ABET
Self-Study Report

for the

Facilities Engineering Technology Program

at

California State University Maritime Academy

Vallejo, CA

01 July 2019

CONFIDENTIAL

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Facilities Engineering Technology (FET) Program Self-Study Report for ETAC of ABET Accreditation or Reaccreditation

BACKGROUND INFORMATION

A. Contact Information

List name, mailing address, telephone number, fax number, and e-mail address for the primary pre-visit contact person for the program.

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B. Program History

Include the year implemented and the date of the last general review. Summarize major program changes with an emphasis on changes occurring since the last general review.

In 1929, the California State Assembly established the California Nautical School in Tiburon, California with programs in maritime navigation and engineering to support the merchant marine operations on the west cost for the United States of America. In 1939, the school changed its name to the California Maritime Academy - three years after passage of the Merchant Marine Act which directed the creation and maintenance of an adequate merchant marine to support United States international and domestic commerce and to meet the needs for national defense. In 1941, the current location, Morrow Cave in Vallejo, California became home to the California Maritime Academy.

In 1974, a four-year undergraduate program was established offering two degrees, Nautical Industrial Technology (for mates) and Marine Engineering Technology (for engineers). The first graduating class students from these four-year degree programs graduated in 1977, which was also the time of the first Accreditation Board for Engineering and Technology (ABET) accreditation for Marine Engineering Technology (MET).

California Maritime Academy (CMA) became a 22nd member campus of the California State University System in 1995, and subsequently added a new undergraduate major in Facilities

Engineering Technology (FET). The FET program received its first ABET accreditation in 1999.

Since their inceptions, both the programs (MET and FET) have been accredited by ABET. The latest accreditation was in 2013 when both programs participated in a general review by ABET. The most recent self-study reports were submitted on July 1, 2013.

In 2015, the name of the campus was officially changed from the California Maritime Academy to California State University Maritime Academy (CSUM), with “Cal Maritime” as its designated shortened name. Since its commencement, Cal Maritime’s academic departments reported to one Academic Dean; one of the recent action undertaken by the institution concerns the reorganization of its academic units into three separate schools. The three schools are named as ‘The School of Engineering’; ‘The School of Maritime Transportation, Logistics, and Management (MTLM)’; and ‘The School of Letters and Sciences (L&S). The goals of the multi-school model, were to plan for the development of new academic programs; to inspire these new schools with clearer identities, focused visions and greater responsiveness to new fields of study; to improve the quality of leadership with more specialized knowledge; to increase support for faculty scholarships; to provide greater support for diverse people, majors, operations, and educational needs; and to create a more efficient overall operational framework that would be energized by certain decentralizations. The FET program in under the ‘The School of Engineering’.

C. Options

List and describe any options, tracks, concentrations, etc. included in the program.

There are no formal options, tracks, or concentrations, etc. included for the FET program.

D. Program Delivery Modes

Describe the delivery modes used by this program, e.g., days, evenings, weekends, cooperative education, traditional lecture/laboratory, off-campus, distance education, web-based, etc.

During the academic year, the MET and FET programs are offered as an on-campus day program. The curriculum has traditional lecture and laboratory courses offered weekdays from Monday through Friday during 15-week semesters. The majority of the courses are offered during the fall and spring semesters. There is an occasional evening class that students may elect to register, but this is an exception rather than the norm.

The program contents are delivered in standard classrooms and laboratories outfitted with appropriate equipment. Lecture courses generally have less than 40 students and laboratory courses have less than 24 students and majority of them have maximum enrollments of 12 or less.

The majority of students enrolled at Cal Maritime are full-time students. First courses begin at 07:00 on Tuesdays and Thursdays and at 08:00 on all other week days. The last classes are completed by 21:50. There are occasional, one-time certification courses that occur over weekends, but this typically amounts to less than five days throughout their stay at Cal Maritime.
FET students are required to spend their first summer on the training ship Golden Bear building the foundations of safety and basic powerplant operations. During the following two summers, they spend eight weeks in industry experiencing an industrial co-op/internship. During their co-op/internship the students follow the service requirement of the host organization, and are required to complete an academic report on their experience.

COM 220L (Programming Application for Engineering Technology Majors) is the only course within the program that is offered in a hybrid mode (partly lecture based and partly online).

E. Program Locations

Include all locations where the program or a portion of the program is regularly offered (this would also include dual degrees, international partnerships, etc.).

During the academic year, the majority of the program's curriculum is offered on the Cal Maritime campus located in Vallejo, CA. Some courses are also offered aboard the 'Training Ship Golden Bear (TSGB)' that is also located by our campus in Vallejo, CA.

All ET students from both the programs participate in a practical training cruise on the TSGB during the summer between their freshman and sophomore academic year. This activity includes a minimum of 60 days on board the vessel as it travels to various domestic and international ports.

During the summer between their sophomore and junior academic year, FET students participate on an eight week co-op/internship experience at an off-campus industrial location.

During the summer between their junior and senior academic year, FET students participate in a second eight week co-op/internship experience at an off-campus industrial location.

F. Public Disclosure

Provide information concerning all the places where the Program Education Objectives (PEOs), Student Outcomes (SOs), annual student enrollment and graduation data are made accessible to the public. This information should be easily found on either the program or institutional website so please provide the URLs.

FET program: https://www.csum.edu/web/academics/et/majors/facilities-engineering-technology

Student enrollment data can be found on the web at:
https://www.csum.edu/web/ir/home/enrollment-and-demographics

Graduation data can be found on the web at:
https://www.csum.edu/web/ir/home/retention-and-graduation

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

Summarize the Deficiencies, Weaknesses, or Concerns remaining from the most recent ABET Final Statement. Describe the actions taken to address them, including effective dates of actions, if applicable. If this is an initial accreditation, state it is an initial accreditation.

The FET program had no Deficiencies, Weaknesses, nor Concerns from the last ABET accreditation review in 2013.

GENERAL CRITERIA

CRITERION 1. STUDENTS

For the sections below, attach in supplemental information any written policies that apply or provide a link to an appropriate page on the institution's website.

A. Student Admissions

Summarize the requirements and process for accepting new students into the program.

Admission criteria are consistent with policies of the California State University (CSU). First time freshmen will qualify for admission if they are a high school graduate, meet the scholarship and test requirements discussed below and have completed with a grade of "C-" or better in the required courses as listed below in the Table 1. (Cal Maritime uses additional elevated impaction criteria-see below)

The scholarship and test requirements are based on an eligibility index. The eligibility index is calculated by the following formula.

The applicant's high school Grade Point Average (GPA) is multiplied by 800. This is added to critical reading and math scores from the Scholastic Achievement Test (SAT) reasoning test. For the students appearing for American College Test (ACT) reasoning test, the GPA is multiplied by 200 and then added to ten times the ACT composite score to obtain the index.

- *GPA x 800 + Combination of SAT Math and SAT Reading scores = SAT Index*
- *GPA x 200 + (ACT composite x 10) = ACT Index*

For persons who are California high school graduates (or residents of California for tuition purposes) the minimum eligibility index is 2900 SAT (694 with ACT). Applicants with a 3.0 GPA or higher can be admitted without an SAT or ACT score although it is highly recommended to take either test.

For persons who neither graduated from California high school graduates nor are a resident of California for tuition purposes the minimum eligibility index is 3502 SAT (842 with ACT). Non-resident applicants with a 3.61 GPA or higher can be admitted without an SAT or ACT score although it is highly recommended to take either test. Graduates from secondary schools in foreign countries must be judged to have academic preparation and abilities equivalent to applicants eligible under these criteria. CSU campuses with impacted programs requires SAT or ACT scores of all applicants for freshman admission.

The CSU requires a minimum 15-unit pattern of courses for admission as a first-time freshman. Each unit is equal to a year of study in a subject area. A grade of "C-" or better is required for each course to meet any subject requirement. Table 1 shows the a-g admission pattern and the required terms for each of the areas.

Table 1. CSU course admission pattern

Area	Subject	Years
a.	History and Social Science (including one year of U.S. history or one semester of U.S. history and one semester of civics or American government AND one year of social science)	2
b.	English (four years of college preparatory English composition and literature)	4
c.	Math (four years recommended) including Algebra I, Geometry, Algebra II, or higher mathematics (take one each year)	3
d.	Laboratory Science (including one biological science and one physical science)	2
e.	Language Other than English (two years of the same language; American Sign Language is applicable - See below about a possible waiver of this requirement)	2
f.	Visual and Performing Arts (dance, drama or theater, music, or visual art)	1
g.	College Preparatory Elective (additional year chosen from the University of California "a-g" list)	1
Total Required Courses		15

The student body entering the Engineering Technology (ET) department for the years between 2013 – 2019 is represented in the tables (Tables 2 and 3) given below. Table 2 depicts the standardized testing distributions that are based upon the admission requirements during the last six years for the Facilities Engineering Technology (FET) and Marine Engineering Technology (MET). The enrollment distribution for the FET majors during the last six years is presented in

Table 3.

Table 2. Standards for ET freshmen admissions between 2013-2019 [MET and FET programs are included]

Academic Year	FET Composite ACT		FET Composite SAT		Number of new FET students enrolled	MET Composite ACT		MET Composite SAT		Number of new MET students enrolled
	Min	Ave	Min	Ave		Min	Ave	Min	Ave	

2013-2014	17	19.67	820	1087.14	8	17	24.8	890	1151.48	29
2014-2015	18	23	750	1106.47	18	13	23.07	820	1127.71	37
2015-2016	19	23.75	1270	1354.29	8	18	24.86	950	1219.58	28
2016-2017	18	24.44	1000	1163.12	20	17	24.05	910	1140.8	32
2017-2018	21	23	1130	1160	3	21	24.82	970	1143.66	45
2018-2019	20	22.83	1000	1156	11	20	25.13	1040	1235.45	39

Table 3. FET program enrollment trends for the past six academic years

Term	Gender	Facilities Engineering Technology (FET-BS)			
		Full Time		Part Time	
		FTE Count	Student Term Count	FTE Count	Student Term Count
Fall 2013	Female (F)	4	4.63	-	-
Fall 2013	Male (M)	42	44.83	-	-
Spring 2014	Female (F)	6	10	-	-
Spring 2014	Male (M)	40	53.73	3	1.33
Fall 2014	Female (F)	8	8.37	1	0.47
Fall 2014	Male (M)	54	57.77	8	3.93
Spring 2015	Female (F)	8	8.93	1	0.27
Spring 2015	Male (M)	54	60	6	3.33
Fall 2015	Female (F)	6	6.73	1	0.33
Fall 2015	Male (M)	53	55.77	2	1.33
Spring 2016	Female (F)	7	7.47	-	-
Spring 2016	Male (M)	54	58.8	3	1.47
Fall 2016	Female (F)	7	8.27	-	-
Fall 2016	Male (M)	57	61.3	4	2.6
Spring 2017	Female (F)	5	5.4	1	0.6
Spring 2017	Male (M)	50	54.27	3	2.07
Fall 2017	Female (F)	3	3.27	2	0.6
Fall 2017	Male (M)	40	42.87	4	1.93
Spring 2018	Female (F)	3	2.8	-	-
Spring 2018	Male (M)	41	43.87	2	0.87
Fall 2018	Female (F)	3	3.13	-	-
Fall 2018	Male (M)	44	47.57	4	2.2
Spring 2019	Female (F)	3	3.27	1	0.73
Spring 2019	Male (M)	41	44	7	4.67

A.1-Student Admission for Transfer Students and Transfer Articulation Policies

Lower-Division Transfer Students – These are students who have graduated from high school and later attended a regionally accredited college, but bring a total of fewer than 60 transferrable college semester units.

Basic Admission for Lower-Division Transfer Students – Completion of a college-level English course and college-level math with grades of “C-“or greater. The total college GPA must be at least 2.00, and all basic admission requirements for first-time freshmen must also be met.

Upper-Division Transfer Students – These are students who have graduated from high school and later attended a regionally accredited college before bringing a total of 60 or more transferrable college semester units.

Basic Admission for Upper-Division Transfer Students - Completion of a college-level English course, critical thinking course, and college-level math course, and oral communication course with grades of “C-“ or greater. The total college GPA must be at least 2.00.

Transfer Articulation Policies - To be accepted for transfer credit, college courses must be taken at a regionally accredited institution, and the student must have received at least “C-“ in the course. Engineering courses transferred for credit must have been approved by the Chair of the Mechanical Engineering or Engineering Technology Departments.

Note: Because of the highly sequenced nature of our US Coast Guard licensed degree programs and Cal Maritime’s small size, transfer students in the Marine Engineering Technology (MET) degree programs require 4 years at Cal Maritime to graduate.

A.2- Elevated “Impaction” Admission Requirements and Processes

Impaction is declared for academic programs in the California State University (CSU) when the number of applications meeting minimum CSU admission eligibility would produce an enrolling group which will exceed the available space in a program. Elevated admission requirements combined with a competitive admission processes allow for a controlled number of admission offers produces a controlled number of enrolling students matching the number of available spaces.

A.3- Marine Engineering Technology (MET) and Facilities Engineering Technology (FET) Impaction Admission Requirements and Recommendations

Competitive admission decisions are generally made based on highest admission eligibility index scores as described above for freshmen or college transfer GPA for transfer students.

First-Time Freshman Applicants

- All applicants must submit an SAT or ACT score so that an index score can be computed for everyone.
- The most recent math course (at least algebra II) must be passed with a "C-" or better within five years of the application term
- A minimum Math SAT score of 520 or ACT math score of 20
- All other basic CSU eligibility requirements must be met.
- The following items are recommended
  - Completion of a course in pre-calculus (or equivalent course).
  - Completion of a course in physics.
  - Completion of four years of high school math
  - Submission of a resume including the applicant's background connected to engineering, leadership, and/or the maritime industry.

Lower Division Transfer Applicants

- The "Golden Two" courses must be completed:
  - A college-level math course (CSU GE area B4) must have been passed with a "C-" or better within five years of the application
  - A college-level English course (CSU GE area A2) must have been passed with a "C-" or better.
- The following items are recommended
  - Calculus I, C- or better
  - Engineering Physics with a lab, C- or better
  - General Chemistry with a lab, C- or better
  - Submission of a resume including the applicant's background connected to engineering, leadership and/or the maritime industry
- All other CSU eligibility requirements for freshmen regarding high school grades/courses and standardized test scores must be met. High School grades and test scores will be used for comparison to similar applicants to the same program.

- The overall college GPA will be used for comparison to similar applicants to the same program.

Upper Division Transfer Applicants

- The "Golden Four" courses must be completed:
  - A college-level math course (CSU GE area B4) must have been passed with a "C" or better within five years of the application.
  - A college-level English course CSU GE area A2) must have been passed with a "C" or better.
  - A "Critical Thinking" course (CSU GE area A3) must have been passed with a "C-" or better.
  - An "Oral Communication" course (CSU GE area A1) must have been passed with a "C-" or better.
- All of the following courses are also required.
  - Calculus II, C- or better
  - General Chemistry with a Lab, C- or better
  - Engineering Physics II, C- or better
  - Engineering Graphics, C- or better
  - Properties of Materials, C- or better
  - Engineering Statics, C- or better
  - U.S. History (CSU GE equivalent course), C- or better
  - Lower-Division Humanities Elective (CSU GE area C2), C- or better
- All other CSU eligibility requirements must be met. The overall college GPA will be used for comparison to similar applicants to the same program.

  The following item is recommended: Submission of a resume including the applicant's background connected to engineering, leadership and/or the maritime industry.

B. Evaluating Student Performance

Summarize the process by which overall student academic performance is evaluated and student progress towards graduation is monitored. Include information on how the program ensures and documents that students are meeting course prerequisites and how the situation is addressed when a prerequisite has not been met.

Once enrolled on campus, students are evaluated on a course-by-course basis. The evaluation method is carried out by the faculty based on the grading policy described in the course syllabus. All required engineering courses use a letter grading scheme (A-F). The required grade for passing is generally D- or better although there are two major exceptions. In the math courses, the completion of pre-requisite courses with C- or better is required. Other courses are designated as demonstrating competency for requirements for the US Coast Guard Standard of Training, Certification, and Watchkeeping for Seafarers (STCW). By the requirements of these standards, students must pass the class with a grade of C- or better.

Records of student progress at Cal Maritime are maintained through the Registrar's Office. The office monitors and records student performance and progress. In addition, it maintains the student data in the PeopleSoft Enterprise Student Administration software package. The software allows students to register for, add, or drop courses, monitor their grade point average (GPA), and review their academic progress. The software is also used by faculty to upload final grades into student records. The software provides degree progress reports and unofficial transcripts from which students and advisors can monitor students' progress through the program.

The university has also implemented the SmartPlanner in its PeopleSoft package. It is an interactive online eAdvising tool that interfaces with our student information system (PeopleSoft Campus Solutions) to allow students to proactively plan their courses. This tool gives students a visual representation of their academic status and can be used when meeting with advisors each semester to plan an appropriate path to their degree. SmartPlanner also allows the university to use the course planning information to determine demand for specific courses and to respond accordingly. The intent is to aid students in completing their degree in appropriate time and effectively while also providing the campus with course demand information for enrollment planning.

Cal Maritime recently implemented an application locally named "The Passport". With The Passport, advisors and faculty have the ability to look at a dashboard that quickly and succinctly summarizes a student's progress and helps to identify areas that need to be focused for academic success. Major benefits of the platform include student progress tracking, advising notes, critical path alerts, predictive analytics, student risk level determination, case management, and historical trends. Additional applications that are utilized are progress report campaigns, advising appointments through live calendars, appointment reminders, and tutoring activity usage.

The monitoring of student academic process is ensured by academic advising provided by the faculty as discussed later in Section D. Every semester, it is mandatory for the students to meet with their academic advisor during a designate advising period prior to registration for the next semester. Advising meetings are ensured by placing a registration hold that can only be released by faculty after having an advising meeting. During this meeting the academic advisor checks the student progress and discusses all the prerequisites and co-requisites with the students. All the faculty members follow the curriculum sheets (https://www.csum.edu/web/registrar/curriculum-sheets-your-major-road-map) and flow chart that is specifically developed for the faculty to keep track of all prerequisites and co-requisites for all the courses. Students may also consult the university advisors (discussed in Section D) for question about their academic career path.

Pre-requisites and co-requisites are programmed into PeopleSoft by the Registrar's Office. PeopleSoft will not allow a student to register for a course if the pre-requisites and co-requisites are not met. The only way a student is allowed to enroll in the course without having completed the prerequisite is with a "Waiver of Prerequisite Request". The form requires the student to provide a compelling reason for the waiver and must be approved by the instructor (via add code), the major department chair of the student, and the major department chair of the course in which the student is trying to add.

As per the Academic Policy, students are required to complete their degree program with a minimum cumulative grade point average of 2.0 in the three following areas: overall (all college level units at any institution including Cal Maritime), campus (all units completed at Cal Maritime), and major (all units designated in the major). Students are placed on academic probation if they have either:

- An overall, campus, or major cumulative GPA of less than 2.0, or
- Two semesters in a three-semester period with a semester GPA of less than 2.0

Students on academic probation are required to take a minimum of 12 units and a maximum of 15 units in consultation with their academic advisors to improve their GPA. In the probationary period students must:

a. Complete a minimum of 12 units
b. None of the grades can be a D, F, NC, or WU
c. Earn a 2.00 semester grade point average or raise their cumulative grade point average to above 2.00

Students may repeat courses only if they earned grades lower than a C-. Up to 16 semester units may be repeated with "grade forgiveness." Grade forgiveness occurs when a student repeats a course and the new grade replaces the former grade in terms of the calculation of the student's grade point average; although no longer used in the grade point average, the previous grade remains on the transcript. Students may repeat an individual course for grade forgiveness no more than two times. Grade forgiveness shall not be applicable to courses for which the original grade was the result of a finding of academic dishonesty. Cal Maritime may permit students to repeat an additional 12 semester units with "grade averaging." In such instances the repeat grade shall not replace the original grade for grade point average calculation; instead both grades shall be calculated into the student's grade point average.

Students who have exceeded the 16-unit limit on grade forgiveness are placed on administrative academic probation. While under administrative academic probation, students must:

- Repeat as many classes as practical
- Pass all classes at the appropriate grade level
- Show progress toward the degree

Students who are on administrative academic probation and fail another course are disqualified from the institution.

Students repeating a course at another accredited college are expected to adhere to Cal Maritime's course transfer requirements. When a course is repeated elsewhere, the student will be given credit toward meeting the graduation requirement and the overall grade point average will be affected; however, the Cal Maritime grade point average will not be affected.

If students are unable to meet the terms of their probation, they are subject to academic disqualification. Additionally, a student who receives a grade of F, WU, or IC in a course for the third time at Cal Maritime will be academically disqualified.

Students may contest academic disqualification by appealing to the engineering dean if they feel that there are extenuating circumstances that contributed to poor academic performance. This appeal must be made with 10 business days of the notification of academic disqualification. Appeals will be reviewed by the department chair, engineering dean, and provost within 10 business days of receipt of the appeal.

Students that are academically disqualified may normally seek readmission after at least one full semester has passed. Students have the option of remediating a specific course grade of "D" or "F" through the Open University system available to members of the public. Students readmitted after academic disqualification will continue on probation and must meet all the criteria outlined above.

In addition to the GPA-driven academic probation mechanism, instructors (especially in lower-division courses) are able to provide unofficial early alert grades, which are used to identify students at risk of failing a course (defined as having D or lower grade in the course at the time). This triggers a letter from the dean to the student warning them that they might fail and instructing them to seek help from their advisor and the course instructor. In addition, the university advisors reach out the students to have a meeting and discuss their situation. This early notification process has been implemented to improve retention rates of Cal Maritime students in all majors.

Students who have achieved academic excellence at Cal Maritime are honored and recognized through the following programs:

- President's List.
- Dean's List.
- Honors at graduation.
- Nomination to Pi Tau Sigma (Mechanical Engineering Honor Society).

The description and requirements of the above programs can be found in the Cal Maritime Catalog (http://catalog.csum.edu/) under "Academic Regulations and Policies."

Course pre-requisites requirement checks
Every semester it is mandatory for the students to meet with their academic advisor during the advising period in order to get their registration hold removed. During this meeting the academic advisor checks the student progress and discusses all the pre/co-requisites with the students. All the faculty members follow the curriculum flow chart road map that is specifically developed for

the faculty to keep track of all pre-/co-requisites for all the courses. Cal Maritime also has a new tool called SmartPlanner. It is an interactive online eAdvising tool that interfaces with our student information system (PeopleSoft Campus Solutions) to allow students to proactively plan their courses. This tool gives students a visual representation of their academic status and can be used when meeting with advisors each semester to plan an appropriate path to their degree. SmartPlanner also allows the university to use the course planning information to determine demand for specific courses and to respond accordingly. The intent is to aid students in completing their degree in appropriate time and effectively while also providing the campus with course demand information for enrollment planning.

C. Transfer Students and Transfer Courses

Summarize the requirements and process for accepting transfer students and transfer credit. Include any state-mandated articulation requirements that impact the program.

Transfer Articulation Policies - To be accepted for transfer credit, college courses must be taken at a regionally accredited institution, and the student must have received at least "C-" in the course. Engineering courses transferred for credit must have been approved by the Chair of the Engineering Technology Departments.

To be accepted for transfer credit, courses must be taken at a regionally accredited institution. Transfer courses that are older than 10 years will not be accepted. The chair of the ET department as well as the university registrar must approve engineering courses transferred for credit.

A transfer student is anyone who comes with 30 or more semester units. Because of the special nature of our program, transfer students often still require four years at Cal Maritime to graduate, particularly in the MET program. This is due to the requirements of Standard for Training, Certification and Watchkeeping (STCW) and United States Coast Guard (USCG) domestic licensure. The number of transfer students in ET programs is given in the Table 4 below.

Table 4. Transfer students during the past six academic years [Data for FET and MET programs is presented]

Fall Terms	Facilities Engineering Technology (FET-BS)	Marine Engineering Technology (MET-BS)
	Distinct Students	Distinct Students
Fall 2013	2	15
Fall 2014	8	9
Fall 2015	2	7
Fall 2016	4	9
Fall 2017	-	8
Fall 2018	2	6

D. Advising and Career Guidance

Summarize the process for advising and providing career guidance to students. Include information on how often students are advised, who provides the advising (program faculty, departmental, college or university advisor).

A Faculty academic advisor is assigned to each student at the beginning of the student's academic program. Freshman students go through a three-day orientation program right before the start of their freshman year where they are introduced to all aspects of the academy's life. As part of this process the incoming freshman students meet with the Engineering Technology faculty. During this meeting, the faculty members introduce themselves and tell about their areas of teaching and expertise. They also discuss program objectives and outcomes, curriculum structure, options and concentrations, student performance, the heavy semester load, survival skills and time management, and faculty advisor roles. While this introduction is necessarily brief, these topics are all reinforced in the ET 110 course during the fall of freshman year. The intention is to ensure a good starting point and a smooth transition into engineering studies for the students.

Students are required to consult with their academic advisors (who are program faculty) in the following cases: during registration each semester, when adding or dropping courses, when taking an overload (over 20 units), or in the event that they have been placed on Academic Probation. Registration for courses is done through PeopleSoft and the students are given class priority enrollment appointments and guidelines through the Office of the Registrar. Before registration begins, students have a mandatory academic advising hold, blocking the registration process. Students are required to see their academic advisors so that the hold can be removed and they can proceed with registration. This ensures that students meet with their advisors once a semester at a minimum. Additionally, advisors attempt to monitor and meet regularly with students that face academic challenges to assist the students with a recovery plan from their situation. Cal Maritime recently implemented a tool named the 'Passport'. With the Passport tool, advisors and faculty have the ability to look at a dashboard that quickly and succinctly summarizes a student's progress and helps to identify areas that need to be focused for academic success. Major benefits of the platform include student progress tracking, advising notes, critical path alerts, predictive analytics, student risk level determination, case management, and historical trends. Additional applications that are utilized are progress report campaigns, advising appointments through live calendars, appointment reminders, and tutoring activity usage.

The incoming freshman students are given the MET and FET curriculum sheets on which the program requirements, for each option, are shown. The sheet is a powerful advising tool in showing students their semester as well as summer loads and their respective course offerings. A curriculum roadmap that visually shows the pre-requisite framework of the program is shared with students to help them determine critical paths for their academic goals. In addition, the freshman students get introduced to the curricular structure and requirements in the ET 110-Introduction to Engineering Technology, course. The ET 110 course not only introduces students to the curriculum, but also to the engineering professions and organizations, and to the professional responsibilities of practicing engineers. Students are also thoroughly informed on the expectations of the program and the work required to be successful.

Students also have the opportunity to work with our university advisors. Cal Maritime's university advisors promote student success by helping students to navigate University requirements, policies, forms, and deadlines, while educating them about other programs and opportunities that are available to assist with student success. The advisors are responsible for academically advising students, focusing predominantly on at-risk and probation students. Students who are on academic probation are required to meet with a university advisor throughout the term to review their academic progress. The university advisors collaborate with faculty advisors for major and general education course advisement and work with students to develop a plan, including support services, to ensure completion of all university requirements for graduation in a timely manner.

The Career Services continues to be a great asset to engineering students with assistance in finding full time jobs and summer internships. There is a dedicated engineering shore side Assistant Director which has added great value to the engineering program. The Center holds workshops, trainings, and other engineering focused career related meetings and training to prepare engineering graduates for job placement. Examples of these training workshops are:

- Job-preparedness
- Resume preparation and business letter writing
- Interviewing and job search strategies
- Dress-for-success seminars
- Business and dining etiquette
- One-on-one job search counseling
- Mock, video-taped interviews

With the Career Services Center's assistance and on-campus employment most of our engineering technology graduates are obtaining employment within four months of graduation.

E. Work in Lieu of Courses

Summarize the requirements and process for awarding credit for work in lieu of courses. This could include such things as life experience, Advanced Placement, dual enrollment, test out, military experience, etc.

Cal Maritime students have very few options to receive credit in lieu of a course. The two options available are Advanced Placement tests, and challenging a particular course. Many courses that contain STCW and domestic licensure elements may only be satisfied by completing the course in which they are embedded. The process for obtaining credit, quoted from the catalog, is below.

COURSE CHALLENGE

Students may receive credit for courses (grade: CR) by passing challenge examinations developed at Cal Maritime. The following rules apply:

1. Students must demonstrate substantial knowledge and background in the areas they are challenging.
2. Approval must be obtained for each challenge from the instructor and department chair. Applications are available in the Student Records Office.

3. The instructor must be presented with a receipt for the required fee, which must be paid prior to the challenge examination.
4. A course may be challenged only once.
5. Challenges will not be approved for courses in which any grade has been assigned, including “F”, “IC”, “WU”, or “W.”
6. Challenges will not be approved for courses in which a student is currently registered, or in a semester in which a student has dropped the course to be challenged.
7. Challenges are not allowed in certain cases, such as the GWE Exam and certain STCW classes.

CREDIT BY EXAMINATION

Cal Maritime grants credit to those students who pass certain examinations that have been approved. These include the Advanced Placement (AP) examination of the College Board, College Level Examination Program (CLEP), International Baccalaureate (IB), and the CSU English Equivalency Examination (EEE).

F. Graduation Requirements

Summarize the graduation requirements for the program and the process for ensuring and documenting that each graduate completes all graduation requirements for the program. State the name of the degree awarded (e.g., Bachelor of Science in Electrical Engineering Technology, Associate of Science in Engineering Technology, Associate of Applied Science in Civil Engineering Technology.)

Graduates from the Cal Maritime Engineering Technology department receive a Bachelor of Science in Marine Engineering Technology or Facilities Engineering Technology. The academic management system is the primary tool used to ensure and document that each graduate has completed all requirements. Additionally, a separate office maintains all records associated with STCW compliance and domestic licensure.

Cal Maritime utilizes PeopleSoft as its academic management system. As part of this system, all students are tracked against the graduation requirements of their majors. These requirements are broken down into requirements of the major, other Cal Maritime requirements, Math and Science requirements, American History and Government requirements, and Humanities and Social Science requirements. This tracking report is called the academic advisement report.

The student, academic advisors and academic administrators can access the academic advisement report at any time. This is particularly useful when a student is registering for a new semester. The academic advisor can look at the academic advisement report and see how the student is progressing.

Additionally, prior to the student’s senior year, the Registrar’s Office communicates with all students who anticipate graduating before the beginning of the next academic year and reviews the student’s record to ensure that all degree requirements are met.

To graduate, a student must have a 2.0 GPA in three separate areas:

1. Overall on all baccalaureate level courses
2. All units completed at CSU Maritime Academy
3. All core MET or FET courses.

Additionally the CSU Graduate Writing Assessment Requirement (GWAR) requires that all CSU students demonstrate competence in written communication before they are granted a baccalaureate degree. At Cal Maritime, students that have achieved junior standing, and have completed EGL 100 (English Composition) and at least 60 units, must either take EGL 300 (Advanced Writing) or challenge the course by taking the Graduate Writing Exam (GRE). Students who pass the GWE will receive credit for EGL 300.

The graduation data for the FET and MET programs for the past six years in presented in Table 5.

Table 5. Number of graduates during the past six years [data for FET and MET programs is presented]

Academic Year	Distinct Graduates: FET-BS	Distinct Graduates: MET-BS
2013-2014	4	27
2014-2015	5	32
2015-2016	13	33
2016-2017	11	43
2017-2018	11	29
Grand Total	44	164

G. Transcripts of Recent Graduates

The program must provide transcripts from recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. **These transcripts will be requested separately by the Team Chair.** State how the program and any program options are designated on the transcript. (See 2019-2020 APPM, Section I.E.3.a.)

The transcripts of the recent FET graduates have already been emailed to the ABET visiting team chair and will be presented to the ABET/ETAC visiting team during the site visit.

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Provide the institutional mission statement.

The vision statement of California State University Maritime Academy (Cal Maritime) provides a compelling conceptual image of the future we will create for this institution. This statement describes how we will build Cal Maritime in the years to come:

The California State University Maritime Academy will be a leading educational institution, recognized for excellence in the business, engineering, operations, and policy of the transportation and related industries of the Pacific Rim and beyond.

We will maintain our commitment to quality instruction, research, and service in maritime and facilities education. From this foundation we will develop further to become a leader in engineering, science, and technology for the transportation and facilities industries. We believe that our strength as an institution lies in maintaining focused areas of excellence, as distinguished from engaging in programmatic proliferation which our resource base cannot support.

The mission for Cal Maritime defines our purpose as an organization. Our educational community subscribes to the following statement of what we intend. Our mission is to:

- Provide each student with a college education combining intellectual learning, applied technology, leadership development, and global awareness.
- Provide the highest quality licensed officers and other personnel for the merchant marine and national maritime industries.
- Provide continuing education opportunities for those in the transportation and related industries.
- Be an information and technology resource center for the transportation and related industries.

This mission, combined with Cal Maritime's vision, beliefs and values, are clearly presented and embraced by faculty, staff, students and administration.

B. Program Educational Objectives

List the program educational objectives and state where these can be found by the general public. *This is typically an easy to find web page clearly linked to the program's website.*

FET graduates of California State University Maritime Academy working in the engineering profession will meet the following program educational objectives:

1. Graduates will have the knowledge and ability to perform analysis, applications engineering and system or process development in large commercial, industrial, institutional and power generation facilities.

2. Graduates will have the knowledge and ability to operate and maintain systems or processes in large commercial, industrial, institutional and power generation facilities.

3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams.

4. Graduates will have the knowledge and ability to communicate effectively with speaking, writing and presentation skills including the ability to put together a compelling argument.

5. Graduates will demonstrate a respect for professional, ethical and social issues as well as a commitment to safety, quality and productivity.

The program educational objectives for the FET program are listed on the web page.

C. Consistency of the Program Educational Objectives with the Mission of the Institution

Describe how the program educational objectives are consistent with the mission of the institution. *A table illustrating how educational objectives support the elements of the institutional mission can be used, in addition to a brief explanation.*

Institutional Mission	Program Educational Objectives (PEOs)
Provide each student with a college education combining intellectual learning, applied technology, leadership development, and global awareness.	The PEO 1 and 3 directly invoke the four "compass points" of Cal Maritime: intellectual learning, applied technology, leadership development, and global awareness.
Provide the highest quality licensed officers and other personnel for the merchant marine and national maritime industries.	The PEO 2 supports the creation of graduates who are well prepared to serve as highest quality licensed officers and qualified professional facility system engineers.
Provide continuing education opportunities for those in the transportation and related industries. Be an information and technology resource center for the transportation and related industries.	The PEOs 3, 4, and 5 highlights the quality of FET engineering students who are well prepared to act as resource centers in their respective industries. The PEOs 3, 4, and 5 also reflect the core compass points of Cal Maritime as specified in the institutional mission statement.

The PEOs for both FET students are consistent with the mission of California State University Maritime Academy. The PEOs seek to create graduates who are the "highest quality licensed officers" (mission statement) and practicing "professional engineers, managers, and leaders". They also reflect the core "compass points" of intellectual learning, applied technology, leadership development, and global awareness as specified in the institutional mission statement.

D. Program Constituencies

List the key program constituencies involved in the review of the program educational objectives. Describe how the program educational objectives meet the needs of these constituencies.

The Engineering Technology (ET) program identifies its significant constituencies as its students, faculty, alumni, the engineering profession and prospective employers, and Cal Maritime Advisory Council (CMAC).

We want our ET alumni, upon graduation to become more responsible and productive members of society. We want our alumni to share their knowledge and experiences with us to help shape both our Program Educational Objectives (PEOs) and our Student Outcomes (SOs) for future graduates. Based upon surveys and contact between faculty and alumni, we find our ET graduates in a variety of fields. Many do sail with the merchant marine, at least for a few years, but it is common to see graduates change career paths and seek a shore side engineering position (or) return to school for graduate study. Cal Maritime alumni are typically strong supporters of our program and are involved with the academy through the alumni association and its board of directors. In addition to the maritime transportation industry there is a significant representation of our alumni in the areas of power generation, HVAC, and facility commissioning and engineering.

To support the continuous growth of Cal Maritime, with a goal to develop a more efficient and effective academic administrative structure, the academic units has been reorganized into three schools: The School of Engineering (SoE); The School of Maritime Transportation, Logistics, and Management (MTLM); and the School of Letters & Sciences (L&S). This was a monumental effort, with input from the Department Chairs, the Academic Senate, Academic Affairs Leadership and other external stakeholders. In preparation for this reorganization during the 2017-2018 academic year, the previously named External Advisory Board (EAB) and Maritime Industry Advisory Board (MIAB) was renamed as the Cal Maritime Advisory Council (CMAC), which includes three subcommittees that correspond to each of the new academic schools. The new advisory subcommittee for the School of Engineering (SoE) met for the first time in fall 2018 with the new Dean for the SoE and associated faculty. The SoE subcommittee includes representation from industry, the ASME professional society, and academia. During this meeting the Program Educational Objectives (PEOs) and Student Learning Outcomes (SLOs) for the Facilities Engineering Technology (FET) and Marine Engineering Technology (MET) programs were presented to the SoE subcommittee. At this meeting it was also decided that the full council should be meeting periodically to establish active partnerships among industry, government, other educational institutions, and Cal Maritime academic programs to address their mutual needs. All the meeting notes will be provided to the ABET/ETAC team during the site visit.

In addition, the office of career services hosts an annual career fair event at which employers, students, alumni and faculty can interact. These interactions help us to maintain a curriculum that will stay current with the needs of the industry. We believe that we have a responsibility and an obligation to provide students who are not only well versed with current technology but also provide them the ability to adapt their problem solving skills to succeed in whatever career path they choose.

The PEOs are developed to incorporate the diverse skills and abilities that graduates are utilizing in their varied careers. By defining qualities of successful engineers as our PEOs, our program meets the needs of groups who wish to become successful engineers or who require well-educated engineers.

E. Process for Review of the Program Educational Objectives

Describe the process that periodically reviews the program educational objectives including how the program's key constituencies are involved in this process. Describe how this process is systematically utilized to ensure that the program's educational objectives remain consistent with the institutional mission, the program constituents' needs and these criteria.

A table illustrating the following may be helpful to summarize the review process:
Key Constituents involved in the review of PEOs
Time table for those constituent's review of the PEOs (schedule and when last accomplished)
Manner of the Review (tool or process)
Who/how review results are utilized

Also, provide information about how the processes described above are documented, which will be necessary for the ABET review process.

Figure 2-1 depicts a schematic that explains the review and improvement process for the PEOs and ET program. The PEOs are reviewed periodically and modified in consultation with our primary constituents as illustrated in the figure that is depicted below. This process is identical to the process used to implement curriculum changes. The current PEOs were presented to the Cal Maritime Advisory Council (CMAC) in fall 2018 and were approved by the CMAC with few minor changes. The changes will be incorporated into the current PEOs in the future.

The current PEOs are published in the official school catalog and school web site. They are communicated to the students in course syllabi and are covered in ET 110, Introduction to Engineering Technology. They are also communicated to the alumni, employers, and CMAC in various forms such as surveys or in cases where feedback is needed.

Every year during the President's Retreat, the campus President and his staff (Vice-Presidents and Deans), the faculty Senate chair, and the Academic Senate Executive Committee members gather to discuss and exchange views as to the direction that Cal Maritime should be going and the challenges ahead. This provides an opportunity for faculty, staff and administrators to review the mission of the Cal Maritime, and therefore, provides an opportunity for the ET department to review its PEOs and their relations to the mission of the campus.

Alumni input on PEOs is solicited and documented through periodic alumni surveys. These surveys not only ask if our alumni believe that they are meeting our PEOs, but also ask how important they consider each outcome has been to them, and if there might be objectives that were not included. The results of the alumni survey are included in the report under Criterion 4.

Input from the various constituencies is reviewed by the department annually at a luncheon/retreat held during the fall or spring semesters. PEOs are reviewed in light of these constituent inputs and modifications are proposed if necessary. The retreat is documented by minutes. The recommendations of the faculty for any changes to the PEOs are presented to the CMAC for approval. Although approval has been the norm, any disapproval would lead to further faculty discussion. This CMAC review is also documented in the notes of the meeting.

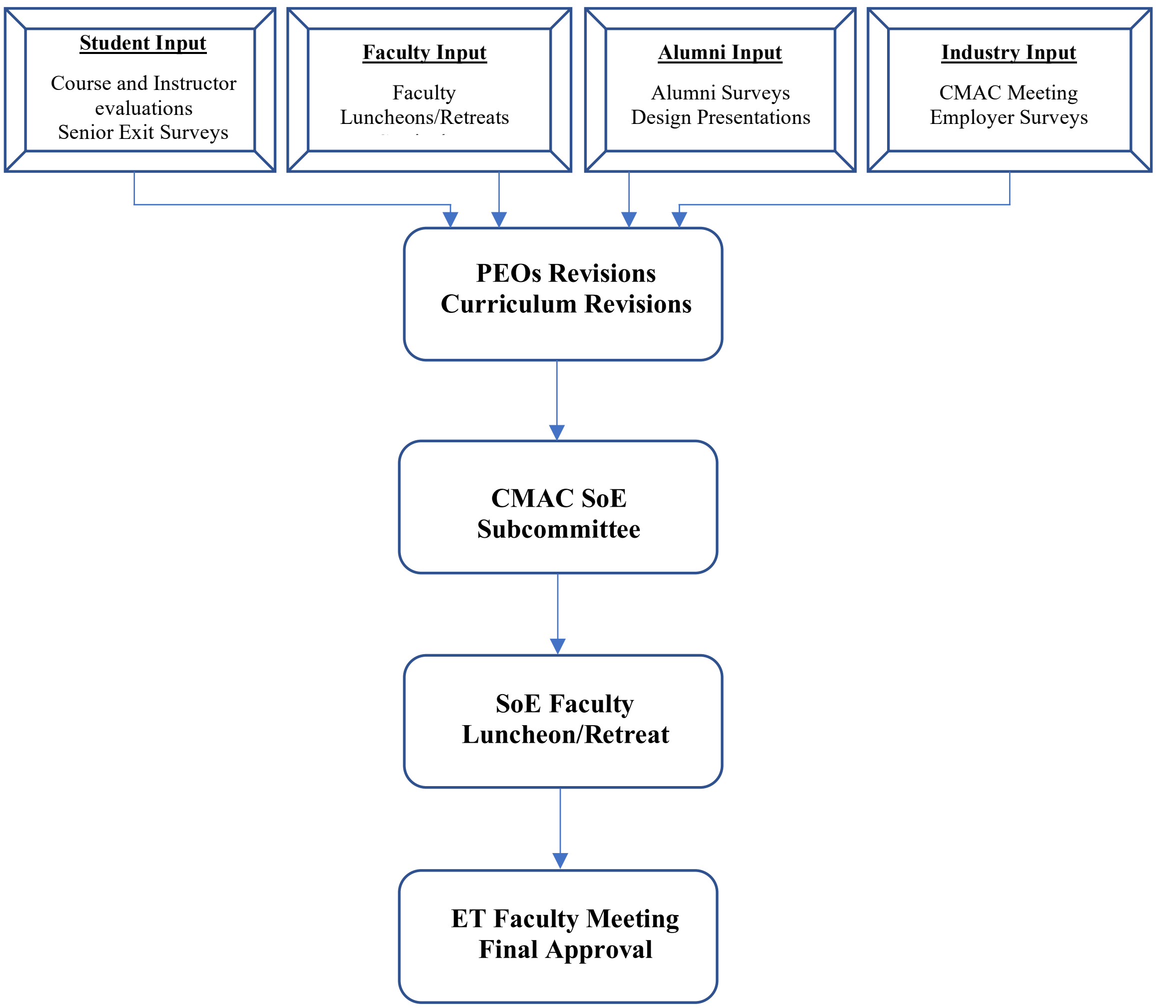


Figure 2-1: Process for review and improvement of PEOs and ET program.

CRITERION 3. STUDENT OUTCOMES

A. Process for the Establishment and Revision of the Student Outcomes

Describe the process used for establishing, reviewing, and revising student outcomes.

The student learning outcomes (SLOs) represent the foundation of knowledge and skills for graduates to maintain competence and achieve professional success following graduation. These outcomes are developed and approved by the Engineering Technology (ET) department faculty. The faculty are responsible for collecting, reviewing, and interpreting data related to SLOs. The SLO results are discussed at the School of Engineering faculty meetings and ET department meetings, where issues regarding SLOs are identified and assessment strategies are developed. In addition, changes in the process are also discussed, changes proposed and a change process is executed by the faculty. Periodically, all the SLOs are also presented to the Cal Maritime Advisory Council (CMAC) for input.

B. Student Outcomes

List the student outcomes for the program. Indicate where the student outcomes are documented and made accessible to the public. *This is typically an easy to find web page clearly linked to the program's website but could also be in a student handbook.*

The following table constitutes the SLOs for the Facilities Engineering Technology (FET) program. The SLOs (b-f) for both the programs are aligned with ABET requirements and all other outcomes are developed by the faculty of Engineering Technology (ET) department. The SLOs are posted on the website located at,

FET: www.csum.edu/web/academics/et/majors/facilities-engineering-technology

Facilities Engineering Technology (FET) Program

a. Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.

b. An ability to gain knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly- defined engineering problems associated with facilities equipment, systems and vehicles.

c. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes and design.

d. An ability to function effectively as a member or leader on a technical team.

e. An ability to design systems, components, or processes meeting specific needs for broadly-defined engineering problems appropriate to facilities equipment, systems and structures.

f. An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

g. Ability to understand and apply concepts of professional, ethical and social responsibilities.

h. Respect for diversity and a knowledge of contemporary professional, societal and global issues.

i. Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.

j. Commitment to quality, safety, timeliness and continuous improvement.

C. Mapping of Student Outcomes to Criterion 3 Student Outcomes

Describe if the student outcomes used by the program are stated differently than the requirements listed in Criterion 3. If so, provide the mapping of the program's student outcomes to the Criterion 3 requirements one through five.

The applicable program criteria could include statements that add specificity to the requirements for student outcomes found in Criterion 3. However, ongoing changes to program criteria are removing language related to student outcomes. Contact ABET at etac@abet.org if you have questions about the program criteria that apply to your program.

The student learning outcomes listed in the table above meets all the requirements one through five as mentioned by ABET in Criterion 3 with some program-specific information. Our programs have five additional student learning outcomes (SLOs) developed by the department faculty. These encompass knowledge and skills that are important for students following graduation.

D. Relationship of Student Outcomes to Program Educational Objectives

Describe how the program's student outcomes prepare graduates to attain the program's educational objectives.

It is helpful if the self-study questionnaire provides a mapping, using the table below, of the Program Educational Objectives, Student Outcomes, the ABET (1) – (5) student outcomes and the program courses that support the program student outcomes (courses where the students learn or develop competencies related to the student outcomes).

FET Program

Program Educational Objective	***Program Student Outcome***	***ABET (1)-(5)***	***Program Courses Supporting the Program Outcome***
Graduates will have the knowledge and ability to perform analysis, applications engineering and system or process development in large commercial, industrial, institutional and power generation facilities.	a, b, c, e,	b, c, and e	CHE 205; CEP 270; CEP 370; ET 400L; ET 460L
Graduates will have the knowledge and ability to operate and maintain systems or processes in large commercial, industrial, institutional and power generation facilities.	a, b, e, i, and j	b and e	EPO 110; CEP 270; CEP 370; ET 490L; EPO 110
Graduates will have the knowledge and ability to function effectively as leaders on professional teams.	b, d, and i	b and d	CEP 270; CEP 370; EPO 235
Graduates will have the knowledge and ability to communicate effectively with speaking, writing and presentation skills including the ability to put together a compelling argument.	e - h	e and f	ET 230L; ET 370/370L; ET 490L
Graduates will demonstrate a respect for professional, ethical and social issues as well as a commitment to safety, quality and productivity.	c – e g, h, j	c - e	HUM 310; EPO 315; ENG 470; ET 490/490L

CRITERION 4. CONTINUOUS IMPROVEMENT

All ET full-time faculty participate in the assessment process of PEOs and SLOs. A plan for assessment and improvement is in place as shown in Figure 4-1. The Figure 4-1 illustrates the implementation plan for continuous improvement of curricular content and assessment of progress towards program objectives.

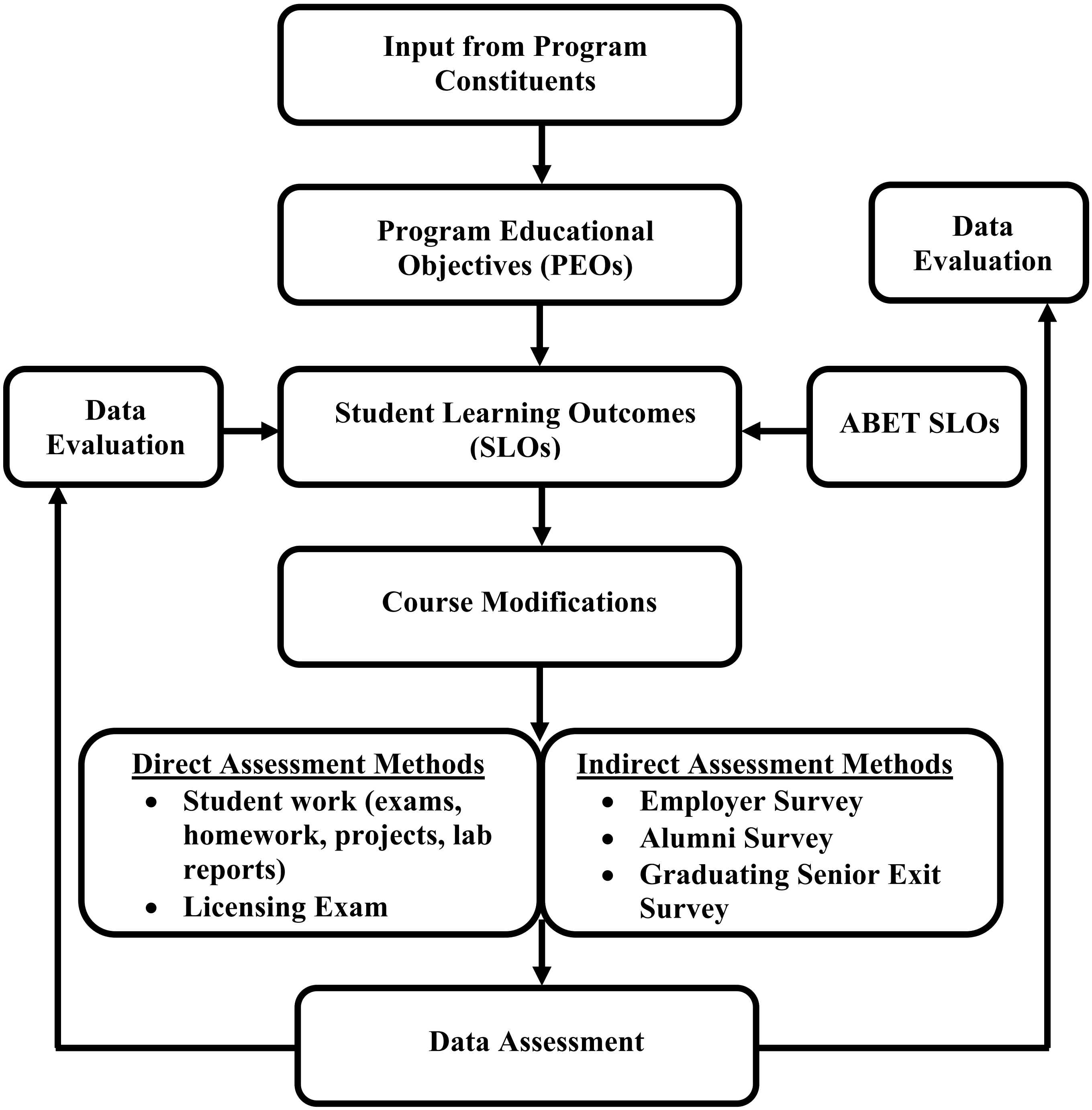


Figure 4-1: Process for revision of PEOs and SLOs

A. Documentation of Processes or Plan

Provide a reference to the plan (documentation of processes in the appendices or in electronic form) used to assess student outcome attainment for the purpose of continuous program improvement. In the sections below, briefly summarize key elements of that process (tabular presentation, where appropriate, is encouraged).

Provide the written plan/graphical representation of the assessment plan clearly identifying who will do what when. If different student outcomes will be assessed in different years, provide an overview of this via a simple table (student outcome versus year of assessment).

As an example here is a table (one table per outcome) that captures much of what is requested below. Programs can present the information in their own preferred format.

Figure 4-1 illustrates the plan to implement for continuous improvement of PEOs and SLOs using various direct and indirect assessment methods. For indirect assessment methods, we used three different survey instruments to measure 5 PEOs and 10 SLOs. These surveys included measures from each of our three program constituents: a) employers, b) alumni, and 3) graduating seniors. The common elements of each of these surveys included questions regarding each SLO. The responses characterize 1) emphasis given to each aspect of SLO and 2) assessment of the level to which the program was successful in meeting the stated SLO. In addition to the quantitative questions the survey invites an open response comments on the program by indicating the strengths and weaknesses of the FET/MET programs.

For direct assessment methods we used a variety of exams, projects, homework assignments, lab reports, rubrics, Assistant Engineer license exam results to establish a direct measure of each SLO. At least one each direct measure was used for each SLO to provide insight into graduates' performance in different areas.

<u>*Program Educational Objectives (PEOs)*</u>

Input used to assess PEOs is solicited from each of program constituents (employers, alumni and advisory council), with the exception of the current students. Current students do not have the experience required to develop a knowledgeable perspective on the expectations for a program graduate after several years of work as an engineer in the field. Input from all the employers and alumni is collected through surveys and input from the Cal Maritime Advisory Council (CMAC) is collected through meetings. Employers' input regarding the PEOs is collected during career fairs; program alumni provide input through surveys that are conducted periodically; the CMAC meetings happen at least once a year and their input on PEOs is collected during the meetings.

Table 4-1: PEOs assessment timeline

Assessment	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
CMAC	X	X	X	X		X
Alumni Survey			X		X	
Employer Survey						X

Improvement: Due to the changes in the Career center and shortage of personnel, employer feedback via surveys had not been collected at an expected frequency and moving forward this will be improved. Our goal is collect employer feedback at least once every year.

During the reorganization of the academic structure on campus, advisory council meetings were not conducted during the 2017-2018 academic year.

In regards to alumni survey our goal moving forward is to collect feedback for every two years.

Viable strategies will be formulated to enhance the response rate on the surveys.

Student Learning Outcomes (SLOs)

Each faculty is primarily responsible to perform assessment for their respective courses. Each course instructor identifies the particular exam question, assignment, or project that best reflects achievement of each targeted SLO for that class. However, the evaluation of the assessed data is conducted by the committee constituting ET Department ABET coordinator as well as several rotating faculty depending on specific SLO being assessed each year. The goal of the SLO assessment plan is to ensure that each SLO is assessed at least twice in a six-year ABET cycle. If SLOs needing improvement are identified, recommendations with an action plan will be made by the committee (and/or course instructors) and the SLO need to be reevaluated during the next year.

Table 4-2: SLOs assessment timeline

SLO	**2013-2014**		**2014-2015**		**2015-2016**		**2016-2017**		**2017-2018**		**2018-2019**	
	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
a		**X**	**X**	**X**				**X**			**X**	
b			**X**		**X**		**X**				**X**	
c			**X**				**X**	**X**	**X**	**X**	**X**	**X**
d		**X**				**X**			**X**	**X**		
e			**X**	**X**	**X**	**X**	**X**		**X**	**X**	**X**	
f		**X**		**X**		**X**						**X**
g		**X**		**X**		**X**		**X**		**X**		**X**
h			**X**	**X**		**X**			**X**			**X**
i			**X**	**X**	**X**	**X**	**X**				**X**	**X**
j				**X**	**X**				**X**	**X**		**X**

Improvement: Even though the data for a course that servs as a source of assessment for a particular SLO had been conducted, during certain years it was not assessed and evaluated as per the plan presented to ABET during our last visit. Moving forward this will be rectified and the assessment and evaluation of all the courses serving as a source for an SLO will be conducted as per the plan that will be presented to the ABET visiting team.

The minutes from the meetings during which the evaluation of SLO assessment is conducted, have not been recorded and properly documented. Moving forward this will be rectified. A general template will be developed by the faculty and the notes from the meetings will be duly recorded.

B. Assessment Metrics and Methods of Student Outcomes

List the metric(s), measure(s) or performance indicator(s) used for each student outcome. Describe the process for collecting data or making assessments for each (tabular format is encouraged). Examples of assessment instruments can be electronically referenced in the self-study report and must be available for review at the time of the visit.

B.1 Indirect Assessment Methods

Alumni Survey: The online survey weblink is emailed periodically to the alumni of two graduating classes (2 years and 5 years past graduation). The graduates two years out provide more immediate feedback, while the graduates five years out give a long-term perspective. The weblink online format of the survey makes it more convenient for the alumnus to provide feedback. The survey is three pages long and is made up of four sections: career/profession information, qualitative assessment of their education at CSUM and their suggestions for program improvement, assessment of PEOs, and assessment of SLOs.

Assessment: All PEOs and SLOs

Assessment Metric: Table 4-3 depicts the assessment rating for PEOs and SLOs.

Table 4-3: Assessment rating for PEOs and SLOs in the alumni survey

Assessment	Category	Assessment Rating
Program Educational Objectives (PEOs)	*Unsuccessful*	1
	Satisfactorily-Successful	2
	Very-Successful	3
Student Learning Outcomes (SLOs)	*Under-Prepared*	1
	Satisfactorily-Prepared	2
	Exceptionally-Prepared	3

Target: The performance goal is to have ~70% attainment as a level 2 for each PEO and SLO.

Summary of the Results:

We rely on the alumni's goodwill for completion of the survey's. The response rate based on the year of graduation is shown in Figure 4-2. Among the responses received for the alumni survey *70.6%* belong to MET program and *29.4%* belong to the FET program. The alumni are expected to provide their input on the knowledge and skills that they have developed graduating through the program at CSUM and rate the level of success of the Engineering Technology program with respect to its mission and objectives, based on their current professional view. The program faculty have chosen a target performance level of ~70% attainment as a level 2 for each individual Program Educational Objective (PEO) {there are 5 PEOs} and each individual Student Learning Outcome (SLO) {there are 10 SLOs}. If any PEO or SLO doesn't meet the target set up by the faculty appropriate action plan will be established based on the qualitative assessment received from the alumni.

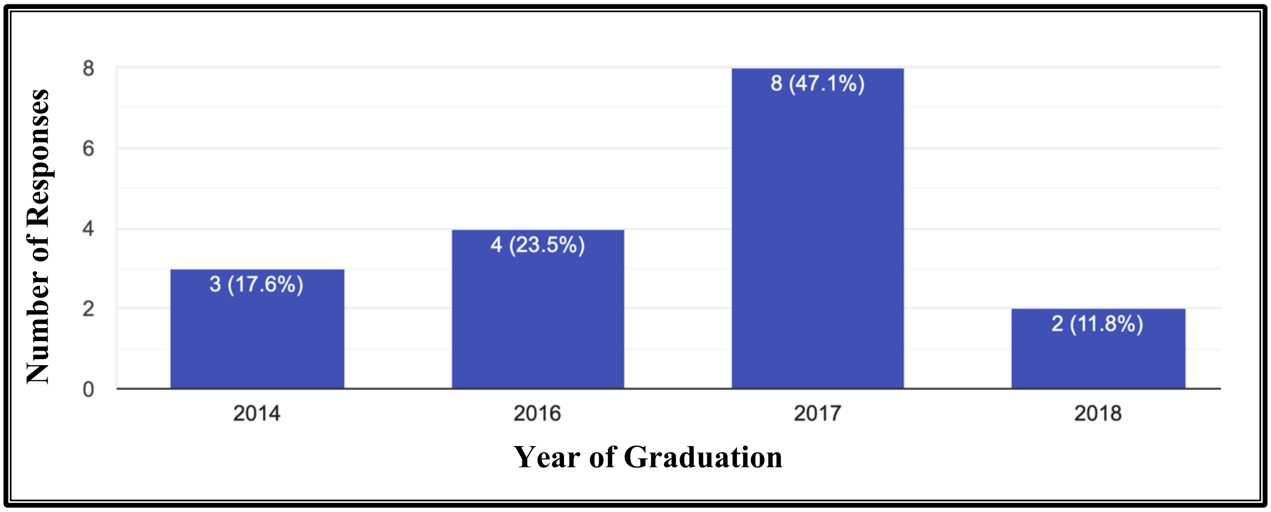


Figure 4-2: Number of responses received based on the year of graduation

Table 4-4: Summary of results with an average alumni input attainment level 2 or above for each PEO and SLO

Assessment Category	Individual Assessment Category	Average alumni input with an attainment level 2 or above	Action Required
Program Educational Objectives (PEOs)	*PEO 1*	87.5%	NO
	PEO 2	94%	NO
	PEO 3	100%	NO
	PEO 4	88%	NO
	PEO 5	100%	NO
Student Learning Outcomes (SLOs)	*SLO a*	76%	NO
	SLO b	100%	NO
	SLO c	100%	NO
	SLO d	94%	NO
	SLO e	76.5%	NO
	SLO f	100%	NO
	SLO g	88%	NO
	SLO h	71%	NO*
	SLO i	76%	NO
	SLO j	100%	NO

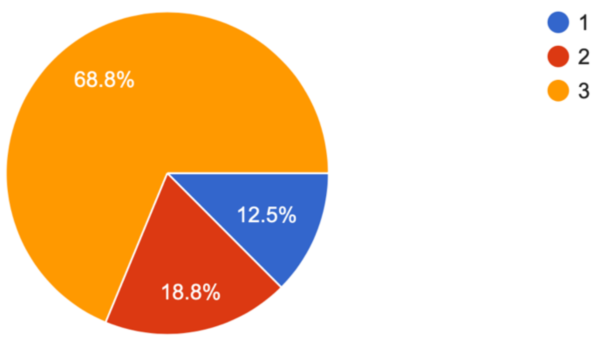
* The attainment of '*SLO h'* is very close to the target, faculty felt that continuous improvement strategies should be considered for this specific outcome based on the alumni input.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

(Alumni Survey Results)

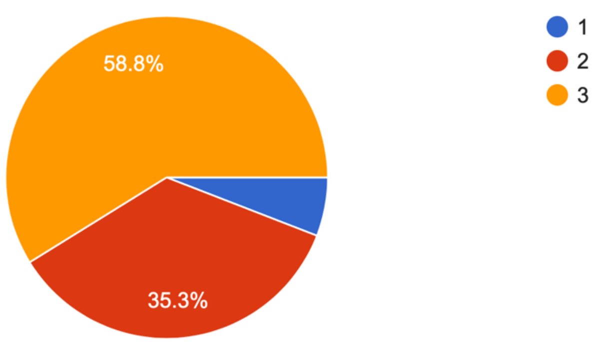
a) To prepare graduates with knowledge and ability to perform analysis, applications engineering and system (or...ional and power generation facilities.

16 responses



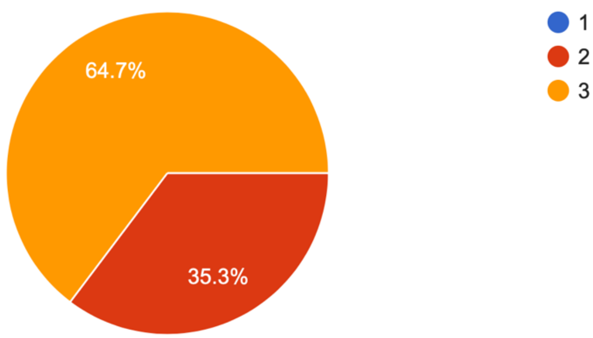
b) To prepare graduates with knowledge and ability to design, manufacture, operate, manage and maintain systems (...in maritime (or) respective industry.

17 responses



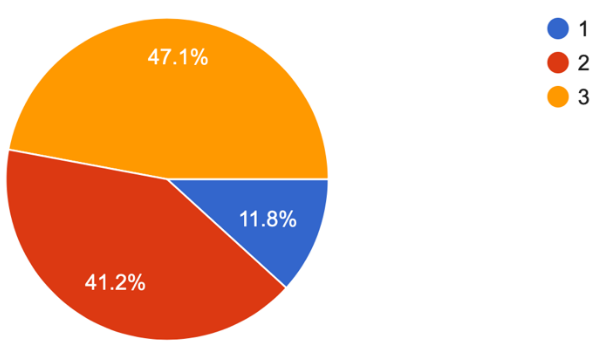
c) To prepare graduates with knowledge and ability to function effectively as leaders on professional teams.

17 responses



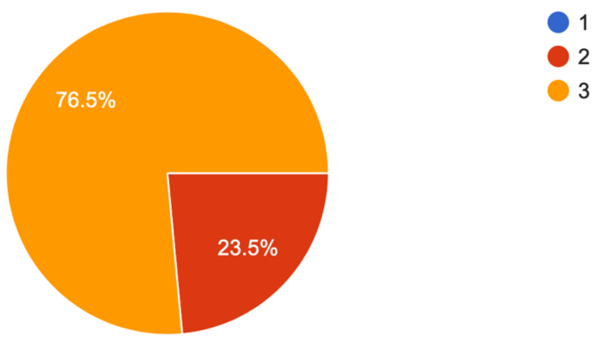
d) To prepare graduates with knowledge and ability to communicate effectively with speaking, writing and ...to put together a compelling argument.

17 responses



e) To prepare graduates who can demonstrate a respect for professional, ethical and social issues as well as a co...nt to safety, quality and productivity.

17 responses

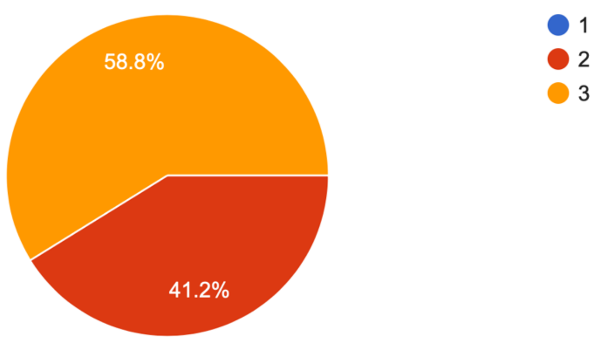


STUDENT LEARNING OUTCOME (SLOs)

(Alumni Survey Results)

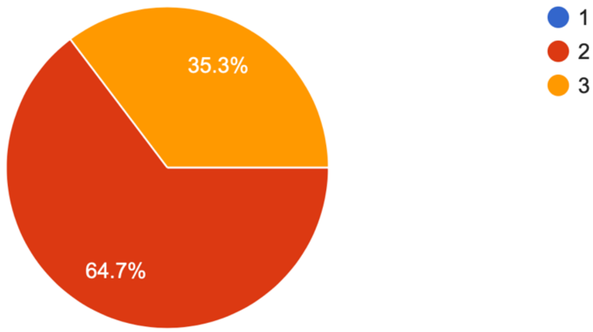
a) Ability to apply math, science and engineering to obtain solutions.

17 responses



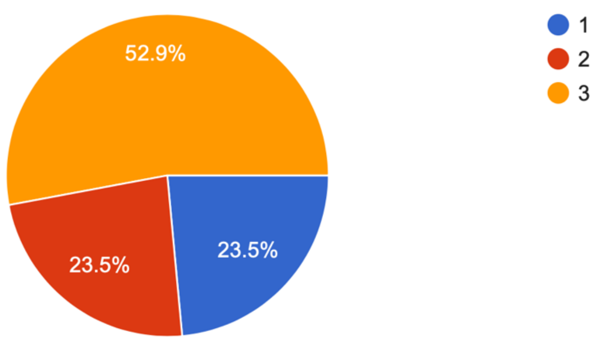
b) Designing and conducting experiments, analyzing and interpreting results.

17 responses



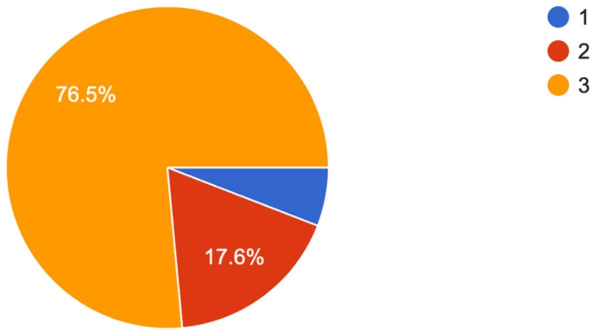
c) Ability to design a system, component or process to meet a specified need.

17 responses



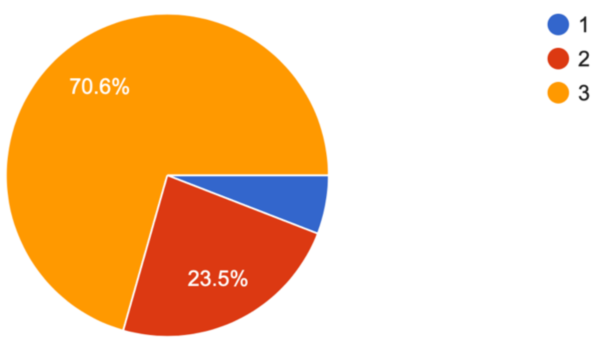
d) Ability to function on multi-disciplinary teams or in groups.

17 responses



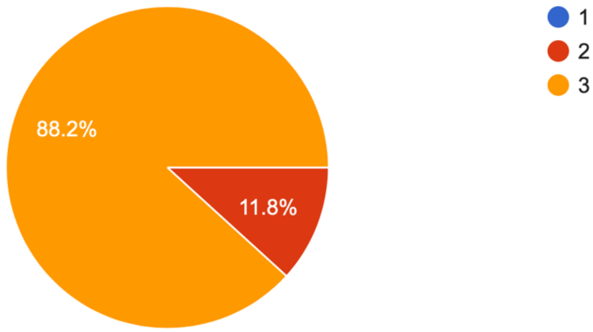
e) Ability to identify, formulate and solve engineering problems.

17 responses



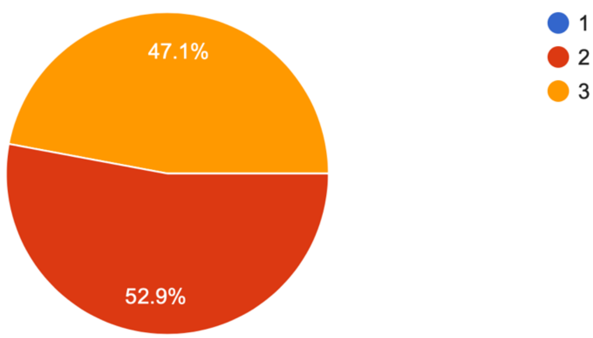
f) Your understanding of professional and ethical responsibilities.

17 responses



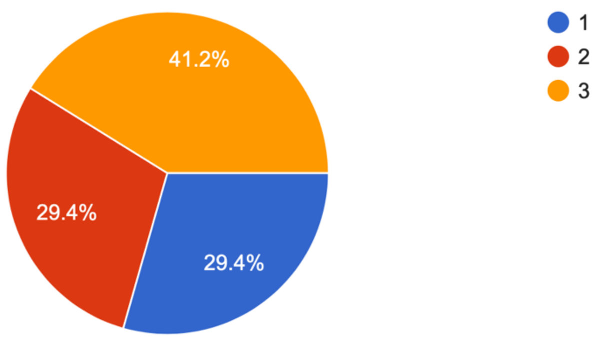
g) Written and oral communication skills.

17 responses



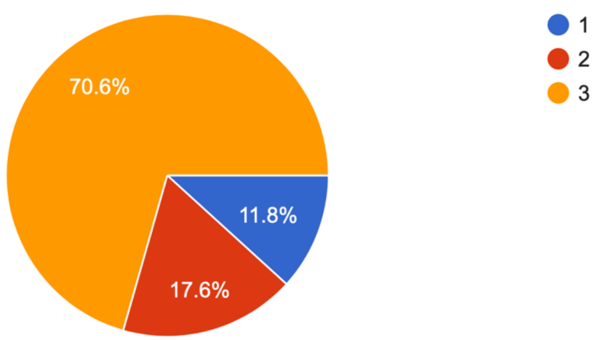
h) Understanding the impact of engineering solutions in an economic, environmental and societal context.

17 responses



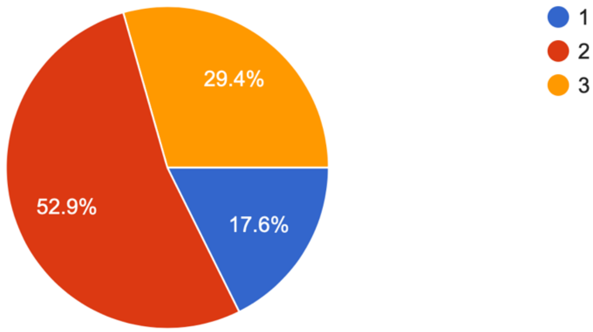
i) Recognize the need for continuing professional development and life-long learning.

17 responses



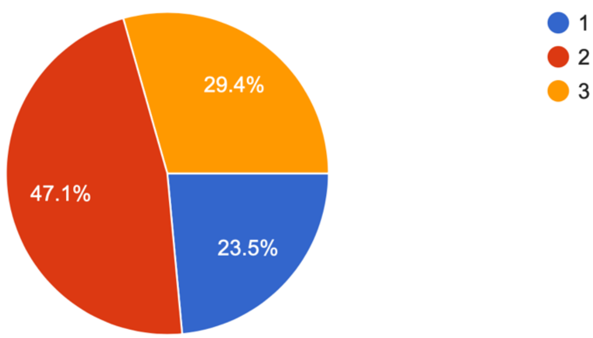
j) Your knowledge of contemporary issues.

17 responses



k) Ability to use modern engineering techniques and tools (including software) necessary for engineering practice.

17 responses



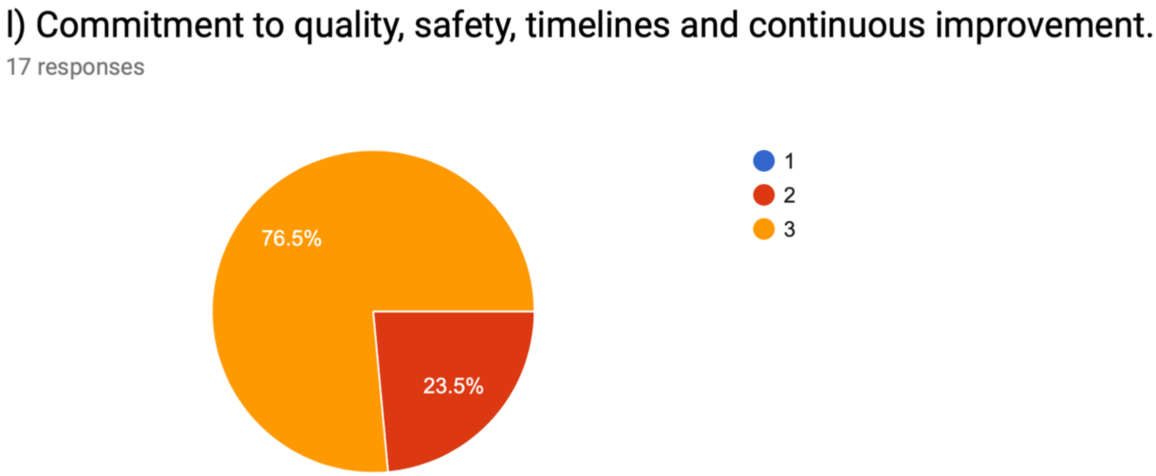


Figure 4-3: Graphical representation of the alumni results for individual PEO and SLO.

Table 4-4 shows the summary of the results for each PEO and SLO with an attainment of level 2 or above based on the alumni input. It can be witnessed that all PEOs and SLOs meet the target level. However, *SLO h* met the target level very closely and faculty concluded that continuous improvement strategies should be sought out for this specific outcome based on the qualitative assessment received from the alumni. The graphical representation for individual PEO and SLO based on the alumni survey is shown in Figure 4-3. All this data will be available for review to the ABET/ETAC visiting team.

Employer Survey: The employer survey is relatively short (two pages) and is typically made up of three sections: evaluator information, assessment of PEOs and SLOs, and qualitative assessment of the programs' education. We were able to solicit responses from 11 employers and future strategies will be developed to solicit an adequate response rate from employers and industrial partners.

Assessment: All PEOs and SLOs

Assessment Metric: Table 4-5 depicts the assessment rating for PEOs and SLOs.

Table 4-5: Assessment rating for PEOs and SLOs in the employer survey

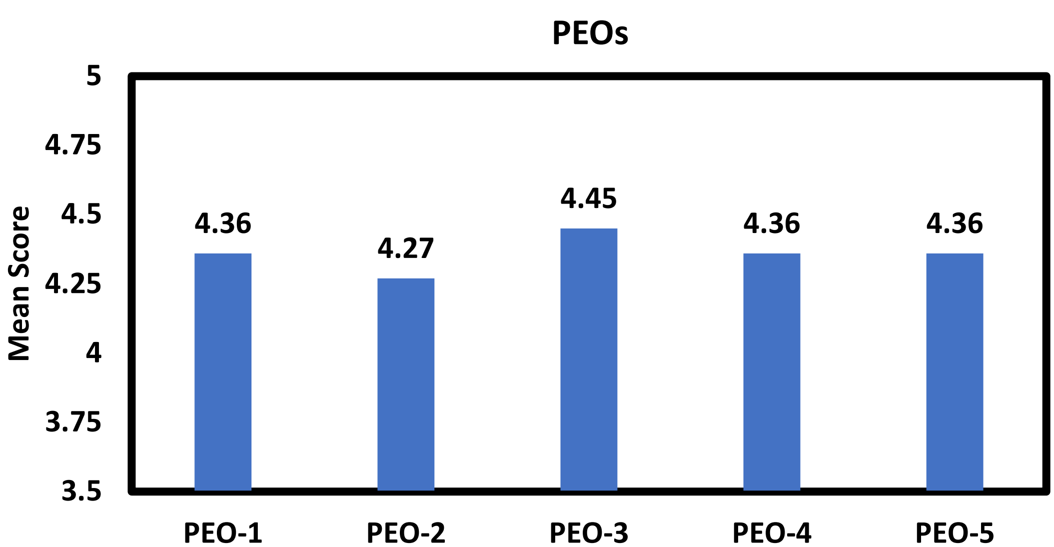
Assessment	Category	Assessment Rating
Program Educational Objectives (PEOs) and Student Learning Outcomes (SLOs)	*Unsatisfactory*	1
	Marginal	2
	Average	3
	Very Good	4
	Outstanding	5

Target: The performance goal is to have a mean score of >3.5 (out of 5) for each PEO and SLO.

Table 4-6: Summary of results based on employer survey for each PEO and SLO

Assessment Category	Individual Assessment Category	Mean score (out of 5)	Action Required
Program Educational Objectives (PEOs)	*PEO 1*	4.36	NO
	PEO 2	4.27	NO
	PEO 3	4.45	NO
	PEO 4	4.36	NO
	PEO 5	4.36	NO
Student Learning Outcomes (SLOs)	*SLO a*	4.36	NO
	SLO b	4.45	NO
	SLO c	4	NO
	SLO d	4.45	NO
	SLO e	4	NO
	SLO f	4.36	NO
	SLO g	4.36	NO
	SLO h	4.22	NO
	SLO i	4.18	NO
	SLO j	4.36	NO

Table 4-6 summarizes the results for individual PEO and SLO based on the employer survey. The program faculty have decided that the target performance level for the employer surveys should be a mean score of 3.5 on a 1to 5 scale for individual PEO and SLO. As witnessed in Table 4-6 the target has been achieved for all PEOs and SLOs so no further action is recommended. Figure 4-4 depicts the graphical representation of the results for PEOs and SLOs based on the employer surveys. All this data will be available for review to the ABET/ETAC visiting team.



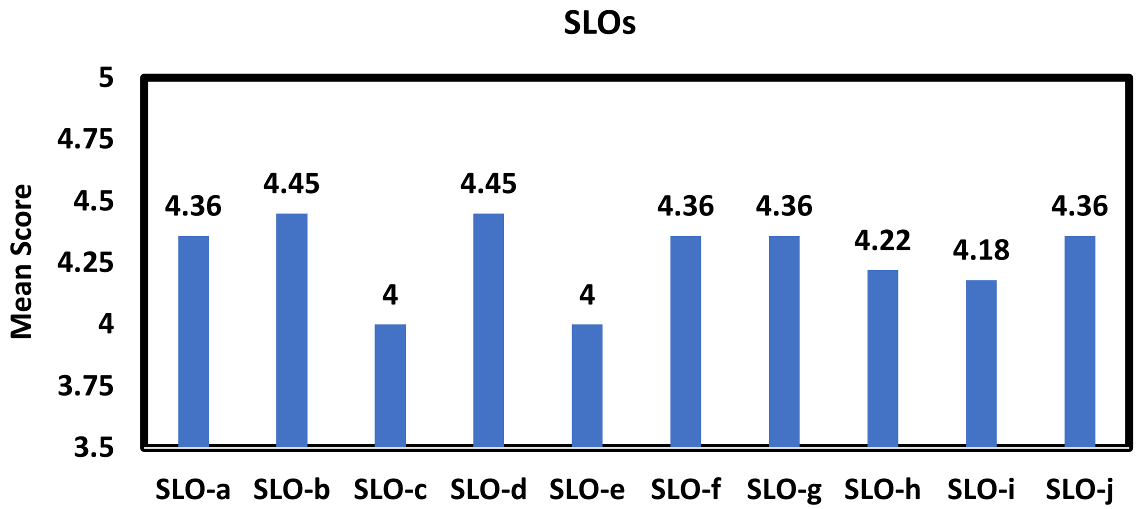


Figure 4-4: Graphical representation of the results for individual PEO and SLO based on the employer survey.

Graduating Senior Exit Survey: The graduating senior exit survey is used to solicit input from ET seniors in their last semester in the program. Since we have captive audience, we solicit extensive feedback from graduating seniors. The survey, which is approximately five pages in length, consists of six sections: personal information, career plans, ET curriculum, program SLOs, educational experience, and qualitative evaluation of the ET program. Most of these sections involve check boxes except for the qualitative evaluations section which invites subjective comments on the programs' strengths, weaknesses, and general comments. Candidates are told that aggregated data will be used for the purpose of continuous improvement and will be included in the ABET report. Note: This survey have been initiated for the first time in the academic 2018-2019 and we could only solicit 11 responses. However, this will continued every year since faculty felt that valuable feedback on the program can be obtained from the graduating seniors. If needed, appropriate continuous improvement measures will be undertaken based upon the feedback.

Assessment: All SLOs

Assessment Metric: Table 4-7 depicts the assessment rating for PEOs and SLOs.

Table 4-7: Assessment rating for PEOs and SLOs in graduating senior exit survey

Assessment	Category	Assessment Rating
Program Educational Objectives (PEOs) and Student Learning Outcomes (SLOs)	*Not Satisfied*	1
	Somewhat Satisfied	2
	Satisfied	3
	Very Satisfied	4
	Extremely Satisfied	5

Target: The performance goal is to have a mean score of >3.5 (out of 5) for each PEO and SLO.

Table 4-8: Summary of results based on graduating senior exit survey for each SLO

Assessment Category	Individual Assessment Category	Mean score (out of 5)	Action Required
Student Learning Outcomes (SLOs)	*SLO a*	3.18	YES
	SLO b	3.09	YES
	SLO c	3.18	YES
	SLO d	3.63	NO
	SLO e	3.36	YES
	SLO f	3.27	YES
	SLO g	3.63	NO
	SLO h	3.63	NO
	SLO i	3.27	YES
	SLO j	3.63	NO

Table 4-8 summarizes the results for individual SLO based on the graduating senior exit survey. The program faculty have decided that the target performance level for the exit surveys should be a mean score of 3.5 on a 1to 5 scale for individual SLO. As witnessed in Table 4-8 the target has not been achieved for six SLOs. <u>As an action, the program faculty will review the qualitative evaluation comments and come up with continuous improvement strategies during the 2019-2020 academic year</u>. Figure 4-5 depicts the graphical representation of the results for all SLOs based on the graduating senior exit surveys. All this data will be available for review to the ABET/ETAC visiting team.

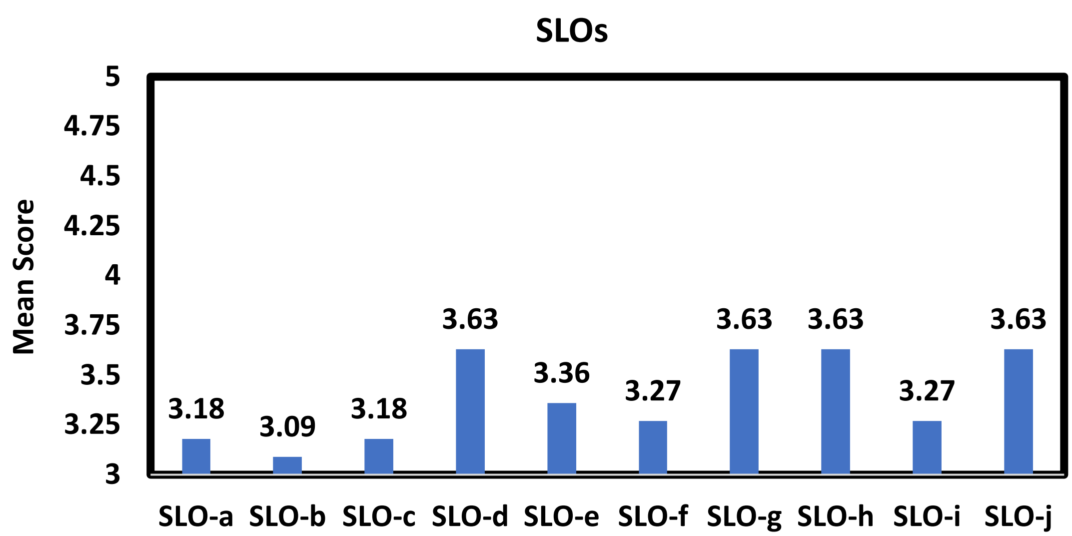


Figure 4-5: Graphical representation of the results for individual SLO based on the graduating senior exit survey.

B.2 Direct Assessment Methods

Direct assessment of Student Learning Outcomes (SLOs) is accomplished through direct evaluation of students' work (e.g., exam questions, homework, report, etc.) that is required within the ET curriculum. Each SLO is addressed in at least two different courses from the FET and MET curriculum as shown in the mapping of SLOs with ET courses, in Table 4-9.

SLO data for each course is collected by a course instructor, typically by a faculty member who teaches the respective course most frequently and who has been identified as the 'course coordinator' for that course. Each coordinator identifies the particular exam question, assignment, or project that best reflects achievement of each targeted SLO for that class. The Specific Method of Assessment column in Table 4-9 lists the source from which the data for a performance indicator (PI) for a particular SLO is collected. After identifying the source of assessment, coordinators then assess individual student performance based on an appropriate scale. It is emphasized to faculty members that SLO assessment scores must reflect the degree of learning on a particular course concept and, therefore, these scores are different and separate from the overall grade assigned for a student in the source for assessment.

Assessment Metric: Typically for lab reports and projects an appropriate scoring rubric is used. For heavy problems based courses, a particular homework or exam questions are assessed based on the weightage of that source.

Target: The expected level of attainment for each SLO is typically, a minimum 70% of the students must receive 70% average for all direct measures.

The frequency at which a particular PI is assessed for a particular SLO is listed in Table 4-9 under a separate column.

All the evidence in regards to the direct assessment methods will be presented for review to the ABET/ETAC visiting team during the site visit.

Table 4-9: Direct assessment of individual SLO

FET Student Outcome a: *Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated ability to use technical, operation and maintenance manuals, material specifications and industry regulations.	CEP 270 CEP 370 ENG 100 ENG 472 EPO 213 EPO 215 EPO 315 EPO 319	Co-op Employer Surveys Machining Project	CEP 270 CEP 370 EPO 213 EPO 215 EPO 315	2 years	Summer 2014/ 2015/2017/ 2018 {CEP 270/370} Spring 2015/2018/20 19 {EPO 315} Fall 2018/2017 {EPO 215} Spring 2018/2019 {EPO 213} Spring 2016/2017/20 18 {ET 460L}	80% of students scoring at least 4 (on a scale between 1-5) on the supervisor evaluations. 80% students scoring at least 80% in the Final Machining Project and Welding Exercises.
2. Demonstrated ability to develop and operate	COM 220L ENG 100 ET 400	Lab Reports	ET 460L	2 years	Fall 2014/2016/ 2018	80% students scoring at least 80% in

computer tools and automation system.	ET 400L LIB 100					the Lab Report.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
CEP 270/370	Co-Op Courses	Summer 2018	26	Met the target	NONE
		Summer 2017	8	Met the target	NONE
		Summer 2015	6	Met the target	NONE
		Summer 2014	8	Met the target	NONE
EPO 315	Manufacturing Processes II	Spring 2019	48	Met the target	NONE
		Spring 2018	33	Met the target	NONE
		Spring 2015	64	Met the target	NONE
EPO 215	Manufacturing Processes I	Fall 2018	77	Met the target	NONE
		Fall 2017	71	Met the target	NONE
EPO 213	Welding Lab	Spring 2019	30	Met the target	NONE
		Spring 2018	16	Met the target	NONE
ET 460L	Automation Lab	Spring 2018	24	Met the target	NONE
		Spring 2017	40	Met the target	NONE
		Spring 2016	32	Met the target	NONE

Action: Based on the direct assessment of FET SLO (a) using the courses (CEP 270; CEP 370; EPO 215; EPO 315; EPO 213; ET 460L), no action was warranted. However, there were improvements made to the CEP 270/CEP 370 Co-Op courses in the areas of project submission, overseeing of faculty member on weekly basis during the student Co-Ops, a single faculty member being responsible for overseeing CEP 270/CEP 370 courses. Improvements have also been made to the instructions provided to the students for machining projects in EPO 215/315 courses.

FET Student Outcome b: *<u>An ability to gain knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems associated with facilities, equipment, systems and vehicles.</u>*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated ability to apply mathematical tools in solving facilities engineering problems.	ET 230/230L ET 232 ET 250 ET 330 ET 332 ET 344 ET 350/350L	Exam Question Lab Reports	ET 230L ET 250 ET 344	1 year	Fall 2014/2016/ 2017/ 2018 {ET 230L} Fall 2015-2018 {ET 250} Fall 2014-2018 {ET 344}	80% students scoring at least 80% on the Lab Report. 70% students scoring at least 60% in the Exam Question.
2. Demonstrated ability to understand emerging technologies.	COM 220L ET 250/250L ET 370/370L ET 400/400L ET 460/460L	Lab Reports Exam Question Quizzes	ET 400 ET 460	2 years	Fall 2015/ 2017/2018 {ET 400} Spring 2016/ 2018/2019 {ET 460}	70% students scoring at least 60% in the Quiz. 70% students scoring at least 60% in the Exam Question.

3. Demonstrated ability to apply emerging technologies to facilities projects.	ET 370/370L ENG 470 ET 460/460L ET 490/490L	Project Case Study	ENG 470 ET 490	2 years	Spring 2016-2019 {ET 490} Fall 2014-2016 {ENG 470}	70% students scoring at least 80% in the Final Project and Case Study.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
ET 230L	Properties of Materials Lab	Fall 2018	42	Met the target	NONE
		Fall 2017	53	Met the target	NONE
		Fall 2016	45	Met the target	NONE
		Fall 2014	67	Target not met	YES
ET 250	Electrical Circuits	Fall 2018	50	Target not met	YES
		Fall 2017	60	Met the target	NONE
		Fall 2016	54	Met the target	NONE
		Fall 2015	40	Met the target	NONE
ET 344	Thermodynamics	Fall 2018	40	Met the target	NONE
		Fall 2017	46	Met the target	NONE
		Fall 2016	68	Target not met	YES
		Fall 2015	47	Target not met	YES
		Fall 2014	67	Target not met	YES
ET 400	Instrumentation	Fall 2018	51	Met the target	NONE
		Fall 2017	30	Met the target	NONE
		Fall 2015	52	Met the target	NONE

ET 460	Automation	Spring 2019	53	Met the target	NONE
		Spring 2018	31	Target not met	YES
		Spring 2016	48	Met the target	NONE
ET 490	Power Engineering	Spring 2019	15 Teams (3-4 students/team)	Met the target	NONE
		Spring 2018	32	Met the target	NONE
		Spring 2017	57	Met the target	NONE
		Spring 2016	48	Met the target	NONE
ENG 470	Engineering Management	Fall 2016	53	Met the target	NONE
		Fall 2015	56	Met the target	NONE
		Fall 2014	42	Met the target	NONE

Action: As depicted in the table above, the expected level of attainment has not been reached in ET 250 (Fall 2018); ET 344 (Fall 2014-2016); ET 400 (Fall 2015, Fall 2017, Fall 2018); ET 460 (Spring 2018); ET 490 (Spring 2019). Appropriate improvements have been made in the courses where action was needed. All the course improvements will be discussed in Section E.

FET Student Outcome c: *An ability to conduct standard tests, measurements, and experiments and to analyze and the results to improve processes and design.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated ability to develop lab procedures given	ET 230L ET 250L ET 340L ET 342L	Lab Reports	ET 230L ET 340L	2 years	Fall 2014/2016/ 2017/ 2018 {ET 230L}	80% students scoring at least 80% in the Lab Report.

instructions concerning required data.	ET 400L ET 460L ET 490L				Spring 2015/ 2017/2019 {ET 340L}	
2. Demonstrated ability to use instruments for measuring.	ET 230L EPO 315 ET 250L ET 370L ET 400L ET 460L	Lab Reports Projects	ET 460L EPO 315 ET 250L	2 years	Spring 2016/ 2017/2018 {ET 460L} Fall 2014/2015/2017 {ET 250L} Spring 2015/2018/2019 {EPO 315}	80% students scoring at least 80% in the Lab Report. 80% students scoring at least 80% in the Machining Project.
3. Demonstrated ability to write a lab report.	ET 230L/250L/ 340L/400L/ 460L	Lab Report	ET 340L	2 years	Spring 2015/2017/2019 {ET 340L}	80% students scoring at least 80% in the Lab Report.
4. Demonstrated ability to analyze and interpret results of experiments.	ET 230L/250L/340L/ 400L/460L	Lab Report	ET 230L ET 340L ET 460L	2 years	Fall 2014/2016/ 2017/ 2018 {ET 230L} Spring 2015/2017/2019 {ET 340L} Spring 2016/ 2017/2018 {ET 460L}	70% students scoring at least 70% in the Lab Report.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
ET 230L	Properties of Materials Lab	Fall 2018	42	Met the target	NONE
		Fall 2017	53	Met the target	NONE
		Fall 2016	45	Met the target	NONE
		Fall 2014	67	Target not met	YES
ET 340L	Fluids Lab	Spring 2019	33	Met the target	NONE
		Spring 2017	50	Met the target	NONE
		Spring 2015	45	Met the target	NONE
EPO 315	Manufacturing Processes II	Spring 2019	48	Met the target	NONE
		Spring 2018	33	Met the target	NONE
		Spring 2015	64	Met the target	NONE
ET 250L	Electrical Circuits Lab	Fall 2017	63	Met the target	NONE
		Fall 2015	40	Met the target	NONE
		Fall 2014	31	Met the target	NONE
ET 460L	Automation Lab	Spring 2018	24	Met the target	NONE
		Spring 2017	40	Met the target	NONE
		Spring 2016	32	Met the target	NONE

Action: Based on the direct assessment of FET SLO (c) using the courses (ET 230L; ET 340L; EPO 315; ET 250L; ET 460L) no action was warranted. However, improvements have been made to the instructions provided to the students for machining projects in EPO 315 course and grading rubric for ET 340L course.

FET Student Outcome d: *An ability to function effectively as a member or leader on a technical team.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated understanding of issues in working on a team.	CEP 270 CEP 370 CRU 150 ENG 470 EPO 235 EPO 321	Co-Op Project Evaluation Simulator Watch Team Evaluations	CEP 270 CEP 370 EPO 230	2 years	Summer 2014/ 2015/2017/ 2018 {CEP 270/370} Spring 2015/ Fall 2017 {EPO 230}	80% of students scoring at least 4 (on a scale between 1-5) on the supervisor evaluations. 80% students at least 80% or above in the assigned milestone task
2. Demonstrated ability to function as a member of a small team including providing individual contributions to the team.	CEP 270 CEP 370 EPO 235 ET 370L ET 340L ET 350L ET 490L	Co-op Project Evaluation Simulator Watch Team Evaluations	CEP 270 CEP 370 EPO 235	1 year	Summer 2014/ 2015/2017/ 2018 {CEP 270/370} Spring 2014/2015/2016/2019 {EPO 235}	80% of students scoring at least 4 (on a scale between 1-5) on the supervisor evaluations.

						70% students scoring at least 4 (on a scale 1 to 5) in their Watch Team Evaluation as Chief Engineer
3. Demonstrated ability to lead a team.	CEP 370 EPO 235 EPO 321	Simulator Watch Team Evaluations	EPO 235	2 years	Spring 2014/2015/2016/2019 {EPO 235}	70% students scoring at least 4 (on a scale 1 to 5) in their Watch Team Evaluation as Chief Engineer

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
CEP 270/370	Co-Ops	Summer 2018	26	Met the target	NONE
		Summer 2017	8	Met the target	NONE
		Summer 2015	6	Met the target	NONE
		Summer 2014	8	Met the target	NONE
EPO 230	Steam Plant System and Operations	Fall 2017	26	Met the target	NONE
		Spring 2015	24	Met the target	NONE

EPO 235	Steam Plant Watch Team Management	Spring 2019	24	Met the target	NONE
		Spring 2016	23	Met the target	NONE
		Spring 2015	59	Met the target	
		Spring 2014	24	Met the target	NONE

Action: Based on the direct assessment of FET SLO (d) using the courses (CEP 270; CEP 370; EPO 230; EPO 235) no action was warranted. However, there were improvements made to the CEP 270/CEP 370 Co-Op courses in the areas of project submission, overseeing of faculty member on weekly basis during the student Co-Ops, a single faculty member being responsible for overseeing CEP 270/CEP 370 courses. The course improvements will be discussed in Section E.

FET Student Outcome e: *An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to facilities equipment, systems and structures.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated ability to apply engineering principles of thermodynamics, fluid mechanics, mechanics, materials and electrical circuits to facility engineering problems.	ET 230/230L ET 250/250L ET 232 ET 330 ET 340/340L ET 344 ET 490/490L ET 350/350L	Exam Question	ET 330 ET 340 ET 344	2 years	Fall 2014/2015/ 2016/2018 {ET 330} Spring 2015/ 2017/2019 {ET 340}	70% students scoring at least 60% in the Exam Question.

					Fall 2014-2018 {ET 344}	
2. Demonstrated ability to apply electrical and electronics concepts to facility engineering systems	CEP 370 EPO 250/250L ET 350/350L ET 370/370L ET 400/400L ET 460/460L	Exam Question Projects	ET 250 ET 400 ET 460	1 year	Fall 2015-2018 {ET 250} Fall 2015/ 2017/2018 {ET 400} Spring 2016/2018/2019 {ET 460}	70% students scoring at least 60% in the Exam Question.
3. Demonstrated ability to analyze energy system for efficiency and performance.	ET 344 ET 490/490L EPO 214 EPO 312	Exam Question	ET 344	1 year	Fall 2014-2018 {ET 344}	70% students scoring at least 60% in the Exam Question.
4. Demonstrated ability to design electronic circuits to perform a desired task.	ET 250/250L ET 370/370L ET 400/400L ET 350/350L	Exam Question	ET 370	1 year	Spring 2015-2018 {ET 370}	70% students scoring at least 60% in the Exam Question.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
ET 330	Dynamics	Fall 2018	46	Target not met	YES
		Fall 2016	32	Target not met	YES
		Fall 2015	66	Target not met	YES
		Fall 2014	61	Met the target	NONE

ET 340	Fluids	Spring 2019	47	Target not met	YES
		Spring 2017	51	Met the target	NONE
		Spring 2015	38	Met the target	NONE
ET 344	Thermodynamics	Fall 2018	40	Met the target	NONE
		Fall 2017	46	Met the target	NONE
		Fall 2016	68	Target not met	YES
		Fall 2015	47	Target not met	YES
		Fall 2014	67	Target not met	YES
ET 250	Electrical Circuits	Fall 2018	50	Target not met	YES
		Fall 2017	60	Met the target	NONE
		Fall 2016	54	Met the target	NONE
		Fall 2015	40	Met the target	NONE
ET 400	Instrumentation	Fall 2018	51	Target not met	YES
		Fall 2017	30	Target not met	YES
		Fall 2015	52	Target not met	YES
ET 460	Automation	Spring 2019	53	Met the target	NONE
		Spring 2018	31	Target not met	YES
		Spring 2016	48	Met the target	NONE
ET 370	Electronics	Spring 2018	51	Target not met	YES
		Spring 2017	33	Target not met	YES
		Spring 2016	58	Target not met	YES
		Spring 2015	51	Target not met	YES

Action: Based on the direct assessment of FET SLO (e) using the courses (ET 330; ET 340; ET 344; ET 250; ET 400; ET 460; ET 370) there was a need for course improvements in ET 330 (Fall 2015 and Fall 2016); ET 340 (Spring 2019); ET 344 (Fall 2014, Fall 2015, Fall 2016); ET 250 (Fall 2018); ET 400 (Fall 2018, Fall 2017, Fall 2015); ET 460 (Spring 2018); ET 370 (Spring 2015-2018). All the course improvements that were implemented in these courses will be discussed in Section E.

FET Student Outcome f: ***An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments and an ability to identify and use appropriate technical literature.***

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated understanding of effective writing skills.	EGL 100 EGL 300 GE Electives HUM 310	Report	HUM 310	1 year	Spring 2015-2019 {HUM 310}	70% students scoring at least 80% on the Report.
2. Demonstrated ability to write an effective technical report.	CEP 270 CEP 370 ET 370L ET 340L ET 350L ET 490L	Co-op Project Evaluation Lab Reports	CEP 270 CEP 370 ET 340L	2 years	Summer 2014/ 2015/2017/ 2018 {CEP 270/370} Spring 2015/ 2017/2019 {ET 340L}	80% students scoring at least 80% in the Co-Op Report and Lab Report.
3. Demonstrated ability to communicate a compelling argument through a professional presentation.	EGL 110 ENG 470 ET 490L	Course Presentation	ET 490	2 years	Spring 2016-2019 {ET 490}	70% students scoring at least 80% in the Course Presentation.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
CEP 270/370	Co-Ops	Summer 2018	26	Met the target	NONE
		Summer 2017	8	Met the target	NONE
		Summer 2015	6	Met the target	NONE
		Summer 2014	8	Met the target	NONE
HUM 310	Engineering Ethics	Spring 2019	56	Target not met	YES
		Spring 2018	61	Met the target	NONE
		Spring 2017	92	Target not met	YES
		Spring 2016	98	Target not met	YES
		Spring 2015	75	Met the target	NONE
ET 340L	Fluids Lab	Spring 2019	33	Met the target	NONE
		Spring 2017	50	Met the target	NONE
		Spring 2015	45	Met the target	NONE
ET 490	Power Engineering	Spring 2019	15 Teams (3-4 students/team)	Met the target	YES
		Spring 2018	32	Met the target	YES
		Spring 2017	57	Met the target	NONE
		Spring 2016	48	Met the target	NONE

Action: Based on the direct assessment of FET SLO (f) using the courses (CEP 270; CEP 370; ET 490; HUM 310; ET 340L) there was a need for course improvements in HUM 310 (Spring 2019) and ET 490 (Spring 2019). Course improvements that were implemented will be discussed in Section E.

FET Student Outcome g: *An ability to understand and apply concepts of professional, ethical and social responsibilities.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated understanding of ethical issues in engineering.	ENG 470 ENG 472 HUM 310	Report	HUM 310	1 year	Spring 2015-2019 {HUM 310}	70% students scoring at least 80% on the Written Report.
2. Demonstrated ability to analyze a potential ethical situation and present a clear and compelling case.	EGL 100 HUM 310 Critical Thinking Elective	Report	HUM 310	1 year	Spring 2015-2019 {HUM 310}	70% students scoring at least 80% on the Written Report.
3. Demonstrated understanding of the professional societies and their code of ethics.	ET 110 ENG 470 HUM 310	Report	HUM 310	1 year	Spring 2015-2019 {HUM 310}	80% students scoring at least 80% on the Written Report.
4. Demonstrated understanding of social responsibilities.	CRU 150 ENG 470 ENG 472 ET 490/490L HUM 310	Report	HUM 310	1 year	Spring 2015-2019 {HUM 310}	70% students scoring at least 80% on the Written Report.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
HUM 310	Engineering Ethics	Spring 2019	56	Target not met	YES
		Spring 2018	61	Met the target	NONE
		Spring 2017	92	Target not met	YES
		Spring 2016	98	Target not met	YES
		Spring 2015	75	Met the target	NONE

Action: Based on the direct assessment of FET SLO (g) using the course (HUM 310) there was a need for course improvement in HUM 310 (Spring 2019). The plan for course improvement will be discussed in Section E.

FET Student Outcome h: *Respect for diversity and a knowledge of contemporary professional, societal and global issues.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated understanding of issues of pollution from facilities.	CRU 150 EPO 110 EPO 230 CEP 270 CEP 370 ENG 472 ET 490/490L	Class Task Exam Questions	EPO 230 ENG 472	2 years	Spring 2015/ Fall 2017 {EPO 230} Spring 2015/2016/2018/2019 {ENG 472}	80% students scoring at least 80% on the Class Task. 80% students scoring at least 80% in

						the Case Study (or) Class Discussion.
2. Demonstrated understanding of the environmental effects of technology.	CHE 205 CRU 150 CEP 270 CEP 370 ENG 472 ET 490/490L	Report	ET 490	1 year	Spring 2016-2019 {ET 490}	70% students scoring at least 80% on the Project Report.
3. Demonstrated understanding of the effects of technology on the globalization process.	CEP 270 CEP 370 ENG 470 ET 490/490L	Case Study	ENG 470	2 years	Fall 2014-2016 {ENG 470}	80% students scoring at least 80% on the Case Study.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
EPO 230	Steam Plant Systems and Operations	Fall 2017	26	Met the target	NONE
		Spring 2015	24	Met the target	NONE
ET 490	Power Engineering	Spring 2019	15 Teams (3-4 students/team)	Met the target	NONE
		Spring 2018	32	Met the target	NONE
		Spring 2017	57	Met the target	NONE
		Spring 2016	48	Met the target	NONE

ENG 470	Engineering Management	Fall 2016	53	Met the target	NONE
		Fall 2015	56	Met the target	NONE
		Fall 2014	42	Met the target	NONE
ENG 472	Facilities Management	Spring 2019	9	Met the target	NONE
		Spring 2018	17	Met the target	NONE
		Spring 2016	18	Met the target	NONE
		Spring 2015	12	Met the target	NONE

Action: Based on the direct assessment of FET SLO (h) using the courses (EPO 230; ET 490; ENG 470; ENG 472) no action was warranted.

FET Student Outcome i: *Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated ability to analyze the performance of power plants.	EPO 214 EPO 312 ET 344 EPO 321 ET 490/490L	Exam Questions	ET 344		Fall 2014-2018 {ET 344}	70% students scoring at least 60% on the Exam Question.
2. Demonstrated ability to operate and maintain facility systems.	CEP 270 CEP 370 EPO 110 EPO 210 EPO 230	Report Task	EPO 230 ENG 472		Spring 2015/2016/2018/2019 {ENG 472}	80% students scoring at least 80% on the Task and Case

	EPO 310				Spring 2015/Fall 2017 {EPO 230}	Study/Class Discussion.
3. Demonstrated ability to analyze energy consumption and conservation of facilities.	CEP 270 CEP 370 ENG 472 ET 490/490L	Report	ENG 472 ET 490		Spring 2015/2016/2018/2019 {ENG 472} Spring 2016-2019 {ET 490}	70% students scoring at least 80% on the Report and Case Study/Class Discussion.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
ET 344	Thermodynamics	Fall 2018	40	Met the target	NONE
		Fall 2017	46	Met the target	NONE
		Fall 2016	68	Target not met	YES
		Fall 2015	47	Target not met	YES
		Fall 2014	67	Target not met	YES
EPO 230	Steam Plant Systems and Operations	Fall 2017	26	Met the target	NONE
		Spring 2015	24	Met the target	NONE
ET 490	Power Engineering	Spring 2019	15 Teams (3-4 students/team)	Met the target	NONE
		Spring 2018	32	Met the target	NONE
		Spring 2017	57	Met the target	NONE
		Spring 2016	48	Met the target	NONE

ENG 472	Facilities Management	Spring 2019	9	Met the target	NONE
		Spring 2018	17	Met the target	NONE
		Spring 2016	18	Met the target	NONE
		Spring 2015	12	Met the target	NONE

Action: Based on the direct assessment of FET SLO (i) using the courses (EPO 230; ET 344; ET 490; ENG 472) there was a need for course improvements in ET 344 (Fall 2014, Fall 2015, Fall 2016); ET 490 (Spring 2019). The course improvements that were made will be discussed in Section E.

FET Student Outcome j: *Commitment to quality, safety, timeliness and continuous improvement.*

Performance Indicators (PI) for this outcome	Courses were PI exists (use a simple list)	Specific Method of Assessment (rubric, etc.)	Courses Assessed (where the PI and related data are collected)	Cycle of When the PI Assessed (how often)	Year & Semester when Data Were Collected	Performance Target for PI
1. Demonstrated understanding of the measures of quality and timeliness and how these measures are applied.	EPO 215 EPO 213 EPO 315 EPO 230 EPO 235 ENG 470 ENG 472	Project	EPO 315	2 years	Spring 2015/2018/2019 {EPO 315}	80% students scoring at least 80% on the Machining Project.
2. Demonstrated understanding of current management tools for continuous improvement.	EPO 315 ENG 470 ENG 472	Case Study	ENG 470	2 years	Fall 2014-2016 {ENG 470}	80% students scoring at least 80% on

						the Case Study.
3. Demonstrated understanding of safety as it relates to facilities.	EPO 215 EPO 315 CEP 270 CEP 370 EPO 230	Project	EPO 215 EPO 315	2 years	Spring 2015/2018/2019 {EPO 315} Fall 2018/2017 {EPO 215}	80% students scoring at least 80% on the Machining Project.

Summary of Results:

Course	Name	Assessment Term	Sample Size for Assessment	Result	Action Required
EPO 315	Manufacturing Processes II	Spring 2019	48	Met the target	NONE
		Spring 2018	33	Met the target	NONE
		Spring 2015	64	Met the target	NONE
EPO 215	Manufacturing Processes I	Fall 2018	77	Met the target	NONE
		Fall 2017	71	Met the target	NONE
ENG 470	Engineering Management	Fall 2016	53	Met the target	NONE
		Fall 2015	56	Met the target	NONE
		Fall 2014	42	Met the target	NONE

Action: Based on the direct assessment of FET SLO (j) using the courses (EPO 215; EPO 315; ENG 470) no action was warranted.

C. Assessment Schedule and Frequency

Present the schedule and frequency for each type of assessment as well as points of accountability (tabular format is encouraged). Examples of assessments or data collected to date can be referenced electronically in the self-study report and must be available for review at the time of the visit.

Table 4-1 and Table 4-2 tabulates the assessment timeline for PEOs and SLOs, respectively.

D. Evaluation

Present the evaluation schedule, points of accountability, and expected level of attainment for each student outcome. Provide summaries of the results of evaluation analyses over time illustrating current attainment of each student outcome and trends in attainment over time (tabular presentation is encouraged). Describe how results are communicated and preserved and provide one or more examples electronically or in appendices.

All the results from the indirect assessment methods and direct assessment methods have been presented in Section A and Section B. In this section all the courses for which the target was not attained will be graphically presented over time illustrating the attainment level compared to the target.

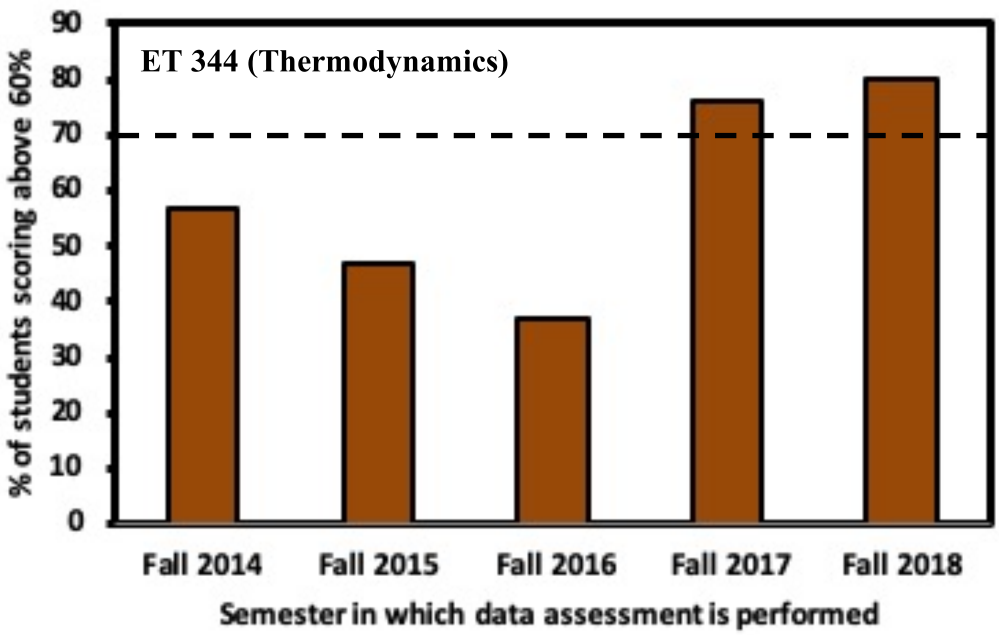


Figure 4-6: Percentage of students scoring above 60% in the exam question in ET 344 (Thermodynamics). Target (70%) is shown as dashed line.

Assessment for the ET 344 course was based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4-6 depicts the results between 2014-2018. It can be witnessed that the attainment level was below the target for the years between 2014-2016 and it needed course improvements be implemented addressing the issues with unit conversions (English

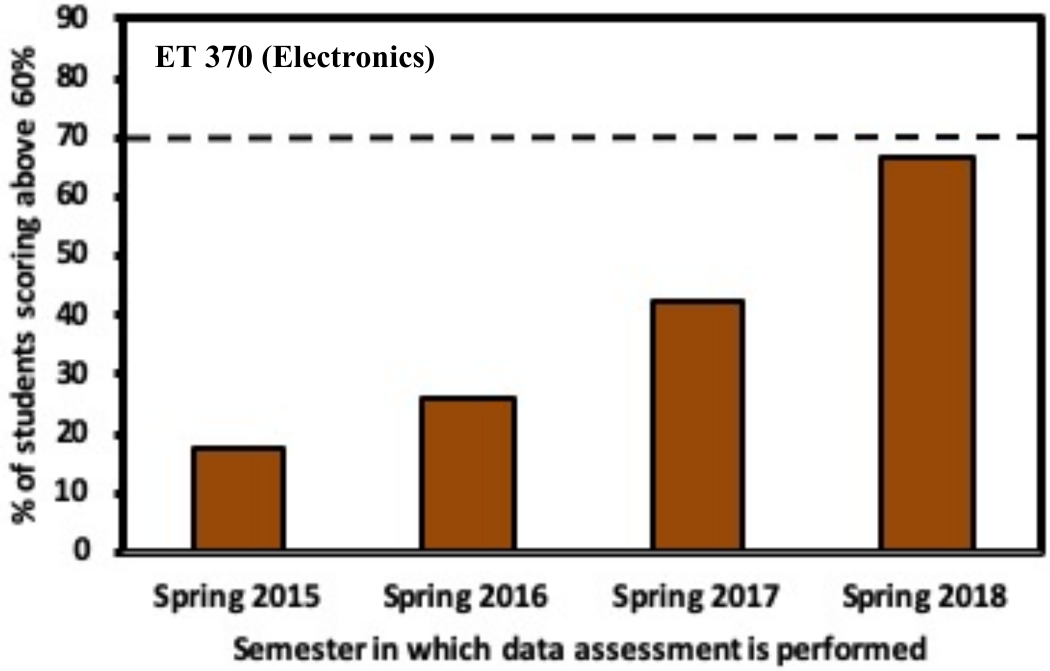


Figure 4-7: Percentage of students scoring above 60% in the exam question in ET 370 (Electronics). Target (70%) is shown as dashed line.

system and SI system) and problem solving. Continuous improvement strategies have been implemented by the course instructor that will be discussed in Section E.

Assessment for the ET 370 course was based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4-7 depicts the results between 2015-2018. It can be witnessed that the attainment level was below the target for all the assessment years and it needed course improvements be implemented by addressing the students' issues with understanding the concept of the problem question and coming up with a solution to the problems. Although, there has been improvement in the student attainment level over the years, implementation of the continuous improvement strategies should be continued and they will be discussed in Section E.

Assessment for the ET 400 course was based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4-8 depicts the results for Fall 2015, Fall 2017 and Fall 2018 semesters. It can be witnessed that the attainment level was below the target for all the assessment years and it needed course improvements be implemented by addressing the students' issues with understanding the concept of the problem question and coming up with a solution to the problems. The continuous improvement strategies will be discussed in Section E.

The assessment for the ET 460 course was also based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4.9 depicts the results for Spring 2016, Spring 2018 and Spring 2019. Except for Spring 2018 the target has been met for other semesters. The continuous improvement strategies for this course will also be discussed in Section E.

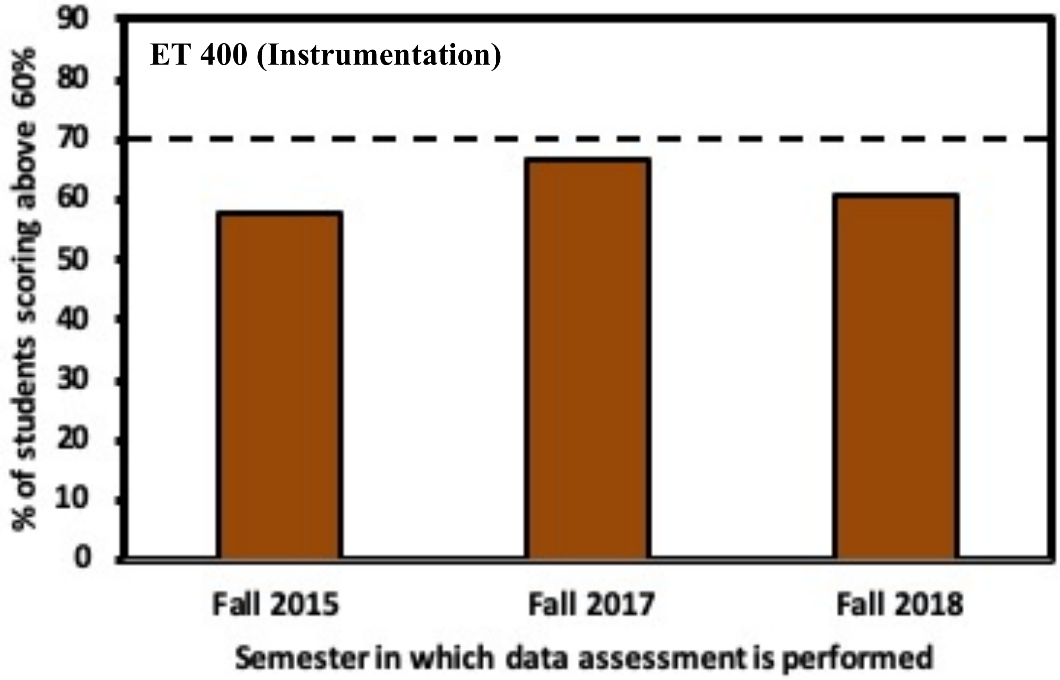


Figure 4-8: Percentage of students scoring above 60% in the exam question in ET 400 (Instrumentation). Target (70%) is shown as dashed line.

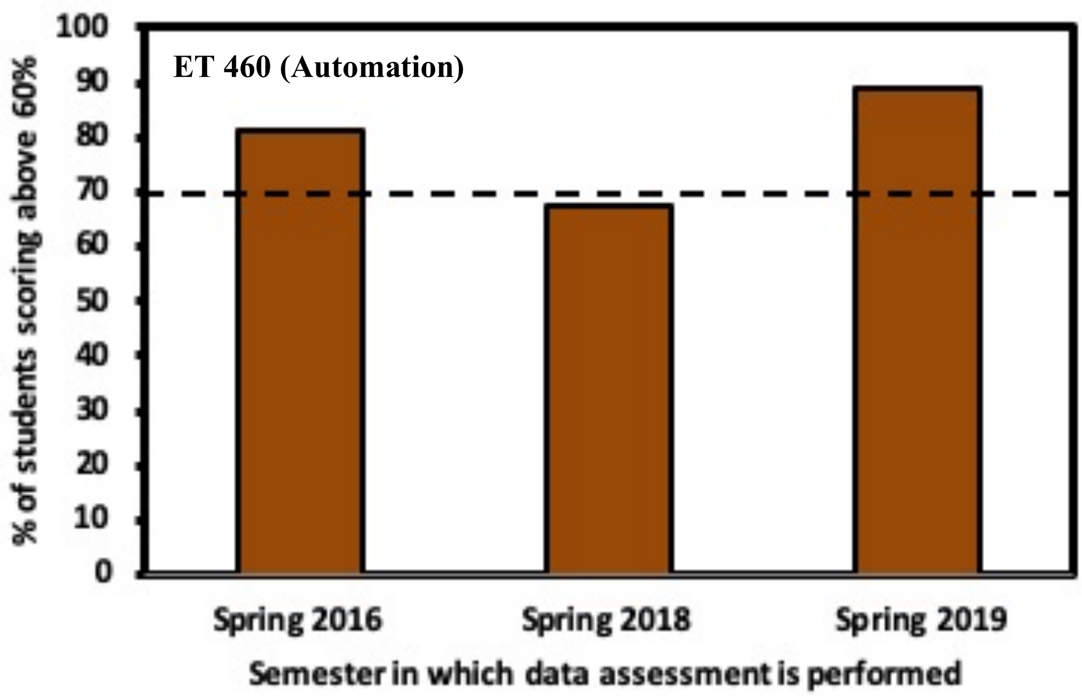


Figure 4-9: Percentage of students scoring above 60% in the exam question in ET 460 (Automation). Target (70%) is shown as dashed line.

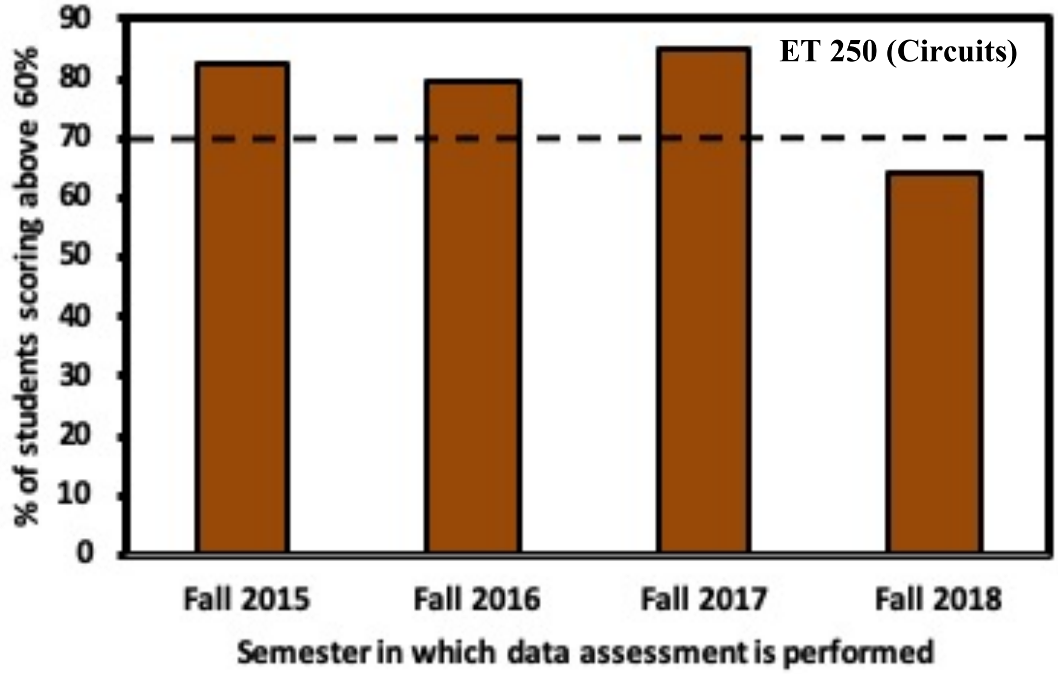


Figure 4-10: Percentage of students scoring above 60% in the exam question in ET 250 (Circuits). Target (70%) is shown as dashed line.

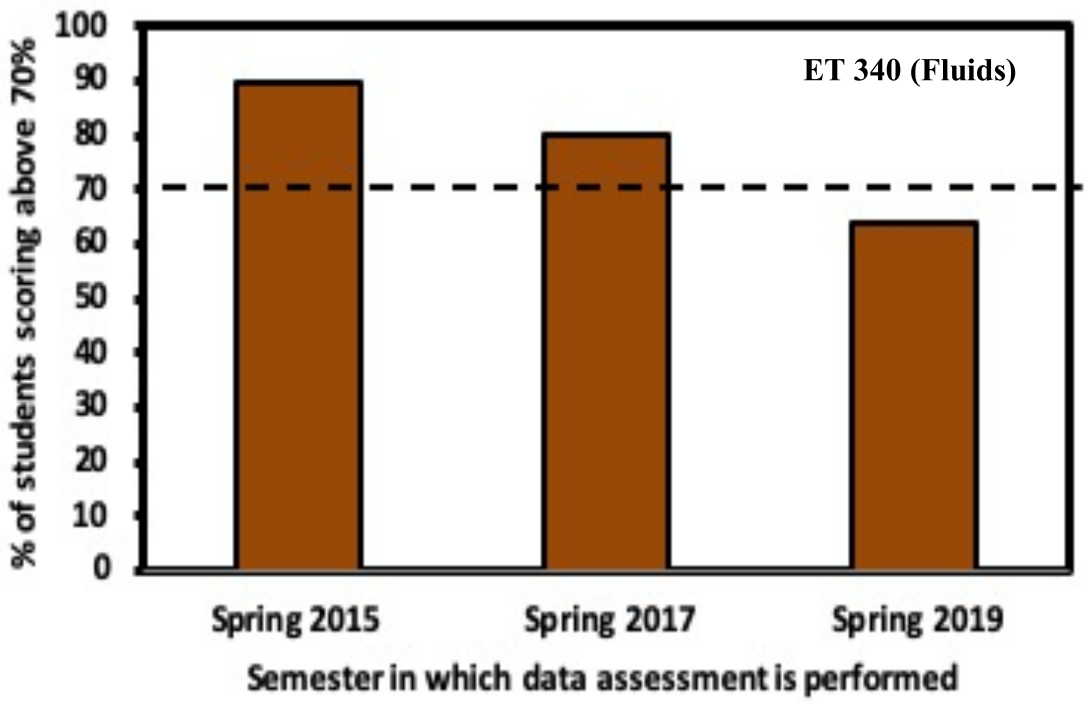


Figure 4-11: Percentage of students scoring above 60% in the exam question in ET 340 (Fluids). Target (70%) is shown as dashed line.

Assessment for the ET 250 course was based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4-10 depicts the results between Fall 2015-2018 semesters. It can be witnessed that the attainment level met the target for all the semesters except for Fall 2018. The course improvements need to be implemented by analyzing the students' performance in the concept that was assessed. The continuous improvement strategies will be discussed in Section E.

Assessment for the ET 340 course was based on the performance goal of 70% students scoring 70% or above in the exam question. Figure 4-11 depicts the results for Spring 2019, Spring 2017 and Spring 2015 semesters. It can be witnessed that the attainment level met the target for Spring 2015 and Spring 2017 semesters but the target was not met during the Spring 2019 semester. The course improvements need to be implemented by analyzing the students' performance in the concept that was assessed. The continuous improvement strategies will be discussed in Section E.

Assessment for the ET 330 course was based on the performance goal of 70% students scoring 60% or above in the exam question. Figure 4-12 depicts the results for Fall 2014, Fall 2015, Fall 2016 and Fall 2018 semesters. It can be witnessed that the attainment level did not meet the target except for the Fall 2014 semester. The course improvements need to be implemented by analyzing the students' performance in the concept that was assessed. The continuous improvement strategies will be discussed in Section E.

Assessment for the HUM 310 course was based on the performance goal of 70% students scoring 80% or above in the written report. Figure 4-13 depicts the results between Spring 2015-2019 semesters. It can be witnessed that the attainment level did not meet the target during Spring 2016, Spring 2017 and Spring 2019 semesters. The continuous improvement strategies will be discussed in Section E.

Figures 4-14 and 4-15 depict the assessment results for ET 340L and ET 230L, respectively. The assessment target was that 80% students scoring 80% or above in the lab report. It can witnessed that the target was not met, during Spring 2017 semester for ET 340L and during Fall 2014 semester for ET 230L. The course changes that were implemented as a continuous improvement process will be discussed in Section E.

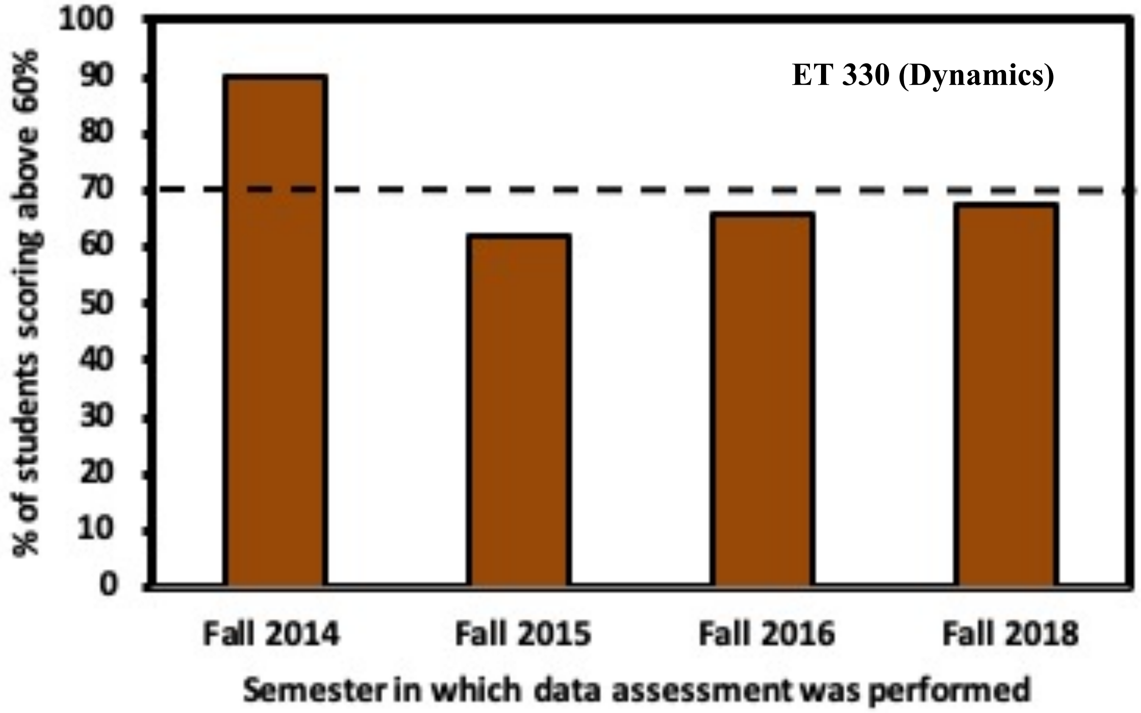


Figure 4-12: Percentage of students scoring above 60% in the exam question in ET 330 (Dynamics). Target (70%) is shown as dashed line.

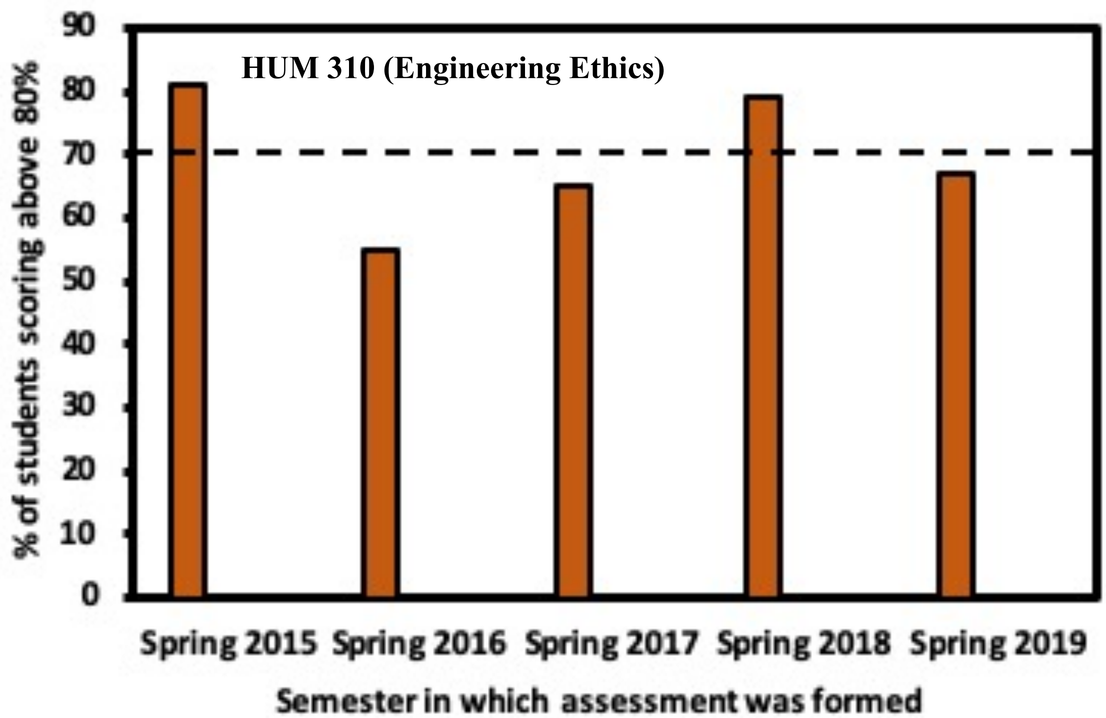


Figure 4-13: Percentage of students scoring above 80% in the written report in HUM 310 (Engineering Ethics). Target (70%) is shown as dashed line.

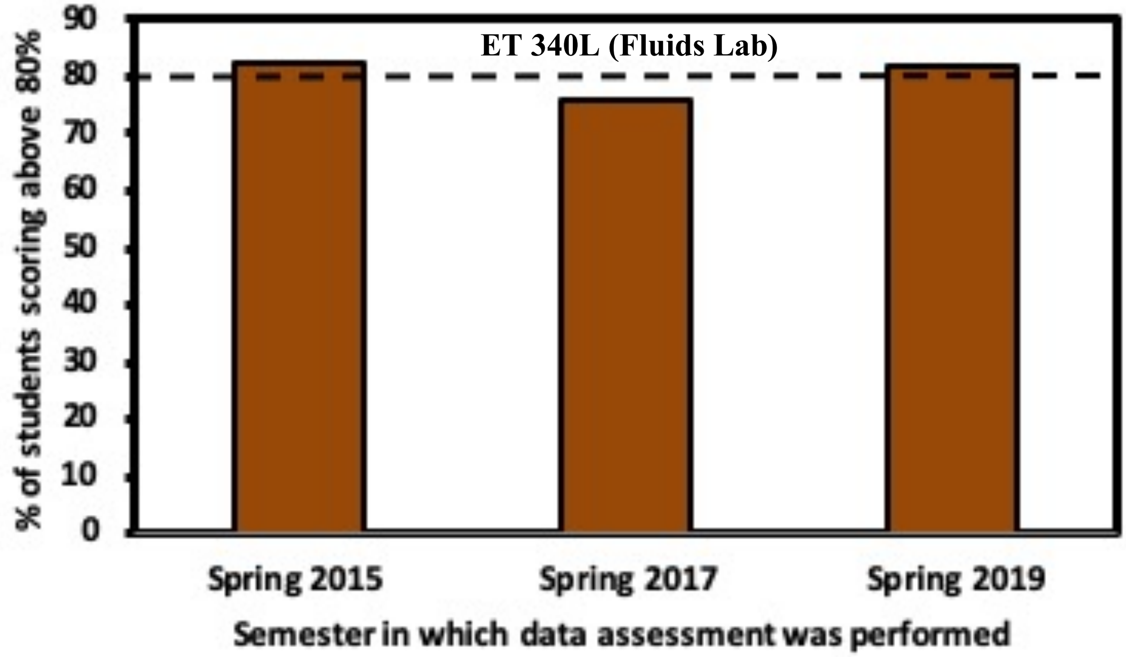


Figure 4-14: Percentage of students scoring above 80% in the lab report in ET 340L (Fluids Lab). Target (80%) is shown as dashed line.

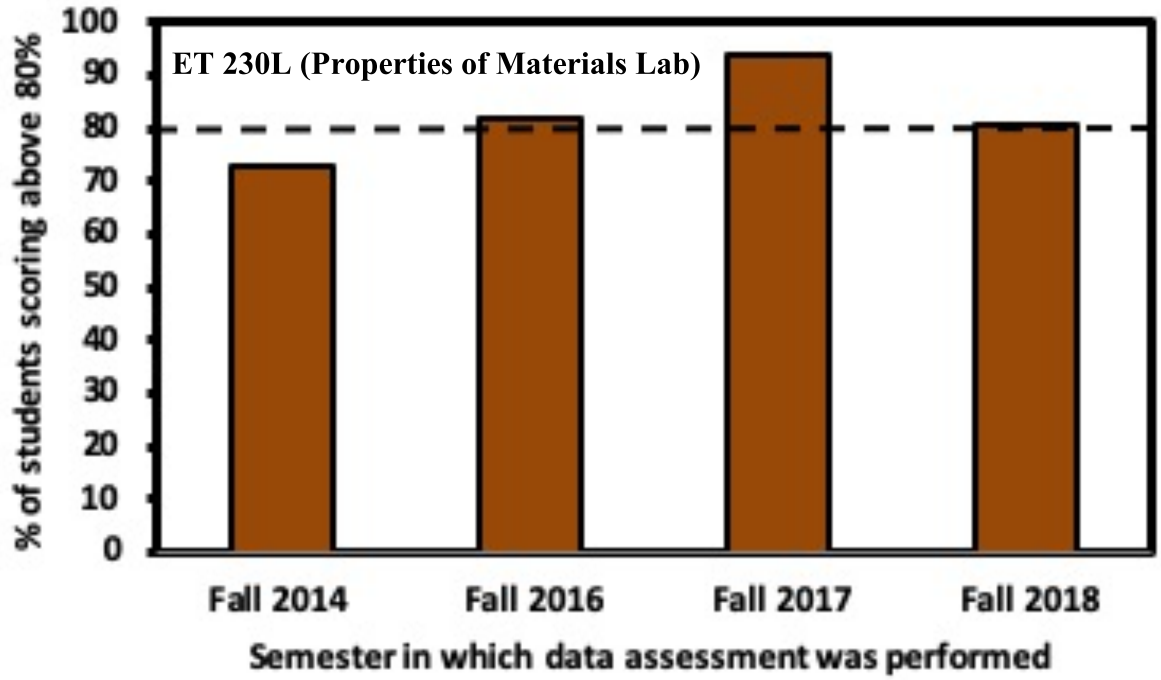


Figure 4-15: Percentage of students scoring above 80% in the lab report in ET 230L (Properties of Materials Lab). Target (80%) is shown as dashed line.

E. Using Results for Continuous Improvement

Describe how the results of the evaluations (from section D above) and any other available information are systematically used as input in the continuous improvement of the program. Present points of accountability, schedule and frequency. Summarize deliberations, decisions and actions which have been implemented as a result of these evaluations and indicate any significant future program improvement plans including the rationale for each. Provide references in the appendices or electronically as evidence of deliberations and decisions on improvements and input used. Evidence might include evaluation reports, agendas, minutes, memos, etc.

The example table above has boxes for this information.

Assessment is defined as one or more processes that identify, collect, and prepare the data necessary for evaluation. As discussed in Sections A and B, the Engineering Technology programs at California State University Maritime Academy (CSUM) has identified 10 program outcomes for Facilities Engineering Technology (FET) and Marine Engineering Technology (MET) that also envelopes ABET/ETAC recommended Student Learning Outcomes (SLOs). SLOs achievement in the ET programs is assessed through a variety of both indirect and direct methods as discussed in the earlier sections.

Although direct assessment methods are often considered to be a more reliable method of assessing SLOs than the indirect assessment methods, our program recognizes the advantage with surveys that offers both 'objective' rating of outcomes and 'subjective' comments that are useful in interpreting the data and better understand underlying contributors to 'high' and 'low' ratings. Thus, faculty consider both types of assessment data (indirect and direct) to be important in making decisions about program improvement actions.

The process of continuous improvement occurs at the program level and at the individual course level with evaluation, which is defined as one or more processes for interpreting the assessment data in order to determine how well the student learning outcomes (SLOs) are being attained. A goal of the Engineering Technology program is to create a culture of assessment among the faculty. The results of SLOs assessment as described above in Section A and Section B are regularly reviewed as they become available, with results and recommendations discussed at the department meetings. Results are then considered when making decisions and establishing priorities for all aspects of the program (e.g., curriculum development; resource allocation; course improvement strategies; faculty recruitment; lab renovation; and student advising procedures). If the attainment of the performance target for any SLOs is identified as needing improvement, the problem is discussed directly with faculty members whose courses map directly to that SLO. The course improvements that were implemented in the individual courses that did not meet the performance target will be further discussed in this Section E under the header Continuous Improvement (Direct assessment methods)..

E.1 Continuous Improvement (Indirect assessment methods)

Alumni Surveys: The program's policy is to seek input from its alumni every 2 to 3 years with the survey asking for both 'objective' ratings of how the program prepared them to meet SLOs, as well as subjective comments about program strengths, weaknesses and recommendations for improvement. However, the rate of return was low and appropriate strategies should be formed to address this issue. This will be further discussed with the alumni board and the Office of Advancement during the academic year 2019-2020. Copies of all the survey responses and data summaries will be available in a binder at the time of the ABET/ETAC site visit.

Employer Surveys: The program's policy is to seek regular input from the employers with the survey to evaluate the preparedness of the graduates to attain SLOs. Employers also provide feedback on the appropriateness of the Program Educational Objectives (PEOs) relative to meeting industry needs and relative to their consistency with the University Mission. As a part of continuous improvement process, employer feedback will be sought out every year in coordination with career services. Copies of all the survey responses and data summaries will be available in a binder at the time of the ABET/ETAC site visit.

Graduating Senior Exit Surveys: This survey was conducted for the first time in Spring 2019. This survey is intended to discuss students' experiences in the program to obtain feedback regarding strengths, weaknesses, and suggestion for improvement. As a part of continuous improvement the department chair will meet graduating seniors every year to sought feedback. Copies of all the survey responses and data summaries will be available in a binder at the time of the ABET/ETAC site visit.

E.2 Continuous Improvement (Direct assessment methods)

The courses that did not attain the performance target in individual courses during the assessment cycle had been presented in Section D. The continuous improvement strategies for each course based on the evaluation is discussed here in this section.

ET 344 (Thermodynamics)

The assessment for this course is performed between Fall 2014 - Fall 2018 semesters. As shown in Figure 4-6 the performance target was not met during Fall 2014, Fall 2015 and Fall 2016 semesters. The students' work has been evaluated and it was identified that majority of the student population had struggled with unit conversions, understanding the problem statements and analyzing the problem.

Continuous improvement strategies

- An assignment just focused on the unit conversions had been introduced.
- The number of example problems that are solved in-class had been increased to introduce wide variety of problems, helping students understand problem statements and different approaches to solve a problem.

- Online videos of the instructor solving example problems had been provided to the students. These problems can be reviewed by the students' at any time and provides them an ability to control the pace according to their convenience.

- Online assistance is provided by the instructor at least for two hours before all the exams.

- The number of homework assignments assigned to the students' had been increased.

ET 370 (Electronics)

The assessment for this course is performed between Spring 2015 - Spring 2018 semesters. As shown in Figure 4-7 the performance target was clearly not met during all the semesters although improvement had been made in approaching the set performance target. The students' work has been evaluated and it was identified that majority of the student population had struggled with understanding the problem concepts and solving the problem. Also, majority of students struggled with the concept of diode conditions.

Continuous improvement strategies

- The concept of diode conditions has been highlighted more carefully in lectures. At every opportunity this concept had been revisited.

- The number of example problems that are solved in-class had been increased to introduce wide variety of problems, helping students understand, problem statements and different approaches to solve a problem.

- At every possible opportunity electronic components were bought to the lecture to enhance the understanding of students.

- Few concepts had been explained using simulations.

- Open office hours in a lecture hall had been introduced on a weekly basis.

- Homework solutions were posted for students reference.

ET 400 (Instrumentation)

The assessment for this course is performed during Fall 2015, Fall 2017 and Fall 2018 semesters. As shown in Figure 4-8 the performance target was not met during all the semesters. After evaluation of students' work it was identified that majority of students struggled with the understanding of microcontroller concepts, coding and debugging of the electronic systems. The instructor in discussion with other faculty members had come up with some continuous improvement strategies to address these issues.

Continuous improvement strategies

- A four week microcontroller project has been introduced. Students create a closed loop instrumentation system.

- Students ability to code and debug electronic systems had been introduced in homework and evaluated in a quiz and final exam problem.

ET 460 (Automation)

The assessment for this course is performed during Spring 2016, Spring 2018 and Spring 2019 semesters. As shown in Figure 4-9 the performance target was not met during the Spring 2018 semester. After evaluation of students' work it was identified that majority of students struggled with the concept of ladder logic evaluations and discontinuous controllers. The instructor in discussion with other faculty members had come up with some continuous improvement strategies to address these issues.

Continuous improvement strategies

- More problems focused on ladder logic evaluations had been introduced in homework and students were evaluated on this concept in three quizzes before the final exam. Students are evaluated on their ability to create a ladder logic program from scratch based on a given automation task/sequence.

- A discontinuous controller lab had been introduced in ET 460L (Automation Lab).

ET 250 (Electrical Circuits)

The assessment for this course is performed between Fall 2015 - Fall 2018 semesters. As shown in Figure 4-10 the performance target was not met only during the Fall 2018 semester. Since the performance target was met during the Fall 2015 – 2017 semesters a more challenging problem had been introduced to the students in Fall 2018 that is a combination of varied concepts. The majority of the student population had struggled with this problem and clearly this issue need to be addressed in homework's and evaluated in the online quizzes before the exams. After recent discussions between the instructor and some faculty members few strategies had been formulated.

Continuous improvement strategies

- More problems that are focused on the combination of two different concepts will be introduced.

- Example problems that are focused on combining the fundamental principles of different concepts will be solved in class. Students will also be introduced to such combinations in the Circuits lab.

ET 340 (Fluids)

The assessment for this course is performed for Spring 2015, Spring 2017 and Spring 2019 semesters. As shown in Figure 4-11 the performance target was not met during the recent Spring 2019 semester. The students' work had been evaluated and it was identified that majority of student population had difficulty to analyze a hydraulic system by calculating major and minor losses. In consultation with some faculty members the instructor of this course had formulated few strategies to address these issues.

Continuous improvement strategies

- Online video problems recording the instructor solving example problems of complicated hydraulic system will be shared with students' to enhance their understanding with problem solving methodologies.

- More emphasis will be put forth on the calculation of losses and evaluating the volumetric flow rate during lectures and Fluids lab.

ET 330 (Dynamics)

The assessment for this course is performed during Fall 2014-2016 and Fall 2018 semesters. As shown in Figure 4-12 the performance target was not met during Fall 2015, Fall 2016 and Fall 2018 semesters. The students' work has been evaluated and it was identified that majority of the student population had struggled with units, application of Newton's second law and application of energy conservation in solving problems.

Continuous improvement strategies

- An assignment just focused on the units had been introduced.

- The number of example problems that are solved in-class had been increased to introduce wide variety of problems, helping students understand problem statements and different approaches to solve a problem.

- Online assistance is provided by the instructor at least for two hours before all the exams.

- Review sessions focused on problem solving before exams had been introduced.

HUM 310 (Engineering Ethics)

The assessment for this course is performed during Spring 2015- 2019 semesters. As shown in Figure 4-13 the performance target was not met during Spring 2016, Spring 2017 and Spring 2019 semesters. The students' work has been evaluated and it was identified that majority of the student population had struggled with the organization of the paper, a clear explanation of the purpose, and grammar.

Continuous improvement strategies

- Explanation of the rubric by highlighting how to organize a good report.
- Discussing good written reports with the class by displaying examples from previous years.
- Reviewing the progress of students' with written reports and providing them a quick feedback with suggestions for improvement.

ET 340L (Fluids Lab)

The assessment for this course is performed for Spring 2015, Spring 2017 and Spring 2019 semesters. As shown in Figure 4-14 the performance target was not met during the Spring 2017 semester. The students' work had been evaluated and it was identified that majority of student population had difficulty in understanding the sections that need to be presented under each header.

Continuous improvement strategies

- The grading rubric that is presented to students had been expanded with sections expected under each header.
- Examples of good lab reports from previous years had been shown to students with a brief discussion.

ET 230L (Properties of Materials Lab)

The assessment for this course is performed for Fall 2014, Fall 2016, Fall 2017 and Fall 2018 semesters. As shown in Figure 4-15 the performance target was not met during the Fall 2014 semester. The students' work had been evaluated and it was identified that majority of student population had difficulty in understanding the sections that need to be presented under each header and lab calculations.

Continuous improvement strategies

- The grading rubric that is presented to students had been expanded with sections expected under each header.
- Examples of good lab reports from previous years had been shown to students with a brief discussion.
- Sample calculations with a data point had been performed in class.

F. Additional Information

All the binders with evaluation reports, student work examples, indirect assessment method (surveys) will be available for the ABET/ETAC visiting team during their visit in October 2019.

CRITERION 5. CURRICULUM

A. Program Curriculum

The applicable program criteria could include statements that add specificity to the curricular requirements found in Criterion 5 to differentiate the discipline designated by the program's title. These should be included in the program's coursework. Contact ABET at etac@abet.org if you have questions about the program criteria that apply to your program.

1. Complete Table 5-1 that describes the plan of study for students in this program including information on course offerings in the form of a recommended schedule by year and term along with average section enrollments for all courses in the program over the two years immediately preceding the visit. State whether the program is based on a quarter system or a semester system and complete a separate table for each option in the program.

2. Describe how the curriculum aligns with the program educational objectives.

3. Describe how the curriculum and its associated prerequisite structure support the attainment of the student outcomes.

4. Attach a flowchart or worksheet that illustrates the prerequisite structure of the program's required courses.

5. Describe how your program meets the specific requirements for this program area in terms of hours and depth of study for each curricular area (Math and Basic Sciences, Discipline Specific Topics) specifically addressed by either the general criteria or the specific program criteria as shown in Table 5-1. It is helpful to describe how the coverage of algebra and trigonometry (for A.S. programs) or differential and integral calculus or other mathematics above the level of algebra and trigonometry (for B.S. programs) is accomplished. Please describe how the curriculum develops student proficiency in the use of equipment and tools common to the discipline is appropriate to the student outcomes and the discipline.

6. Describe how the curriculum accomplishes a capstone or culminating experience (addressed by either the general or program criteria) and describe how this experience helps students attain related student outcomes as appropriate to the discipline and the degree (not degree level). Such description should give, consideration to factors such as engineering standards and codes; public health and safety; and local and global impact of engineering solutions on individuals, organizations and society.

7. Describe how professional and ethical responsibilities, respect for diversity, and quality and continuous improvement are addressed in the curriculum.

8. If your program allows cooperative education or internships to satisfy curricular requirements specifically addressed by either the general or program criteria, describe the academic component of this experience and how it is evaluated by the faculty.

9. Describe by example how the evaluation team will be able to relate the display materials, i.e. course syllabi, textbooks, sample student work, etc., to each student outcome. (See the 2019-2020 APPM Section I.E.5.b. (2) regarding display materials.)

   Display Materials at the Time of the Visit-Evaluators will review samples of displayed course materials including course syllabi, textbooks, example assignments and exams, and examples of student work, typically ranging from excellent through poor for only those courses that:

   a) support attainment of the program's student outcomes; and

   b) develop subject areas supporting attainment of student outcomes or contained in specific program criteria requirements.

   At the program's discretion, other materials that document efforts made to continuously improve curricula, or that illustrate novel, unusual or creative efforts to enrich the curriculum and/or attainment of student outcomes may be provided.

   Wherever possible, materials should be provided online or electronically.

B. Course Syllabi

In Appendix A of the Self-Study Report, include a syllabus for each course used for the degree.

C. Advisory Committee

Describe the composition of the program's advisory committee and describe how it is representative of organizations being served by the program's graduates. Describe activities of the advisory committee and provide evidence that it periodically reviewing the program's curriculum and advising the program on its program educational objectives and the current and future aspects of the technical fields for which the graduates are being prepared.

A. Program Curriculum

Facilities Engineering Technology (FET) program curricula are semester based and are provided in Table 5.1a. In order to better evaluate the student transcripts, four year based curriculum for the Graduating Class of 2019 is provided (i.e. Fall 2015 – Spring 2019). Table 5.1a contains all of the required mathematics, science and discipline specific core engineering courses, other professional based courses as well as placeholders for General Education electives within the programs. This program based curriculum fosters an increasing array of career paths for students that include varied industrial sectors of engineering. Also, included in Table 5.1a is the last two terms the course was offered with average section enrollment.

A.1 Curriculum Alignment With Program Educational Objectives (PEOs)

The FET program curriculum supports the PEOs by providing a strong technical preparation in facilities engineering and marine engineering, while fostering skills development in operations, analytical and open-ended problem solving, written and oral communication, team work, professional and ethical values, social responsibility and leadership.

FET program

Program Educational Objective (PEO)	Sample courses from the curriculum aligned with PEO
1. Graduates will have knowledge and ability to perform analysis, applications engineering and system or process development in large commercial, industrial, institutional and power generation facilities.	**CHE 205**: Students learn solution chemistry in both industrial production and power plant processes. **CEP 270/CEP 370**: Students experience current and practical work experience with various facilities. **ET 460/460L**: Students learn automation in power plants, engineering processes, and manufacturing processes leading to an understanding of modern control systems.
2. Graduates will have the knowledge and ability to operate and maintain systems or processes in large commercial, industrial, institutional and power generation facilities.	**EPO 110**: A laboratory class directly involved in the inspection, maintenance, and repair of machinery and systems. **EPO 230**: A hands-on learning experience in the steam-plant simulator. **EPO 321**: The students are given an introduction to the operation, performance and maintenance of simple cycle gas turbine and medium-speed reciprocating power generation systems, combined cycle gas turbine and steam turbine power plants.
3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams.	**CEP 270 / CEP 370**: Students work in professional teams at various facilities to gain knowledge on team work. **EPO 235**: A hands-on learning experience in the steam-plant simulator. Students work in teams at various assigned leadership roles to develop fault analysis techniques for steam propulsion plants.
4. Graduates will have the knowledge and ability to communicate effectively with speaking, writing and presentation skills	**ET 230L**: Students write detailed lab reports after their investigation of physical characteristics of materials through testing, data acquisition and calculations.

including the ability to put together a compelling argument.	**ET 370 / 370L**: Students work on a comprehensive team project and present their achievements to a wider audience via working demonstrations of their intriguing projects.
5. Graduates will demonstrate a respect for professional, ethical and social issues as well as a commitment to safety, quality and productivity.	**EPO 215 / EPO 315**: Students learn about safe practices in the machine shop utilizing engine lathes and milling machines, precision measuring instruments and hand tools **ET 490 / 490L**: Students become familiar with renewable energy resources. As a part of project students conduct an energy audit of a virtual facility and develop an engineering model for application of "green" technologies to improve energy efficiency and reduce the carbon footprint. **HUM 310**: This course addresses the major concepts of ethics as applied to the discipline and practice of engineering.

A.2 Curriculum Prerequisite Structure Supporting Student Learning Outcomes (SLOs)

The prerequisite structure supports the sequence beginning with algebra, calculus, and basic sciences followed by increasingly specific disciplinary topics. An emphasis on experiential learning is reflected in the laboratory courses, capstone style project based courses and summer co-ops. Courses in general education are spread throughout the curriculum so that students maintain contact and integrate learning with disciplines outside of engineering.

<u>FET Program</u>

SLOs	Sample courses from the curriculum used for assessment	Prerequisites
d, i	EPO 235; EPO 312	*EPO 125; EPO 214; EPO 230; CRU 150* (for EPO 235) *EPO 125; EPO 214* (for EPO 312)
a, c, e, f, i	ET 230L; ET 250; ET 344; ET 340/340L; ET 330; ET 370/370L	*MTH 210; MTH 211; CHE 110/110L; PHY 200/200L; PHY 205; COM 220L*
b, g, h, i, j	ENG 470; ENG 472; EPO 321; EPO 315; HUM 310	*EGL 220* (for ENG 470 and HUM 310) *CEP 270* (for ENG 472) *EPO 215* (for EPO 315) *EPO 220* (for EPO 321)

Pre-reqs (EPO 125; EPO 214; EPO 230; CRU 150):

Students develop basic understanding of common shipboard systems (*via EPO 125*).

Comprehensive study of fossil fuel steam generators, with emphasis on marine propulsion plants (*via EPO 214*).

A hands-on learning experience in the Steam Plant Simulator (*via EPO 230*).

First at-sea experience on the training ship. Introduction to the fundamentals of engineering systems operations and shipboard routine, including operation and monitoring techniques for diesel propulsion, electrical power generation, and evaporators and support equipment (*via CRU 150*).

After gaining necessary knowledge and hands on training via prerequisite courses, students are well prepared to handle course material for EPO 235 (Steam Plant Watch Team Management), a course that is used for the assessment of ***SLO -d*** and EPO 312 (Turbines), a course that is used for the assessment of ***SLO - i***.

Pre-reqs (MTH 210; MTH 211; CHE 110/110L; PHY 200/200L; PHY 205; COM 220L):

After developing strong foundation via mathematics and basic science courses along with conceptual understanding of subjects via laboratory components, students are well prepared to handle discipline specific core courses. Students develop skills needed to utilize operations of the TI-89 calculator and computers in a modern engineering environment via *COM 220L*.

The discipline specific core courses, ET 230L(Properties of Materials Lab); ET 250 (Electrical Circuits); ET 344 (Thermodynamics); ET 340/340L (Fluids and Fluids Lab); ET 330 (Engineering Dynamics); ET 370/370L (Electronics and Electronics Lab), are used for the assessment of **SLOs - a, c, e, f, i**.

Pre-reqs (EGL 220; CEP 270; EPO 215; EPO 220):

Students are introduced to the application of critical thinking skills with emphasis on examining those structures or elements of thought implicit in all argumentation: deductive and inductive reasoning; logical fallacies; implications, assumptions, and consequences; denotative and connotative elements in language; and rhetorical modes and methods (*via EGL 220*).

Students are introduced to machine shop safe practices utilizing engine lathes and milling machines, precision measuring instruments and hand tools. (*via EPO 215*).

Students are introduced to the internal combustion engine utilized by industry and merchant vessels (*via EPO 220*).

CEP 270: This course is the first of two summer co-ops required for the Facilities Engineering Technology major. It requires the student to work in industry under a cooperative education training agreement by working onsite for a 2-month period. Students will encounter current and practical work experience with various facilities.

After developing necessary critical thinking skills via *EGL 220,* students are well prepared for ENG 470 (Engineering Management) and HUM 310 (Engineering Ethics); courses that are used for the assessment of **SLOs – b, g, h, j**.

After learning about quality, safety, timeliness via EPO 215, students are well prepared for EPO 315 (Manufacturing Processes II), a course that is used for the assessment of **SLO j**.

After gaining knowledge about internal combustion engines, gas exchange process, engine types, engine construction, engine parts, fuel injection etc. via *EPO 220*, students are well prepared to handle EPO 321 (Introduction to Power Generation Plants), a course that is used for the assessment of **SLO i**.

After finishing up their summer co-op via *CEP 270*, students are well prepared to handle ENG 472 (Facilities Management), a course that is used for the assessment of **SLO b**.

Table 5-1a Curriculum

FACILITIES ENGINEERING TECHNOLOGY (FET)

Course (Department, Number, Title) List all courses in the program by term starting with first term of the first year and ending with the last term of the final year.	Indicate Whether Course is Required, Elective, or a Selective Elective by an R, an E or an SE[2]	Curricular Area (Credit Hours)				Last Two Terms the Course was Offered: Year and, Semester, or Quarter	Average Section Enrollment for the Last Two Terms the Course was Offered[1]
		Math and Basic Sciences	Discipline Specific Topics	General Education	Other		
FALL 2015							
CHE 110 - General Chemistry	R	3				Fall 2018 Fall 2017	35
CHE 110L - General Chemistry Lab	R	1				Fall 2018 Fall 2017	21
ENG 100 - Engineering Graphics	R				2	Fall 2018 Fall 2017	20
ELEC 8 – American Institutions Elective	SE			3		Spring 2019 Fall 2018	NA
ELEC 21 – Humanities Elective (Lower Division)	SE			3		Spring 2019 Fall 2018	NA
ET 110 - Introduction to Engineering Technology	R		1			Fall 2018 Fall 2017	59
MTH 100 - College Algebra and Trigonometry	R	4				Spring 2019 Fall 2018	18
PE 101 - Swim Competency Exam	R				0	Spring 2019 Fall 2018	292
PE 102 - Beginning/Intermediate Swimming	R				(0.5)	Spring 2019 Fall 2018	30

							Total Units: 17
SPRING 2016							
CHE 205 - Chemistry of Plant Processes	R		3			Spring 2019 Spring 2018	9
DL 105 - Marine Survival	R				1	Spring 2019 Fall 2018	24
DL 105L - Marine Survival Lab	R				1	Spring 2019 Fall 2018	8
DL 105X - USCG Life boatman's Exam	R				0	Spring 2019 Fall 2018	100
EGL 100 - English Composition	R			3		Spring 2019 Fall 2018	14
EPO 110 – Plant Operations I	R				1	Spring 2019 Fall 2018	12
EPO 125 – Introduction to Marine Engineering	R		3			Spring 2019 Fall 2018	32
EPO 125L – Introduction to Marine Engineering Lab	R		1			Spring 2019 Fall 2018	15
EPO 213 – Welding Lab	R				1	Spring 2019 Fall 2018	17
MTH 210 - Calculus I	R	4				Spring 2019 Fall 2018	15
NAU 104 - VPDSD	R				1	Spring 2019 Fall 2018	33
							Total Units: 19
SUMMER CRUISE 2016							
CRU 150 - Sea Training I	R				8	Summer 2019 Summer 2018	97 (2018) 84 (2019)
EPO 220 - Diesel Engineering I	R		2			Summer 2019 Summer 2018	65
							Total Units:10

FALL 2016							
COM 220L - Programming Applications for Engr. Tech Majors Lab	R				1	Fall 2018 Fall 2017	20
ELEC 20 - Critical Thinking Elective	SE			3		Spring 2019 Fall 2018	NA
EPO 210 - Plant Operations II	R				1	Spring 2019 Fall 2018	9
EPO 214 - Boilers	R		3			Spring 2019 Fall 2018	26
EPO 215 - Manufacturing Processes I	R				1	Fall 2018 Fall 2017	11
EPO 230 - Steam Plant System Operations	R		1			Spring 2019 Fall 2018	6
MTH 211 - Calculus II	R	4				Spring 2019 Fall 2018	21
PHY 200 - Engineering Physics I	R	3				Spring 2019 Fall 2018	32
PHY 200L - Engineering Physics I Lab	R	1				Spring 2019 Fall 2018	8
							Total Units: 18
SPRING 2017							
EGL 110 - Speech Communication	R			3		Spring 2019 Fall 2018	17
EPO 235 - Steam Plant Watch Team Management	R		1			Spring 2019 Fall 2018	6
EPO 312 - Turbines	R		3			Spring 2019 Fall 2018	25
ET 230 - Properties of Materials	R		2			Spring 2019 Spring 2018	24
ET 232 - Statics	R		3			Spring 2019 Spring 2018	18
LIB 100 – Information Fluency in the Digital World	R				2	Spring 2019	17

						Fall 2018	
PHY 205 - Engineering Physics II	R	4				Spring 2019 Fall 2018	18
							Total Units: 18
SUMMER CO-OP 2017							
CEP 270 FET Co-Op I	R				3	Summer 2019 Summer 2018	15 (2018) 9 (2019)
							Total Units: 3
FALL 2017							
ELEC 22 - Humanities Elective (Upper Division)	SE			3		Spring 2019 Fall 2018	NA
EPO 319 - Facilities Engineering Diagnostics Lab	R		1			Fall 2018 Fall 2017	8
ET 230L - Properties of Materials Lab	R		1			Fall 2018 Fall 2017	11
ET 250 - Electrical Circuits	R		3			Fall 2018 Fall 2017	32
ET 250L - Electrical Circuits Lab	R		1			Fall 2018 Fall 2017	9
ET 330 - Dynamics	R		3			Fall 2018 Fall 2017	45
ET 332 - Strength of Materials	R		3			Fall 2018 Fall 2017	46
ET 344 - Thermodynamics	R		3			Fall 2018 Fall 2017	24
							Total Units: 18
SPRING 2018							
EGL 300 - Advanced Writing*	R			(3)		Spring 2019 Fall 2018	18
EPO 310 - Plant Operations III	R				1	Spring 2019 Spring 2018	10
EPO 315 - Manufacturing Processes II	R				1	Spring 2019	9

						Spring 2018	
EPO 321 - Introduction to Power Generation Plants	R		1			Spring 2019 Fall 2018	6
ET 340 - Fluid Mechanics	R		3			Spring 2019 Spring 2018	23
ET 340L - Fluid Mechanics Lab	R		1			Spring 2019 Spring 2018	9
ET 342 - Refrigeration and Air conditioning	R		2			Spring 2019 Spring 2018	24
ET 342L - Refrigeration and Air conditioning Lab	R		1			Spring 2019 Spring 2018	12
ET 370 - Electronics	R		3			Spring 2019 Spring 2018	26
ET 370L - Electronics Lab	R		1			Spring 2019 Spring 2018	11
							Total Units: 14
SUMMER CO-OP 2018							
CEP 370 FET Co-Op II	R				3	Summer 2019 Summer 2018	12 (2018) 16 (2019)
							Total Units: 3
FALL 2018							
ELEC 9 - American Institutions Elective	SE			3		Spring 2019 Fall 2018	NA
ENG 470 - Engineering Management	R		3			Fall 2019 Fall 2018	24
ET 350 - Electrical Machinery	R		3			Fall 2019 Fall 2018	32
ET 350L - Electrical Machinery Lab	R		1			Fall 2019 Fall 2018	9
ET 400 - Instrumentation and Measurement	R		3			Fall 2019 Fall 2018	33
ET 400L - Instrumentation and Measurement Lab	R		1			Fall 2019	11

						Fall 2018	
ET 442 - Heating, Ventilation, and A/C	R		2			Fall 2019 Fall 2018	16
ET 442L - Heating, Ventilation, and A/C Lab	R		1			Fall 2019 Fall 2018	8
							Total Units: 17
SPRING 2019							
ELEC 32 - Social Science Elective (Upper Division)	SE			3		Spring 2019 Fall 2018	NA
ENG 472 - Facilities Management	R		3			Spring 2019 Spring 2018	17
ET 460 - Automation	R		3			Spring 2019 Spring 2018	35
ET 460L - Automation Lab	R		1			Spring 2019 Spring 2018	12
ET 490 - Power Engineering Technology	R		3			Spring 2019 Spring 2018	33
ET 490L - Power Engineering Technology Lab	R		1			Spring 2019 Spring 2018	9
HUM 310 - Engineering Ethics	R				3	Spring 2019 Spring 2018	31
							Total Units: 17
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE	***154***						
PERCENT OF TOTAL		**15.5**	**49**	**15.5**	**20**		

*This may be fulfilled by passing the Graduate Writing Exam

1. For courses that include multiple elements (lecture, laboratory, recitation, etc.), indicate the average enrollment in each element.
2. Required courses are required of all students in the program, elective courses are optional for students, and selected electives are courses where students must take one or more courses from a specified group.

Instructional materials and student work verifying compliance with ABET criteria for the categories indicated above will be required during the campus visit.

A.3 Flow Chart Illustrating The Prerequisite Structure of Program's Courses

Figure 5.1a illustrates the program's course and the prerequisite chain for the FET program.

A.4 Curricular Areas

Mathematics and Basic Sciences: For FET and MET students mathematics is covered by three courses (college algebra, calculus I and calculus II) totaling 12 credit hours. This provides sound foundation in mathematics which our students use throughout their curriculum. Physics is covered by two courses in modern mechanics (physics I) and electricity & magnetism (physics II), totaling 8 credit hours. This material is solidly reinforced in much of the FET and MET core curriculum. The chemistry requirement is one course totaling 4 credit hours. The total mathematics and basic science courses sum up to be 24 credit hours which amount to 15.5% of the total credit hours (154) for FET students and 15% of the total credit hours (159) for MET students.

Discipline Specific Topics: The discipline specific topics for FET students amount to 75 credit hours. This accounts for 49% of the total credit hours (154). However, for MET students the discipline specific topics amount to 69 credit hours accounting for 44% of the total credit hours (159).

General Education (GE): FET and MET students take 24 credit hours of GE courses. This accounts for 15.5% and 15% of the total credit hours for FET and MET students, respectively. The general education (GE) courses include courses in American institutions, Humanities, Social Sciences, Critical Thinking and Speech Communication. Note: *The SLOs of certain discipline specific and other courses satisfy the GE requirement of CSU mandated 48 credit hours*.

Other Courses: This category includes required summer co-ops, summer cruises and other discipline related courses. For FET students the category of other courses amount to 31 credit hours accounting for 20% of the total credit hours. Whereas, for MET students the category of other courses amount to 42 credit hours accounting for 26% of the total credit hours.

A.5 Capstone Experience

All FET students have capstone project experience via ET 370/370L (Electronics and Electronics Lab) during their junior year and ET 350/350L (Electrical Machinery and Electrical Machinery Lab) during their senior year. In ET 490/490L (Power Engineering Technology and Power Engineering Technology Lab) students conduct an energy audit of a virtual facility and develop an engineering model for application of "green" technologies to improve energy efficiency and reduce the carbon footprint. Additionally, through guest lecture presentations and/or field trips, students become familiar with renewable energy resources.

The projects in ET 370/370L and ET 350/350L are divided into three distinct phases. During phase I, students are divided into teams of 2-3 members. Each team proposes its own project. Such proposals have to be submitted early in the semester and have to be vetted with Dr. Chang-Siu, the instructor for these courses. The value of this approach is that it allows students with specific interests to propose a project in an area they are passionate about.

In phase II the students focus on concept generation and evaluation. Students use techniques such as functional decomposition and brainstorming to generate numerous ideas for the products required for the project. Students come up with a detailed design and decide which parts to purchase and which parts to fabricate in-house using machine shop facilities.

In phase III the students assemble the parts, develop a code and come up with a working model of the proposed project. At the end of the semester, all student groups participate in a project fair and present their working demonstrations to wider audience that includes faculty, staff, parents, alumni, industry partners, and students.

At the end of the semester, students also write an extensive project report that documents their design process and prepare a summary presentation of their work. All the projects developed abide by engineering standards and codes and are fascinating with innovative engineering solutions that potentially can create an impact on either individuals or society.

In ET 490/490L, course students have a culminating experience by applying courses from different curricular areas including mathematics and basic sciences, discipline specific courses and other course work. Students gain global awareness through a research project that is focused upon reducing the environmental impact of energy use by exploring alternative cleaner energy solutions. The guest presentations by power industry professionals and leaders enhances students experience with communication and supports their development as effective professionals and leaders.

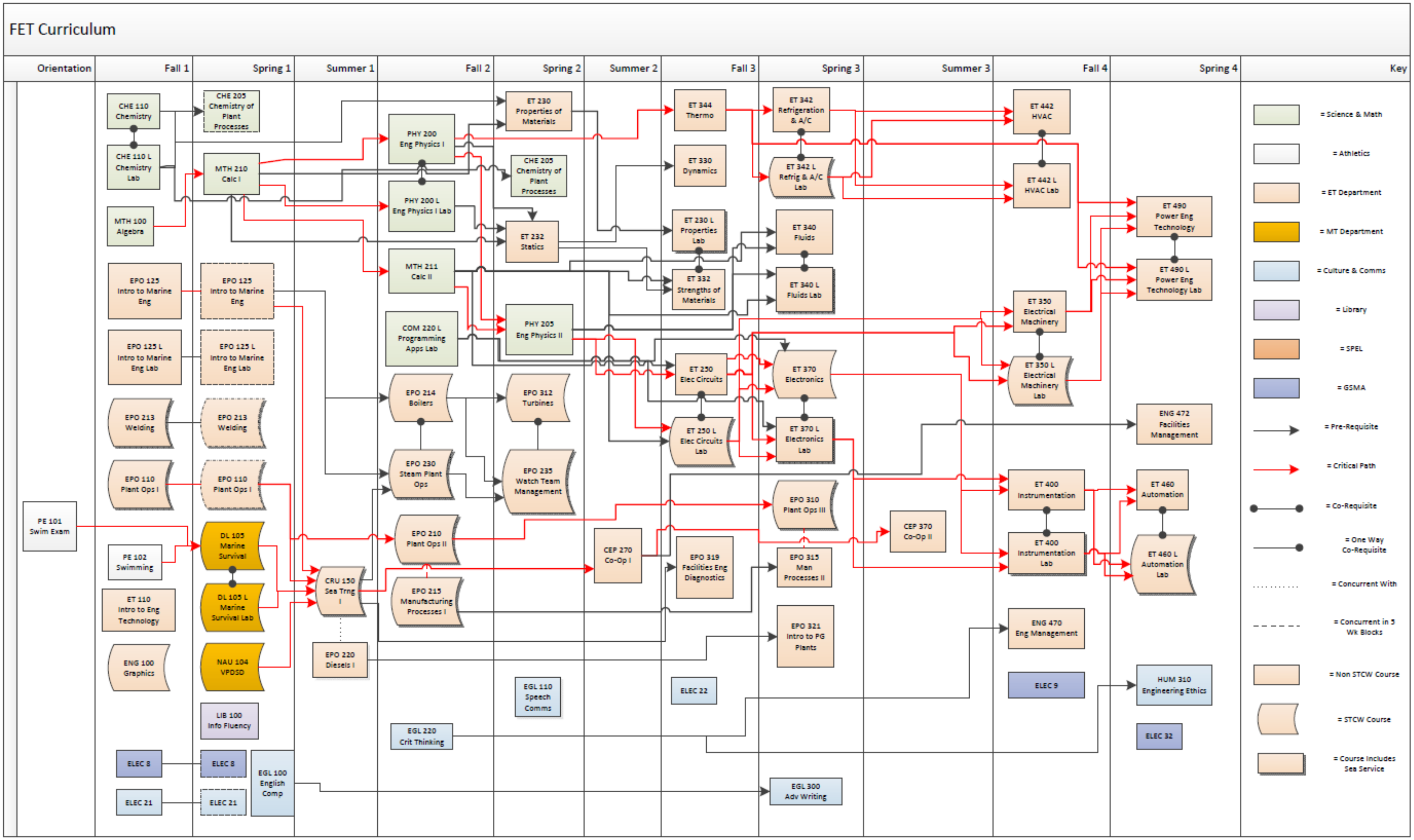
Table 5.2: Student Learning Outcomes (SLOs) attainment with capstone courses

Capstone course	**Student Learning Outcomes (SLOs)**
	FET
ET 370/370L	a, d, e, f
ET 350/350L	e, f,
ET 490/490L	c, d, f, h, i

A.6 Professional and Ethical Responsibilities

The FET program curricula aims to ensure that, upon graduation, students will have the ability to apply concepts of professional, ethical and social responsibilities. The diverse intersection of courses in the FET and MET curriculum, as well as in general education, provides a well-balanced core curriculum that engenders an appreciation for diversity, sciences, humanities and the social behavior fields. Co-op / cruise experiences also provide a broad exposure to diversity and professional responsibilities. The **SLOs g and h** specifically focus on the aspects of professional, ethical and social responsibilities and diversity.

Figure 5.1a - FET pogram's flow chart depicting the prerequisite chain.



A.7 Summer Co-ops / Cruise

All students from the FET program have three summer experiences. All freshmen of both programs sail for a 60 day cruise on the Training Ship Golden Bear (TSGB) during the summer between their freshmen and sophomore year as a member of the engineering department of the ship. This experience allows for close control and thorough education of the inexperienced students in a very safe and controlled environment. They learn safety expectations, procedures and skills as well as elementary operation of all shipboard systems, from main propulsion to the production of and handling of water for ship use. The students also have specific instruction and coursework associated with the systems of the ship.

Between the sophomore and junior year, and between junior and senior year FET students participate in an industrial co-op experience that is arranged through the career center and is overseen by both the FET faculty coordinator and the associated course instructor. Students are required to provide journal reports either on a daily or weekly basis to the course instructor as well as a cumulative document that provides details on the entire experience with a sign-off on the performance criteria evaluation by the industrial supervisors. The minimum time for the co-op experience is eight weeks of full time service at a company. Many students work the entire summer at these positions, gaining valuable additional experience. Many students are hired by their co-op company prior to, or immediately after graduation.

A.8 Display Materials

A course syllabus and multiple examples of varying quality of the graded students work from the course will be available for review from every course in the FET curriculum. Graded student work includes homework, quizzes, exams, laboratories, and project reports, depending on which of these were used for the course. The materials will be organized primarily by course number. We will also duplicate the materials for each course used in our assessment of SLOs and organize this subset of courses by SLO.

B. Course Syllabi

Appendix A includes a syllabus for each course that is used to satisfy the mathematics, basic science and disciple specific requirements.

C. Advisory Committee

Describe the composition of the program's advisory committee and describe how it is representative of organizations being served by the program's graduates. Describe activities of the advisory committee and provide evidence that it periodically reviewing the program's curriculum and advising the program on its program educational objectives and the current and future aspects of the technical fields for which the graduates are being prepared.

One of the recent action undertaken by the institution concerns the reorganization of its academic units into three separate schools. The three schools are named: 'The School of Engineering (SoE)'; 'The School of Maritime Transportation, Logistics, and Management (MTLM)'; and 'The School of Letters and Sciences (L & S). During this reorganization the university has worked diligently to strengthen the role of the advisory board by establishing the Cal Maritime Advisory Council (CMAC), a volunteer group comprised of dedicated alumni, members from industry, members working for government, members from professional organizations, and university faculty. CMAC is comprised of three subcommittees, one corresponding to each academic school, that provide valuable insight and advice in improving the university wide academic programming.

Note: *During the program's previous ABET visit the advisory committee was named the External Advisory Board (EAB) (or) Maritime Industry Advisory Board (MIAB). During the re-organization into schools, the advisory board was renamed as the Cal Maritime Advisory Council (CMAC), which includes three subcommittees that correspond to each of the new academic schools*.

Cal Maritime Advisory Council (CMAC) Members

Name	Company	Job Title	School
John Amos	Amos Logistics	President	MTLM
Bruce Applegate	Scripps Institution of Oceanography	Associate Director of Ship Operations	L & S
Larry Asera	**Asera, LLC**	**Chairman, CEO and Founder**	**SoE**
Mark Bailey	**Northrop Grumman Corp.**	**Engineering Manager**	**SoE**
John Beard	Advanced Maritime Education	Capt., Third Mate, Unlimited Tonnage-All Oceans	MTLM
Dr. Mary K. Berkaw Edwards	University of Connecticut-Avery Point	Associate Professor of English	L & S
Del Boyle	**Verus Associates Inc.**		**SoE**
Steve Brady	**Chevron Shipping Co LLC**	**Manager of Performance & Reliability**	**SoE**

Kurt Carpenter	DHS/TSA Intelligence & Analysis Sacramento Region	Field Intelligence Officer	L & S
Lynden Davis	**ASME**		**SoE**
Kim Estes	The Estes Group LLC	Expert Witness	L & S
Mike Jacob	Pacific Merchant Shipping Association	Vice President & General Counsel	L & S
Dale Keller	TSA, Dept. of Homeland Security		MTLM
Don King	Kaiser (Retired)	Healthcare Facilities Executive	MTLM
Lynn Korwatch	Marine Exchange of the SF Bay Region	Executive Director	MTLM
Manuch Nikanjam	**ASME SF Industry Relations Chevron Products Co**		**SoE**
Bob Piazza	**Price Pump Company**	**President & CEO**	**SoE**
Ian Ralby	IR Consilium	President & CEO	L & S
Andy Schlegel	**Southland Industries**	**Contract Executive**	**SoE**
Lisa Swanson	Matson Navigation Company	Director, Environmental Affairs	L & S
Liz Taylor	DOER Marine	President	L & S
Karen Vellutini	Devine Intermodal	Executive Vice President	MTLM
Brian Wilson	US Coast Guard		L & S

The CMAC subcommittee (previously named as EAB or MIAB) for the SoE evaluates the FET and MET program's success in preparing its graduates to attain the identified Student Learning Outcomes (SLOs). They also provide feedback on the appropriateness of the Program Educational Objectives (PEOs) relative, to meeting the industry needs and in terms of consistency with the university's mission. The advisory council and university faculty meet at least two times a year. However, during the six year cycle there is a gap of one year (due to the re-organization process) during which these meetings did not occur. All the minutes from the meetings will be provided to the ABET visiting team.

The recently formed CMAC subcommittee for the SoE, dean of the SoE, ET department chair and faculty met for the first time in fall 2018. At this meeting the SLOs and assessment process were presented and PEOs were vetted. The CMAC committee approved the PEOs with few minor editions. The suggested changes will be included in 2019-2020 academic year and will be presented to the advisory council. The essence of the changes was to make our PEOs much broader and more inclusive to better align with the expectations of industry and with the mission of the university. Copies of the notes from this meeting will be provided to the ABET team during their visit. The current plan is to have a meeting with CMAC at least twice a year. At these meetings, PEOs and SLOs are vetted seeking improvement such that they meet the expectations of current industry needs.

CRITERION 6. FACULTY

A. Faculty Qualifications

Describe the qualifications of the faculty and how they are adequate to cover all the curricular areas of the program and also meet any applicable program criteria. This description should include the composition, size, credentials, and experience of the faculty. Complete Table 6-1. Include faculty curriculum vitae in Appendix B.

As of the academic year 2018-2019, the Engineering Technology programs (FET and MET) had 12 regular tenure track faculty members, with 1 faculty member bearing a rank of Full Professor and 1 faculty member bearing a rank of Maritime Vocational Instructor (MVI) IV participating in the Faculty Early Retirement Program (FERP) and teaching on a part-time basis. Faculty distribution among the ranks includes 4 Associate Professors, 3 Assistant Professors, 1 MVI IV, 1 MVI III, and 1 MVI II. The programs also had 12 lecturers, of which 4 are full-time and 8 are part-time. We recently hired two tenure-track faculty members who will be primarily teaching licensed track courses starting in Fall 2019.

In terms of undergraduate instructional expertise the faculty are divided into academic track and licensed track. There is an adequate distribution of faculty in each of these tracks to meet the instructional needs of the FET and MET programs. Furthermore, we encourage interested faculty to teach outside their track to help facilitate integration and cross-fertilization of instructional ideas across the curriculum. Academic track faculty minimally hold a master's degree in an engineering discipline. Two academic track faculty members hold a doctoral degree in mechanical engineering. Licensed track faculty minimally hold a bachelor's degree in marine engineering discipline and a United States Coast Guard (USCG) engineer's license (or) significant industrial experience in marine related field. Three licensed track faculty members hold a chief engineer's license under unlimited horsepower. Table 6-1 summarizes the composition, size, credentials, and experience of the faculty.

B. Faculty Workload

Complete Table 6-2, Faculty Workload Summary and describe this information in terms of workload expectations or requirements for the current academic year.

The faculty workload summary for the academic year 2018-2019 is given in Table 6-2. The collective bargaining agreement (CBA) for the faculty defined by the California Faculty Association (CFA) requires that for each semester a full-time instructional faculty needs to fulfill 15 weighted teaching units (WTUs) of workload covering the areas of teaching, scholarship and service. The areas of service and scholarship, including the departmental responsibilities typically accounts for 3 WTUs of indirect workload, leaving 12 WTUs for direct teaching per semester. Faculty in new tenure track positions are provided for the first two years with an additional 3 WTUs per semester of non-teaching time to facilitate scholarship, resulting in a direct teaching workload of 9 WTUs per semester for the first two years. A faculty is also able to buy-out their teaching responsibilities by using funding through external contracts and grants. Reduction from the minimum teaching load of 12 WTUs may be allowed for a number of reasons including but not limited to: release time awarded due to CFA or accreditation responsibilities, departmental chair responsibilities, program coordination responsibilities, special assignments and internally funded grants or projects. Full-time faculty members are expected to participate in commencement ceremonies each spring. All faculty participate in student evaluation of instruction.

The workload schedule information identifies time allocated to teaching, buy-out through external contracts/grants, and service duties. Information on the workload schedules are reviewed by the department chair to facilitate equitable distribution of teaching and non-teaching duties to all the faculty members. Department chairs are expected to discuss faculty workload with the dean prior to making faculty assignments each fall and spring semesters. The dean verifies and approves reassigned time for faculty reassignments prior to the schedule being confirmed.

In addition to teaching the MET curriculum the licensed track faculty also teach the curricula related to the license option of the Mechanical Engineering (ME) curriculum. Over 70-80% of the ME students receive a USCG 3rd Assistant Engineer's license (upon passing a USCG domestic licensure exam) in conjunction with completing the ME academic program at CSU Maritime Academy.

The licensed program also undergoes audits by USCG and US Maritime Administration on a regular intervals. We recently received USCG approval of our licensed programs in April 2019. The effort of the faculty in the Engineering Technology program in maintaining records and meeting all the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) competencies for the attainment of the program approval by USCG is significant. Some faculty members also contribute to the assessment of institution wide learning outcomes for Western Association of Schools and Colleges (WASC) educational effectiveness review.

C. Faculty Size

Discuss the adequacy of the size of the faculty and describe the extent and quality of faculty involvement in interactions with students, student advising, and oversight of the program.

As indicated above, for the academic year 2018-2019, 24 faculty members (including tenure-track, MVI's and lecturers) were involved with FET and MET programs. This represents a sufficient number to cover all the required courses in the curriculum, with at least two faculty members capable of teaching each required course. All of the core courses are offered at least once a year, and many of the licensed courses are offered twice a year serving different cohort of students seeking Assistant Engineer's licenses. This enables students to graduate on time. The number and commitment of FET and MET program faculty members is sufficient to provide for program continuity, adequate frequency of course offerings, appropriate levels of student-faculty interactions, and effective student advising and counseling.

Interactions with Students: As described in Criterion-1, full-time academic advisors conduct the majority of student advising. Each full-time faculty member typically advises about 30 students.

