We have to add a tenure-track faculty within the next 2 academic years to keep the program current and satisfy the accreditation requirements.

Request for Other Resources: