Instructional Program Review 2018/19 (Comprehensive)

Engineering

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General Information (Instructional Program Review 2018/19 (Comprehensive))

2018/19 Instructional Program Review

Program Review Data and Resources

Submission Information (REQUIRED)

- Name of Lead Writer: Morteza Mohssenzadeh
- Name of Liaison: Valerie Abe
- Department Chair: Don Barrie
- Name of Manager/Service Area Supervisor: Susan Topham
- Is this a CTE program? (State **Yes** or **No**): No

Faculty/staff (REQUIRED)

- Number of T/TT Faculty: 1
- Number of Adjunct Faculty: 3
- Number of sections taught by T/TT Faculty: 4
- Percent of FTEF taught by T/TT Faculty: 1.34
- Number of Pro-Rata Faculty: 0

Program Mission (REQUIRED)

The engineering program at San Diego Mesa College offers a two-year lower-division courses that prepares students for transfer to colleges and universities in California and across the nation. The first two years of the engineering curriculum, at most colleges and universities, are similar with specialization commencing in the junior year. This program satisfies the lower division requirements for the majority of engineering programs offered by California colleges and universities. The program provides quality instruction, using industry standard technology, equipment and practices. The primary mission of the Engineering Program is to provide for the education of students through the first two years of college and to prepare students for transfer to a four-year college or university.

Engineering program support the mission of the College by empowering our diverse student body to reach their educational goals and shape their future. As a comprehensive community college committed to access and success, we promote student learning and achievement leading to degrees and certificates in support of transfer education and workforce training, and lifelong learning opportunities. Faculty and staff collaborate with our students to foster scholarship, leadership, and responsibility to effect positive change within our community.

In support of the college-level Mission Statement, the core courses in engineering offer students many pathways to success by satisfying the lower division required courses in all fields of engineering leading to the Associate's Degree and/or transfer to higher-level institutions.

Program Overview (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Program Overview Section (See appendix)

Curriculum (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Curriculum Section (See appendix)

Outcomes and Assessment (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section (See appendix)

File Attachments:

1. **SLO Assessment Schedule.xlsx** (See appendix)

Program Analysis (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Program Analysis Section (See appendix)

Program Goals (REQUIRED)

"Program"Goal Set 2018-2019

Goal

Goal	Mapping
Engineering Tutoring This goal involves finding a qualified individual to work at Mesa's Tutoring Center to assist engineering students with course related assignments and projects.	**"Program"Goal Set 2018-2019:** Engineering Tutoring, **Institutional Learning Outcomes 2016/17:** Communication, Critical Thinking, Global Consciousness, Professional & Ethical Behavior

Action Plans for Non CTE Programs (REQUIRED)

Project Plan for CTE Programs Only (REQUIRED)

Closing the Loop (REQUIRED)

Form: 2018/19 Comprehensive Program Review Instructional Closing the Loop (See appendix)

Form: "2018/19 Comprehensive Program Review Instructional Program Overview Section"

Created with : Taskstream
Participating Area: Engineering

(REQUIRED) Program name

Engineering

(REQUIRED) Program strengths

Discuss strengths of the program.

The strengths of the Engineering program are three folds: First the most important part is an increased in enrollment due to high demand for engineering classes at Mesa College. Second is the solid offering of all the lower division engineering courses that are required for our students to transfer to a four year institutions. Due to high demand for ENGE 151(engineering drawing using the solid modeling software) we are now offering three sections of this course every semester. We have also activated two new courses ENGE 116(Computational methods using Matlab a programming software) and ENGE 260 (Electric Circuits) that are being offered in the spring of 2019 for the first time.

Third is the dedication of the only full time engineering faculty that has improved the quality of engineering program at Mesa College by teaching most of the engineering courses for the last fourteen years. He has strengthen the engineering program by offering new courses and helped to articulate engineering courses to CSU and UC systems. For the first time we have hired three part time faculty to teach the new courses that are being offered in the spring of 2019. The faculty member's academic and professional commitment, background and expertise enable him to offer a first-rate program that in turn provides students with a learning environment that is comparable to those in local baccalaureate and four-year universities such as SDSU and UCSD, as well as private universities.

(REQUIRED) Program challenges

Discuss challenges to the program.

Despite the many successes the Engineering program has achieved, the main program challenges is the barriers engineering students frequently encounter is due to the lack of clear understanding of Math and science concepts, also without sufficient skills in reading comprehension, effective writing, critical thinking, and problem solving technique may be contributing to the low rates of success. Steps our program will take to address these equity gaps is to work with the math and science department to have engineering faculty present lecture series via class visits or provide workshops to link math and science concepts to applied into engineering problem solving.

(REQUIRED) External influences

Discuss external influences (Collegewide and beyond).

The main external influence affecting the Engineering program is the lack of adequate funding to update the needed software for Solid Modeling Creo Parametric for ENGE 151 class and securing the license for computer programing using Matlab for ENGE 116 class as well. For time being we are relying on Math department to share their Matlab software and the Math department computer lab. Since engineering program is growing and enrollment has increased by 75% since 2012 we are in need of additional full time faculty.

(REQUIRED) Areas of Focus

Describe one or more areas that your department is focusing on. You will refer to this response in the Program Analysis Section.

The engineering program at Mesa College is focusing on offering more engineering courses as demand for the lower division courses at Mesa College has increased. In order for our students to transfer on time as indicated on the guided pathways we need to offer more engineering classes every semester as well as in the summer session. Through the SDCCD collaborative support of the Pipeline Project engineering program is committed to participating in the effort to increase the number of engineers graduated from local colleges. Consequently, the Engineering Program promotes regional economic growth by adding technical leaders who were enabled by their community college experience. Engineering education in San Diego promotes regional economic development by partially satisfying the employment needs of local high technology companies.

Mesa College currently offer a comprehensive core engineering courses that prepares students for transfer with full junior standing to four-year engineering colleges and universities in California and across the United States. This program is an integral part of Mesa's transfer mission and is highly respected by the four-year engineering colleges throughout California.

The Following Questions are for CTE Programs ONLY.

Enter "not applicable" if your program is not CTE.

(REQUIRED) Describe how the program's industry partners (including advisory committee) assist with program improvement including curriculum advice, obtaining equipment, providing internships and finding or providing other funding (limit 500 characters) (P.N. 1.b.). Please upload Advisory Committee minutes from the last year here.

Enter "not applicable" if your program is not CTE.

not applicable

(REQUIRED) Describe how your program connects to High Schools, Universities and Continuing Education, creating career pathways in your field. Include articulation, specific projects, collaboration with teachers/professors, etc. (limit 500 characters) (P.N. 3)

Enter "not applicable" if your program is not CTE.

not applicable

Form: "2018/19 Comprehensive Program Review Instructional Curriculum Section"

Created with : Taskstream
Participating Area: Engineering

(REQUIRED) Program Name

Engineering

(REQUIRED) What degrees and certificates are offered?

A.S. Degree, A.A. Degree, and Certificate of Achievement

(REQUIRED) How many of each degree and certificate have been earned in the past 4 years?

A.S. Degree= 23; A.A. Degree= 76; Certificate of Achievement= 22

(REQUIRED) If you have no (or very few) degrees/certificates, what other paths do you offer? (for example, GE, transfer)

N/A

(REQUIRED) Have you developed any new courses in the past 4 years? Please give details.

No

(REQUIRED) Have you made other curricular changes? (for example, renumbering, sequence change, co-reqs or pre-reqs)

No

The Following Questions are for CTE Programs ONLY.

Enter "not applicable" if your program is not CTE.

_____

(REQUIRED) List any licensure and/or accreditation associated with your program.

Enter "not applicable" if your program is not CTE.

not applicable

(REQUIRED) Indicate the program TOP codes for your AA, AS, COA and COPs.

Please find TOP Code Link in the Directions.

Enter "not applicable" if your program is not CTE.

not applicable

(REQUIRED) Indicate the SOC codes and title associated with your program's AA, AS, COA and COPs.

Please find SOC Code Link in the Directions.

Enter "not applicable" if your program is not CTE
not applicable

(REQUIRED) Select the sector associated with your program.
Link to sectors list: In process of being developed

- Other

Form: "2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section"

Created with : Taskstream
Participating Area: Engineering

(REQUIRED) Program name

Engineering

(REQUIRED) We are halfway through our 6-year cycle. Is your department/program on target to complete CLO assessment by Spring 2022? Please attach your schedule for CLO assessment, with explanations as needed.

Refer back to Direction #3 on how to attach documents.

My department is on target to complete CLO assessment by Spring 2022. Please see attached schedule.

(REQUIRED) Please list your PLOs.

PLO #1

Program courses foster scholarship and facilitate the successful transfer of students from Mesa College to other educational
institutions.

PLO #2

Program courses develop students' understanding of the scientific process and thereby enhance scientific literacy.

PLO #3

Program courses develop students as scholars and encourage lifelong learning by exposing the students to new concepts and by allowing them to apply those concepts to gain a deeper understanding of the physical world.

(REQUIRED) What progress have you made in your PLO assessment? Please attach your schedule, with explanations as needed.

Refer back to Direction #3 on how to attach documents.

In 2017/2018 and in 2018/2019, PLO 1 was assessed. Attached is the schedule of assessment for the other two PLOs.

(REQUIRED) What have your completed assessments revealed about your courses or program?

The CLO for all engineering courses were assess during fall 2017 and spring 2018. The assessments finding revealed that the class average was above the expectation of the benchmark, therefore no action is necessary.

(REQUIRED) If issues or problems were identified, what is your plan for implementing change?

The Mesa College engineering faculty participated in a discussion with other faculty in the physical science department. In this meeting our discussion regarding the result of the assessment process for the CLO that was conducted and analyzed by the contract engineering faculty was concluded to be satisfactory and the only suggestion were given and proposed was to hire additional faculty to help the current contract engineering faculty. This will enable our department to accommodate more students with reasonable class sizes in order to maximize learning outcomes. Given the popularity and high demand for all engineering courses, our department is considering offering double sections of each courses in the future.

(REQUIRED) Based on your assessments, have you identified resource needs?

- Faculty

Please provide any other comments.

Since the engineering program enrollment is increasing we are in need of offering more section of all the engineering courses to accommodate our students that are enrolled in engineering program, so they are able to transfer to a 4-year institution on time. Therefore we need resources to hire more part time faculty.

During our department meetings at the end of the spring 2018 semester, we believe our action plan involves careful assessment for the 2018-2019 academic year, coupled with formal requests to hire more part time faculty to assist the only contract faculty in engineering.

Form: "2018/19 Comprehensive Program Review Instructional Program Analysis Section"

Created with : Taskstream
Participating Area: Engineering

(REQUIRED) Program name

Engineering

(REQUIRED) Using the data dashboards, discuss how students are doing in your program. Please refer to indicators of success, retention, persistence, etc.

Looking at the data dashboards, course success rate trends indicate that the engineering program is showing the success rate ove 5-year period is about 80% compare to overall college course sucess rate of 74%. The retension rate for engineering program is about 90% which is more than overall college retension rate of 87%. The Engineering annual program outcomes indicates that the enrollment has increases significantly compare to previous years. Program Outcomes by Ethnicity shows that the success and retention rate is fairly strong for most groups except for African American which indicates the retention rate and success rate is low. Latino enrollment and success rate has increased compared to previous year; the change is about 35%. More female students are enrolled in engineering classes with respect to the previous years. Overall enrollment, success rate, and retention rates for all engineering classes has increased compared to the previous years. Enrollment in engineering program is growing strongly each year. Because of high demand for all engineering courses. We are offering engineering classes Monday through Saturday. With regard to gender equity, males account for slightly greater than 87% of total enrollments in most semesters throughout the past five years; however, in the most recent academic year for which data are available (2017-2018), the proportion of females taking engineering courses has increased by about 67% in the past five years. Academically, students in all engineering courses are doing better currently than they were five years ago. As indicated in annual program outcomes, the program grade point averages (GPAs) have generally increased over the past five years. The two largest ethnicity groups taking program courses include Latino and white; this reflects the distribution of Mesa College students as a whole. Regarding age, a strong majority of students (55 to 62% over the past 5 years) fall into the 18' to 24 year'-old age category. Another important demographic trend observed over the past 5 years is that the overall percentage of first generation students taking engineering courses is increasing. This is a particularly important finding, because first generation students typically have different needs than students who come from college-going families. In summary, gender balance in program courses is improving, an increasing number of students possess high school diplomas, and an increasing percentage are first generation. These trends highlight the need to continue to emphasize our program's core mission to prepare students for transfer to higher 'level institutions. This has implications for the future of our program, because the data indicate that students overwhelmingly seek program courses to satisfy their transfer requirements.

(REQUIRED) How does your program help to prepare students for success beyond your classrooms?

The engineering program at Mesa College is fully committed in facilitating student success by promoting positive learning inside and outside of the classroom. By providing the positive learning environment, we aspired to enhance the educational

experience of students in various ways including: Providing an experience that inspires students to reach for the highest level of accomplishment and personal growth throughout their lives, creating and maintaining a diverse, collegial community that recognizes and values the contribution of each individual, and preparing students to successfully transfer to a four-year university. Students were provided the tools needed to do all of the above with integrity in order to succeed in their learning and be the best in any field of engineering they are planing to pursue. The engineering program had one faculty for the last 14 years and due to high demand for engineering classes, we have hired three part time faculties to teach new courses that are being offered in the spring of 2019. The seasonal faculty is fully committed to maintain engineering program with high standard and to mentor Mesa College engineering students to transfer to four-year institution with good standing. The Engineering club including SHPE (Society of Hispanic Professional Engineering) at Mesa College that is actively involved in an outreach program by visiting local high schools to encourage students to participate in engineering activities. One of these activities include the "Walk On Water" competition that has students collaborate in groups to create various structural designs that provides a practical and enjoyable experience in understanding the fundamental aspects of engineering. This activity in particular is special as it allows students to compete alongside several other high schools, community colleges and even 4-year institutions such as USD and SDSU. The engineering Program at Mesa College also provides a positive and accessible learning environment that is responsive to the needs of a highly diverse student body through a varied selection of courses, learning approaches and teaching methods including traditional classroom instruction, experiential learning, and co-curricular activities. It offers core-engineering courses for students seeking an associate degree, primarily curricula for students planning to transfer to four-year institutions. By providing high quality transfer courses in a specialized discipline, the Engineering Program contributes to workforce development in support of the State and region's economic viability. For the most part, we have determined that students are meeting the target levels for success that we have set. However, there are still some areas of concern regarding student success in particular courses and success for certain ethnicities. The sole Engineering Faculty is aware of the challenges and he is using various techniques and tools such as once a month workshops in and outside of the classroom to close the gaps. One thing that was successful in helping students to achieve better success was the creation of engineering success club that is run and organized by Mesa College engineering students. In addition, we have additional club called SHPE (Society of Hispanic Professional Engineering). The SHPE Club has 25 members that have weekly meeting at the STEM center and they provide support to their fellow classmates by offering free tutoring and workshops. During fall of 2018, the engineering club has invited local companies such as **Northrop Grumman, Sola**r **Turbines, Sempra Energy,** and **Qualcomm** to help and encourage our students to work hard and gave them the incentive of internship and resume workshop. The engineering faculty is the advisor for the SHPE club and Mentored about 10-15 STEM students that are planning to pursue a degree in a field of engineering.

(REQUIRED) Given your stated area(s) of focus in your program overview section, has your program introduced new or different actions that may have affected changes in these indicators? Please describe.

Due to significant increase in enrolment and high demand for Computer Aided Design, we have offered two sections of the CAD Design Solid Modeling (ENGE-151) in the fall of 2017 and we are adding additional section in the spring of 2019. The reason for this high demand for the CAD classes, because the local Manufacturing Companies are hiring engineering students having the knowledge of CAD. Mesa College is well known to prepared students not only to transfer with good standing to a 4-year institution, but also prepared them for the work force. We used to offer Dynamics (ENGE 250) once year and now we are offering every semester due to increased in enrolment in engineering program . For the first time in 12 years we have hired two part time faculties to teach new sections of engineering classes and by fall of 2018 we are adding two new courses that are vital to our program and it will help our students so they can transfer to a four year university with the completion of all pre-engineering classes. We have updated the six-year Curriculum revision for all engineering courses.

The annual engineering program student headcount over 5-year period has increased by 50% as indicated in the data dashboard Mesa College Student Characteristics Report. This shows that the engineering program is well represented. Engineering students in ENGE 210 (Properties of Materials and Science) are actively involved in research projects ranges from bike frame design to ship propeller blades. Students in engineering 151 (CAD Design class) were given the task to design trophy for MCRC Research Conference. Among the forty five different designs, one was selected and it was printed using 3D printer. This trophy that was designed by engineering students was awarded to students that participated in MCRC research conference in the spring of 2016. Currently, students are working on a different design that will be awarded to MCRC Research conference students in the spring of 2018.

The engineering program at Mesa College is fully committed in facilitating student success by promoting positive learning inside and outside of the classroom. Through these efforts, we aspire to enhance the educational experience of students in various ways including: Providing an experience that inspires students to reach for the highest level of accomplishment and personal growth throughout their lives, creating and maintaining a diverse, collegial community that recognizes and values the contribution of each individual, and preparing students to successfully to transfer to a four-year university. Students were instructed to do all of the above with integrity in order to succeed in their learning and be the best in the field of engineering.

The success criterion for 2017/2018 problem solving course learning outcome (CLO) was to analyze the loading intensity given for the lifting force along the wing of a jet aircraft and apply conceptual and mathematical tools to correctly determine the single Resultant force and its line of action measured from a point of reference. This assessment garnered an average of 78% based on the measurement findings which met the target goal of 70% set for the CLO

The most significant accomplishment in the Engineering program is that it continues to enjoy a stellar reputation among top universities including UC-Berkeley,UCSD, SDSU, UC Davis, and USD. Our engineering veterans are particularly well represented and they provide great support in assisting and tutoring one another on the course subject matter as well. Engineering Program offers Associate degree in engineering. For the first time seven engineering students were accepted to UC Berkeley in the fall of 2017 and

five in the fall of 2018. This shows that Mesa College engineering program is well respected.

In summary, the primary mission of the engineering program is to provide for the education of our students through the first two years of college and to prepare students for transfer to four-year institutions. The engineering program at Mesa College also satisfies the lower division requirements for the majority of engineering programs offered by California colleges and universities and is an integral part of Mesa's transfer mission, which is highly respected by many of the four year institutions throughout California and in the country. The engineering program also promotes regional economic growth by adding technical leaders who were enabled by their community college experience which aid in partially satisfying the employment needs of local high technology companies. All of these aspects cement the Mesa College Engineering Program as a driving force in educating our students in becoming practical and efficient innovators that will be essential to our society as a whole.

(REQUIRED) Has your program introduced any new actions specifically focused on issues of equity? Please describe.

This focus contributes to the College' goals of reducing equity gaps by exposing our new faculty to a nurturing environment in which they are properly mentored, thus presenting our best practices in understanding and addressing diversity amongst our student population. Understanding our students and their needs often comes with time and after discussion with colleagues who can share their own experiences over the years. This requires a willingness to accept feedback and make adjustments in one's teaching style over the course of their time with us. One can begin to reduce the equity gaps that exist amongst our students only when open to change and to new ideas through collaboration. Even an individual who is very sensitive to the needs of our diverse community college population finds that he/she learns something new or encounters an obstacle to overcome throughout the course of his/her tenure. Through our efforts, we hope to spark innovation in teaching and greater sensitivity to their students.

The Annual Program Outcomes by Ethnicity indicates that the success rate infact has increased for almost all ethnicity groups. In fact the course success rate for African American is about 70% with equity gap of 5%. Latino course success rate is about 71% with equity gap of 4%. Other ethnicities that tend to perform at high rates of success infact perform lower at 67% with equity gap of negative 8%. Asian Pacific Islander 76%, Filipino 77%, and White 80%. Succsess rate by gender indicate that female has performed almost the same as male with 1% equity gap. In the coming semester working with our new faculty and making sure that they are properly trained and mentored with sensitivity, encouragement, as well as with rigor, is one crucial way in which we feel we can help significantly reduce this equity gap.

(REQUIRED) Describe the trends in enrollment for your program. What changes might you foresee in the next 2-3 years?

The data provided in the dashboards is clearly indicating the upward trend of enrollment for engineering program in the last 5 years. The amount of increase is about 90%. I am expecting this trend to continue in the next 2-3 years. Mesa College engineering program is

one of the most popular among all community colleges in San Diego. We have solid offering of all core engineering courses that are required for transfering to a four-year instituitions. We are attracting more students by offering number of engineering classes during summer session as well.

(REQUIRED) Are there any data sets that are not already provided in the dashboards that you could use to inform your program?

Dashboards warehouse has provided all the needed data sets for my program.

(REQUIRED) In what ways can the college support your program in our effort to encourage major and career exploration early on in a student's college experience?

1. Developing career portfolios, which include test and grades results, examples of student work, and resumes and cover letters to prospective employers.

2. Arranging job shadowing, work placements, and community-based learning programs to allow students to directly experience workplace situations.

3. Sponsoring workshops, classes, focus groups, and special presentations that focus on job skills and personal development.

4. Providing specialized counseling and intervention services to provide students with individualized attention.

5. Informing students about guided Patways, so they have clear undestanding of what classes to take for smooth transition to a 4-year colleges.

The Following Questions are for CTE Programs/Services ONLY.

Enter "not applicable" if your program/service is not CTE.

_____

(REQUIRED) For CTE programs ONLY: Provide specific labor market information showing: 1) Number of jobs available or projected in San Diego County 2) Number of other institutions offering the program 3) How many Mesa students completed the program in the last three years 4) The pay rates for those in the industry (limit 500 characters) (P.N.2.A)

Enter "not applicable" if your program is not CTE.

not applicable

(REQUIRED) For CTE Services ONLY: How are CTE students identified and tracked for service? (limit 500 characters) (P.N.2.B)

Enter "not applicable" if your service is not CTE.

not applicable

(REQUIRED) For CTE programs/services ONLY: Upload the report from Launchboard that includes at least three (3) of the following Strong Workforce metrics for your BASELINE year.

Please use the Cal-PASS Plus Launchboard Link available in the Directions.

Refer back to Direction #3 to #6 on how to attach documents.

Strong Workforce Program Metrics
a. Number of Enrollments
b. Number of students Who Got a Degree or Certificate
c. Number of Students Who Transferred
d. Percentage of Students Employed in Two Quarters After Exit
e. Percentage of Students Employed in Four Quarters After Exit
f. Median Earnings in Dollars Two Quarters After Exit
g. Percentage of Students Who Achieved a Job Closely Related to Field of Study
h. Percentage Change in Earrings
i. Percentage Who Attended a Living Wage.

Enter "not applicable" if your program/services is not CTE.

not applicable

(REQUIRED) For CTE programs/services ONLY Upload the report from the CCCO Perkins site for the College Aggregate Core Indicator Information by 6 digit TOP Code.

Please use the Core Indicator Reports Link available in the Directions.

Refer back to Direction #3 to #6 on how to attach documents.

Enter "not applicable" if your program/service is not CTE.

not applicable

Form: "2018/19 Comprehensive Program Review Instructional Closing the Loop"

Created with : Taskstream
Participating Area: Engineering

(REQUIRED) Program name

Engineering

(REQUIRED) Which one(s) of the following were received in past year?

- None

(REQUIRED) How have these resources benefited your program and your students?

The engineering program did not received any funding.

Request Forms

- **BARC & Facilities Requests**
- **Classified Position Request**
- **Faculty Position Request**

Reviewers

Liaison's Review

Form: Instructional Program Liaison's Review 2018/19 (Comprehensive)

Manager's Review

Form: Instructional Program Manager's Review 2018/19 (Comprehensive)

Appendix

A. **2018/19 Comprehensive Program Review Instructional Program Overview Section** (Form)
B. **2018/19 Comprehensive Program Review Instructional Curriculum Section** (Form)
C. **2018/19 Comprehensive Program Review Instructional Outcomes and Assessment Section** (Form)
D. **SLO Assessment Schedule.xlsx** (Excel Workbook (Open XML))
E. **2018/19 Comprehensive Program Review Instructional Program Analysis Section** (Form)
F. **2018/19 Comprehensive Program Review Instructional Closing the Loop** (Form)