Table 6-1. Faculty Qualifications

Facilities Engineering Technology (FET) and Marine Engineering Technology (MET)

Faculty Name	Highest Degree Earned- Field and Year	Rank [1]	Type of Academic Appointment[2] T, TT, NTT	FT or PT[3]	Years of Experience			Professional Registration/ Certification	Level of Activity[4] H, M, or L		
					Govt./Ind. Practice	Teaching	This Institution		Professional Organizations	Professional Development	Consulting/summer work in industry
Mike Andrews	Bachelors/MET/1976	MVI IV	T	FT	18	21	21	Second Assistant Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower Master Motor Vessels, 100 Ton	L	L	
Jon Fischer	Masters/Mechanical Engineering/2005	ASC	T	FT	1	13	12			M	
Scott Green	Bachelors/MET/1986	MVI III	T	FT	12	20	20	Third Assistant Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower		H	
Mike Kazek	Masters/Mechanical Engineering and Naval & Marine Engineering/1986	ASC	T	FT	21	10	13	SNAME	M	M	

Dinesh Pinisetty	Doctoral/Mechanical Engineering/2011	ASC	T	FT	1	8	6	ASEE, TMS	M	H	
Mike Strange	Masters/ME/1986	ASC	T	FT	9	22	11	ASEE	M	M	H
Evan Chang-Siu	Doctoral/Mechanical Engineering/2013	AST	TT	FT	2	5	5			H	
Brian Crawford	MBA/1997 Bachelors/Marine Systems Engineering/1992	AST	TT	FT	15	1	1	Second Assistant Engineer, Steam, Motor, and Gas Turbine Vessels Unlimited Horsepower	L	M	
Keir Moorhead	Bachelors/Mechanical Engineering/2004	MVI I	TT	FT	10	4.5	4.5	Third Assistant Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower		H	M
Ryan Storz	Masters/Transportation and Engineering Management/2013	AST	TT	FT	7	5	5	AFE SOPE	H	H	L
Robert Jackson	Bachelors/MET/1976	MVI IV	T	PT	25	18	18	Chief Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower		L	
Steve Kreta	Masters/Industrial and Systems Engineering/1988	P	T	PT							
Tom Clyatt	Bachelors/MET/1982	I	NTT	PT							
Danielle Dragon	Bachelors/Mechanical Engineering/2007	I	NTT	PT							
David Grover	A.S./Machine Tool Technology/1979	I	NTT	PT							
Jack Gillespie	Bachelors/Wild Life Management/1981	I	NTT	PT							
Neal Handly	MD (Doctor of Medicine)/1997	I	NTT	PT							

Ken Levan	Bachelors/MET/1976	I	NTT	FT				Chief Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower		H	
Steffan Long	Bachelors/Languages and Business Admin/1989	I	NTT	FT							
Jon Meier	Bachelors/Mechanical Engineering/2005	I	NTT	PT							
Fay Plummer	Bachelors/Mechanical Engineering/2014	I	NTT	FT							
Doug Rigg	Bachelors/MET/1979	I	NTT	FT	30	11	11	Chief Engineer, Steam, Motor, and Gas Turbine Vessels, Unlimited Horsepower			
Lisa Reilly	Bachelors/FET/2007	I	NTT	PT							
Alondro Trevino-Ortiz	Bachelors/Civil Engineering/2006	I	NTT	PT							

Instructions: Complete table for each member of the faculty in the program. Add additional rows or use additional sheets if necessary. Updated information is to be provided at the time of the visit.

1. Code: P = Professor ASC = Associate Professor AST = Assistant Professor I = Instructor A = Adjunct O = Other
MVI = Maritime Vocational Instructor
2. Code: T = Tenured TT = Tenure Track NTT = Non-Tenure Track
3. FT = Full-Time Faculty or PT = Part-Time Faculty, FERP = Faculty Early Retirement Program at the institution.
4. The level of activity (high, medium or low) should reflect an average over the three years prior to the visit.

Table 6-2. Faculty Workload Summary

Facilities Engineering Technology (FET) and Marine Engineering Technology (MET)

Faculty Member (name)	PT or FT[1]	Classes Taught (Course No./Credit Hrs.) Term and Year[2]	Program Activity Distribution[3]			% of Time Devoted to the Program[5]
			Teaching	Research or Scholarship	Other[4]	
Mike Andrews	FT	SPRING 2019 EPO 110 (1 credit hour) - 4 sections (6 WTUs) EPO 310 (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 EPO 110 (1 credit hour) - 5 sections (7.5 WTUs) EPO 210 (1 credit hour) - 3 sections (4.5 WTUs) Departmental Responsibilities - (3 WTUs)	80		20	100
Jon Fischer	FT	SPRING 2019 ET 232 (3 credit hours) - 2 sections (6 WTUs) ET 460 (3 credit hours) - 2 sections (6 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 ET 400 (3 credit hours) - 2 sections (6 WTUs) ET 400L (1 credit hour) - 1 sections (1.5 WTUs) COM 220L (1 credit hour) - 3 sections (4.5 WTUs) Departmental Responsibilities - (3 WTUs)	80		20	100
Scott Green	FT	SPRING 2019 EPO 214 (3 credit hours) - 2 sections (6 WTUs) EPO 235 (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (3 WTUs)	80		20	100

		FALL 2018 EPO 214 (3 credit hours) - 2 sections (6 WTUs) EPO 235 (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (3 WTUs)				
Mike Kazek	FT	SPRING 2019 ET 340L (1 credit hour) - 2 sections (3 WTUs) HUM 310 (3 credit hours) - 3 sections (9 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 ET 110 (1 credit hour) - 2 sections (2 WTUs) ET 230L (1 credit hour) - 2 sections (3 WTUs) ENG 430 (3 credit hours) - 2 sections (6 WTUs) Departmental Responsibilities - (3 WTUs) STCW Coordinator - (1 WTU)	75		25	100
Dinesh Pinisetty	FT	SPRING 2019 ET 340 (3 credit hours) - 2 sections (6 WTUs) ET 340L (1 credit hour) - 1 section (1.5 WTUs) ABET Coordinator Duties - (4.5 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 ET 344 (3 credit hours) - 2 sections (6 WTUs) ABET Coordinator Duties - (6 WTUs) Departmental Responsibilities - (3 WTUs)	45	25	30	100
Mike Strange	FT	SPRING 2019 ET 230 (2 credit hours) - 2 sections (4 WTUs) ET 340L (1 credit hour) - 1 section (1.5 WTUs) Department Chair Duties - (6 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 ET 332 (3 credit hours) - 2 sections (6 WTUs)	40		60	100

		Department Chair Duties - (6 WTUs) Departmental Responsibilities - (3 WTUs)				
Evan Chang-Siu	FT	<u>SPRING 2019</u> ET 370 (3 credit hours) - 2 sections (6 WTUs) ET 370L (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (3 WTUs) <u>FALL 2018</u> ET 250 (3 credit hours) - 2 sections (6 WTUs) ET 350 (3 credit hours) - 2 sections (6 WTUs) Departmental Responsibilities - (3 WTUs)	80	10	10	100
Brian Crawford	FT	<u>SPRING 2019</u> ET 322 (1 credit hour) - 1 section (1 WTU) ET 322L (1 credit hour) - 5 sections (7.5 WTUs) Departmental Responsibilities - (3 WTUs) Cruise Preparation - (0.5 WTU) CFA Release Time - (3WTUs) <u>FALL 2018</u> ET 250L (1 credit hour) - 3 sections (4.5 WTUs) EPO 110 (1 credit hour) - 1 section (1.5 WTUs) CRU 250 (1 credit hour) - 1 section (3 WTUs) Departmental Responsibilities - (3 WTUs) CFA Release Time - (3WTUs)	60		40	100
Keir Moorhead	FT	<u>SPRING 2019</u> EPO 230 (1 credit hour) - 4 sections (6 WTUs) EPO 235 (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (3 WTUs) <u>FALL 2018</u> EPO 230 (1 credit hour) - 1 section (1.5 WTUs) EPO 235 (1 credit hour) - 1 section (1.5 WTUs) ET 350L - 1 section (1.5 WTUs)	55	25	20	100

		Departmental Responsibilities - (3 WTUs) MET Coordinator - (1.5 WTUs) CARB Release Time - (6 WTUs)				
Ryan Storz	FT	<u>SPRING 2019</u> EPO 312 (3 credit hours) - 2 sections (6 WTUs) ENG 472 (3 credit hours) - 1 section (3 WTUs) Departmental Responsibilities - (3 WTUs) <u>FALL 2018</u> EPO 312 (3 credit hours) - 1 section (3 WTUs) ENG 470 (3 credit hours) - 2 sections (6 WTUs) EPO 214 (3 credit hours) - 1 sections (3 WTUs) [7] Departmental Responsibilities - (3 WTUs) FET Coordinator - (1.5 WTUs) CARB Release Time - (1.5 WTUs)	60	15	25	100
Robert Jackson[6]	PT	<u>FALL 2018</u> EPO 319 (1 credit hours) - 2 sections (3 WTUs) EPO 322 (1 credit hour) - 2 sections (1 WTU) EPO 322L (1 credit hours) - 4 sections (6 WTUs) CRU 250 (1 credit hour) - 1 section (2 WTUs)	80		20	100
Steve Kreta[6]	PT	<u>SPRING 2019</u> EPO 230 (1 credit hour) - 4 sections (6 WTUs) Departmental Responsibilities - (1.5 WTUs)	80		20	100
Tom Clyatt	PT	<u>SPRING 2019</u> ET 342 (2 credit hours) - 2 sections (4 WTUs) ET 370L (1 credit hours) - 1 section (1.5 WTUs) ET 460L (1 credit hours) - 5 sections (7.5 WTUs) <u>FALL 2018</u> ET 230L (1 credit hours) - 3 sections (4.5 WTUs) ET 400L (1 credit hours) - 4 sections (6 WTUs)	100			100

Danielle Dragon	PT	SPRING 2019 ET 342L (1 credit hour) - 1 section (1.5 WTUs) ET 490 (3 credit hours) - 2 sections (6 WTUs) EPO 490L (1 credit hour) - 2 sections (3 WTUs) FALL 2018 ET 330 (3 credit hours) - 2 sections (6 WTUs) ET 442 (1 credit hour) - 1 section (2 WTUs) ET 442L - 1 section (1.5 WTUs)	100			100
David Grover	PT	SPRING 2019 EPO 213 (1 credit hour) - 4 sections (6 WTUs) FALL 2018 EPO 213 (1 credit hour) - 1 section (1.5 WTUs) EPO 215 (1 credit hour) - 3 sections (4.5 WTUs)	100			100
Jack Gillespie	PT	FALL 2018 ENG 100 (2 credit hours) - 3 sections (6 WTUs)	100			100
Neal Handly	PT	SPRING 2019 EPO 217 (1 credit hour) - 2 sections (3 WTUs) FALL 2018 EPO 217 (1 credit hour) - 2 sections (3 WTUs)	100			100
Ken Levan	FT	SPRING 2019 ET 342L (1 credit hour) - 2 sections (3 WTUs) EPO 310 (1 credit hour) - 3 sections (4.5 WTUs) EPO 343 (1 credit hour) - 3 sections (4.5 WTUs) Departmental Responsibilities - (3 WTUs) FALL 2018 EPO 210 (1 credit hour) - 7 sections (10.5 WTUs) EPO 213 (1 credit hour) - 1 section (1.5 WTUs) Departmental Responsibilities - (3 WTUs)	80		20	100

Steffan Long	PT	<u>SPRING 2019</u> EPO 315 (1 credit hour) - 5 sections (7.5 WTUs) ME 429 (1 credit hour) - 4 sections (6 WTUs) Shop maintenance and logistics - (1.5 WTUs) <u>FALL 2018</u> EPO 215 (1 credit hour) - 7 sections (10.5 WTUs) EPO 213 (1 credit hour) - 2 sections (3 WTUs)	100			100
Jon Meier	PT	<u>SPRING 2019</u> EPO 321 (1 credit hour) - 2 sections (3 WTUs)	100			100
Fay Plummer	PT	<u>SPRING 2019</u> EPO 125 (3 credit hour) - 2 sections (6 WTUs) EPO 125L (1 credit hour) - 2 sections (3 WTUs) <u>FALL 2018</u> EPO 125L (1 credit hour) - 2 sections (2 WTUs) ET 250L (1 credit hour) - 3 sections (4.5 WTUs) ET 350L (1 credit hour) - 5 sections (7.5 WTUs)	100			100
Doug Rigg	FT	<u>FALL 2018</u> EPO 125 (1 credit hour) - 2 sections (6 WTUs) ET 230 (1 credit hour) - 6 sections (9 WTUs)	100			100
Lisa Reilly	PT	<u>SPRING 2019</u> ET 490L (1 credit hour) - 4 sections (6 WTUs)	100			100
Alondro Trevino-Ortiz	PT	<u>SPRING 2019</u> ET 340L (1 credit hour) - 2 sections (3 WTUs)	100			100

1. FT = Full-Time Faculty or PT = Part-Time Faculty, at the institution
2. For the academic year for which the Self-Study Report is being prepared.
3. Program activity distribution should be in percent of effort in the program and should total 100%.

3. Indicate sabbatical leave, etc., under "Other."

4. Out of the total time employed at the institution.

5. Participate in FERP (Faculty Early Retirement Program).

6. Due to the medical leave absence of Scott Green, the course was taught by Ryan Storz for which the credit was given in Spring 2019.

One of the strengths of our engineering technology (ET) program is its student-to-faculty ratio. Although the average undergraduate engineering class size has increased over the past few years, it is still at a level that fosters and encourages close faculty-student interactions. Our goal is to foster a sense of community with the program. In class, many faculty go to considerable effort to get to know all of their students by name; this greatly fosters more personal interactions with students both within and outside the classroom. All course instructors maintain regular office hours during the semester and it is also not uncommon for some engineering faculty members to supplement office hours with after-hour "help sessions" for students who require additional assistance with class material and homework. Apart from the window of opportunity for advisement, our faculty have many opportunities to interact with students in more informal settings. Some of these opportunities include student active organizations as described below.

Association for Facilities Engineering (AFE) {Faculty member: Ryan Storz}
Society of Naval Architects and Marine Engineers (SNAME) {Faculty member: Mike Kazek}
Tau Alpha Pi National Honor Society {Faculty member: Jon Fischer}

Faculty members advise students on active organizations attend student meetings, assist in organizing events, and accompany students to regional/national meetings or conferences.

Each faculty from the ET program contributes money to sponsor a dinner for the 20-25 top performing graduating senior students in the program. This provides an informal opportunity for faculty to interact with students on a personal basis and offer support and advice.

Service: Service activities, either rendered internally to a university committee or externally to the professional community, are expected of each faculty member. Faculty members in the program serve on department level or university wide committees as elected or appointed with their consent, provided such service does not interfere with duties related to regularly scheduled classes or interfere unduly with other work assignments related to their contractual obligations. Some faculty members also actively contribute to the professional community by the following activities: serving as Board of Directors for professional societies, reviewing books and journal publications, acting as international referees for doctoral dissertations, organizing symposium sessions at international conferences, providing guest lectures etc.

Interaction with Industry: Faculty members interact with industrial and professional practitioners in a number of ways. For example, common avenues for faculty and students to interact with industry professionals and leaders include; industry sponsorship of projects in ET 370/370L and ET 350/350L courses, industrial representatives invited as guest speakers, and industrial representatives attending career fairs.

D. Professional Development

Provide a description of program professional development support for faculty and a general description of how faculty avail themselves of these opportunities (specific recent activities for each faculty member should be noted in their CV in Appendix B).

All program faculty members are expected to stay current in their discipline through scholarly and professional development activities. The ET program's licensed faculty must keep their USCG licenses active. The program's academic and licensed faculty participate in a wide range of professional societies, pursue contract/grant funding opportunities, publish their work in conferences and refereed journals, and pursue teaching related grants for innovative pedagogies of teaching.

Since professional development is required for faculty tenure and promotion decisions, faculty members are assisted and encouraged in these activities with faculty development funding opportunities through the campus and California State University (CSU) system.

***Sources of faculty development funding*:**

CSU Research, Scholarly and Creative Activities Award Program (RSCA Funds)- The sources of this fund are the CSU Chancellor's Office and Cal Maritime. The award maximum is $5000.

Department Faculty Development Funds- During the fall semester, all academic departments receive an allocation of the faculty development funds. The use of these funds may occur for the entire academic year, but requests and approvals must be completed by the end of the fall semester. Unallocated department faculty development funds will be returned to the Academy-Wide faculty development fund at the beginning of the spring semester.

Academy-Wide Faculty Development Funds- These funds are intended to support faculty in the dissemination of research that might not otherwise be able to be funded via department funds.

Professional Faculty Development Funds- Faculty members seeking money for professional development (skills development, professional competencies, pedagogical enhancement, curriculum redesign, etc.) are encouraged to apply through the Professional Development Fund.

President's Mission Achievement Grant- The President's Mission Achievement Grant program is designed to provide resources to the faculty to engage in activity that facilitates the institutional mission. The maximum award for a grant is $5000.

Faculty Maritime Fund Grant- These funds, provided by the Cal Maritime Foundation and open to faculty, students and staff, provide up to $500 to be used to meet a variety of academic needs such as the purchase of specialized equipment and computer programs, project funding, conferences, stipends to hire assistants, etc.

Sabbaticals- This is available to tenured faculty members who have been teaching full-time at Cal Maritime for a minimum of six years. The sabbatical pays for one semester at full pay or two semesters at half pay.

The Department of Human Resources supports the growth and development of faculty. Quality training and professional development opportunities that enhance knowledge and develop skills, are provided to the faculty. All CSU faculty can attend free systemwide professional development webcast trainings offered by the CSU Systemwide Professional Development. No registration necessary, limited to the first 200 logins.

Professional Development Activities in the academic year 2018-2019:

SNAME Maritime Convention, October 24-27, 2018 (Providence, RI)
Attendees: Mike Kazek and around 8-10 students

AFE 39 Day with a Facilities Professional, March 1 2019 (Sunnyvale, CA)
Attendees: Mike Strange, Ryan Storz and around 35 students

ASEE-CIEC Conference, Jan 30 – Feb 1, 2019 (New Orleans, LA)
Attendees: Dr. Dinesh Pinisetty

ABET Symposium, April 12-13, 2018 (San Diego, CA)
Attendees: Dr. Dinesh Pinisetty and Mike Strange

Evaluation of the Ph.D. Thesis title "Experimental Investigation of Cenosphere/Epoxy Syntactic Foam Composites", Dept. of Mechanical Engineering, National Institute of Technology Karnataka, Surathkal, Mangalore, India
Referee: Dr. Dinesh Pinisetty

E. Authority and Responsibility of Faculty

Describe the role played by the faculty with respect to course creation, modification, and evaluation, their role in the definition and revision of program educational objectives and student outcomes, and their role in the attainment of the student outcomes. Describe the roles of others on campus, e.g., dean or provost, with respect to these areas.

The primary duties of the ET faculty are effective classroom teaching, advising and academic counseling of students, committee work, research or scholarly activity, initiatives designed to help students succeed academically, and other assigned duties. All faculty are expected to schedule a proportionate number of office hours that should be spread across the week to provide the best opportunity for student accessibility. Faculty shall share in governance by attending and participating in meetings of the department, school, and/or university. In addition, faculty are expected to foster collegial relationships with students, supervisors, peers, and the university community. If the need arises faculty may also have to represent the university in a positive and professional manner in dealings with the industrial community.

The program faculty, as a collaborative team, has the responsibility for ensuring consistency and quality of the courses being taught. However, each faculty member is primarily responsible for the courses they teach. This includes defining course learning outcomes and creating course portfolios to assess and evaluate how well course objectives and outcomes are being met.

Creating or modifying a course in the programs curriculum should happen through policies and procedures abiding by the Academic Senate's philosophy "Collegiality in Curricular Decisions." Any changes should first be evaluated and then approved by the program faculty before submission to the Curriculum Committee. The Curriculum Committee is comprised of one voting faculty representative from each academic department, the Library, Naval Science, and Athletics; one voting student representative appointed by Associated Student of the University; School Deans, Associate Provost, Registrar, Records Analyst, Representative from Admissions, and an Administrative Assistant, as ex officio non-voting members.

Policies and Procedures for proposing a change to existing curriculum:

a) Proposal for creating or modifying a course in the existing curriculum may be initiated by (1) a faculty member, (2) an academic administrator, or (3) a student. All who wish to initiate a request shall work through an affected academic department, in consultation with that department chair. The initiator shall be required to complete an official Curriculum Change Request Form along with any accompanying material to the department chair.
b) The proposal needs to be discussed in an open forum and voted upon by the faculty members of all the departments affected by the change before submission to the Curriculum Committee. A vote on the acceptability of the proposed change shall be recorded on a Department Chair Questionnaire.
c) The Curriculum Change Request Form, along with all pertinent accompanying material and the Department Chair Questionnaire (which includes specific tally of the results of the departmental vote on the acceptability of the proposed curriculum change), must be submitted to the School Dean within two weeks of receiving these forms.
d) The School Dean will then review the proposal and all related documents and may choose to provide additional written commentary. All this information shall be forwarded to the chair of the Curriculum Committee.
e) The chair of the Curriculum Committee will disseminate the materials to all committee members, no less than one week prior to the meeting at which the proposal is to be considered.
f) An opportunity shall be provided for representatives of a curricular change proposal to appear before Curriculum Committee to provide an oral synopsis of the proposal and to answer any related questions.
g) The curriculum change request shall be discussed and voted upon, separately, at a committee meeting.
h) The chair of the Curriculum Committee shall forward all the documentation to the Office of Academic Affairs, noting the recommendation of the Committee with respect to the implementation of the curriculum change. If desired by any member of the committee, a written dissenting opinion may also be forwarded for consideration.

The program faculty has authority for defining, revising, implementing, and achieving program educational objectives (PEOs) and student learning outcomes (SLOs). The inputs from various program constituencies (Alumni, Industry, Students) are reviewed annually at the School of Engineering faculty retreats held during fall or spring semesters. The discussions conducted regarding the PEOs are designed to promote an open dialogue of program goals and direction.

The plan for the SLO assessment process includes a meeting of the program faculty at the beginning and at the end of each semester. At the beginning-semester meeting, the faculty will review specific criteria to be assessed in that particular semester and the specific assessment materials that need to be collected by the end of that semester on order to complete the assessment process. At the end-semester meeting, faculty bring assessed materials and the material is evaluated by faculty teams, and the results discussed. At the end of the Spring semester, the faculty discuss the assessment material and evaluated data to determine whether curricular changes need to be made or whether assessment instruments need to be changed, effectively closing the loop. These meetings are intended to keep the faculty on track to carry out the process of continuous improvement on a regular basis and in real-time. All these results are further presented to the advisory council at the on-site convened meetings every year for constituent feedback.

CRITERION 7. FACILITIES[1]

This section will discuss the facilities available to the program from 2013-2019. This will provide the reviewer with an understanding of the facilities that support the education of the students in the FET and MET Programs. Facilities discussed will include the physical learning spaces and computing resources as well as the policies that drive safety, maintenance, and upgrading of the facilities.

This section will also refer to the future plans for the facilities, not only for the program, but for the campus on the whole. Growth and development of the campus is driven by the 'Physical Master Plan' (https://wascsenior.app.box.com/s/ukzr6dfzqwlgq3a0bvi6u1gcx06oce7n), which layouts the development plan for the campus until 2032. These plans include the addition of a new buildings dedicated to academics as well as new learning spaces which will be built into the residence halls.

A. Offices, Classrooms and Laboratories

Summarize each of the program's facilities in terms of their ability to support the attainment of the student outcomes and to provide an atmosphere conducive to learning.

1. Offices (such as administrative, faculty, clerical, and teaching assistants) and any associated equipment that is typically available there.

2. Classrooms and associated equipment that are typically available where the program courses are taught.

3. Laboratory facilities including those containing computers (describe available hardware and software) and the associated tools and equipment that support instruction. Include those facilities used by students in the program even if they are not dedicated to the program and state the times they are available to students. Complete Appendix C containing a listing of the major pieces of equipment used by the program in support of instruction.

The physical facilities for teaching and learning are outstanding as far as addressing our educational goals. While there is always room for improvement and additional equipment needs, this statement can be justified by the following list of spaces used for the presentation of the Engineering Technology (ET) programs.

A.1 Offices

All ET tenured and tenure-track faculty have individual offices located in the Technology Building (TECH). Adjunct faculty and lecturers typically share office spaces in the Technology Building.

[1] Include information concerning facilities at all sites where program courses are delivered.

The Dean for the School of Engineering has an office in the Technology Building. An administrative coordinator for the School of Engineering has an office adjacent to the Dean's office.

Faculty use the office space as a workplace when not in the classroom and for holding office hours. All the offices include furnishings (chairs, desks, and desktop computers/laptops), whiteboards, storage space (e.g. file storage cabinet or bookshelf), telephone and a wired network connection. Faculty in these offices have access to all of the campus multifunction and network printers, including the two multifunction printers in the Faculty Office Building and one multifunction and one network printer in the Technology Building.

A.2 Classrooms

California State University Maritime Academy (CSUM) has 19 instructional classrooms located in five buildings on campus as well 5 classrooms as aboard the Training Ship Golden Bear (TSGB). Classroom capacities vary from 8-96 students in a teaching setting. Although most of the classrooms are laid out in a standard lecture style (rows of seats facing the instructor, projector and whiteboard), others such as ABS102 have a flexible layout, as discussed later in Criterion-7. All classrooms include at least one projector and desktop PC.

The Classroom Building has six conventional lecture classrooms. The three lecture halls on the first floor have capacities of 40-52 students in a standard lecture layout. Those classrooms all have sliding whiteboards, dual projectors, and SMART Boards, which allow for on-screen writing. The three classrooms on the second floor have capacities of 28-52 students. These rooms contain a projector, desktop PC, and a whiteboard spanning 3 of the 4 walls. The building also contains a computer lab, which is used for instruction and student computing, that will be discussed in further detail in Section B.

The Technology Building has five classrooms. The largest of the classrooms is Peachman Lecture Hall (Tech 146) which has a capacity of 96 in a standard lecture format. The room has whiteboards and a projector facing the white board. The building also contains 4 smaller classrooms with capacity for 28-40 in a standard lecture layout. These rooms have whiteboards on 2 of the walls in the room and a projector.

The Laboratory Building primarily houses the laboratories which will be discussed in the next section. However, it does contain one classroom, Lab 201, which is a standard lecture hall with capacity for 30 students.

The ABS Building consists of two classrooms. ABS 101 in a standard lecture hall layout with a capacity of 56. This room offers a small whiteboard, a projector, and two SMART boards in the front of the room. ABS 102 is considered a flexible layout classroom. This room is setup in a meeting style, where the tables can be arranged in a conference format, allowing students to see one another during discussions.

In the simulator building, one classroom is scheduled for engineering courses. SIM 135 is a standard lecture layout classroom with capacity for 30 students. It contains whiteboards along the three walls, a desktop computer, and 2 projectors facing the whiteboards to the front.

The TSGB has five classrooms with capacities varying from 15-45 students. (Bowditch/45, Ericson/40, Maury/25, Miller/15, and Osborne/23). The layout is similar to the shore-side classrooms with a standard lecture layout including access to a computer and a projector. These classrooms are primarily used for instruction during the summer training cruises, when the ship is out at sea. During the semester the classrooms are available for scheduled classes if there is insufficient capacity on the main campus.

A.3 Laboratories

The laboratories used by the ET program are spread across the Laboratory (or) Technology Building, Simulator (SIM) Building and TSGB. All labs have first aid boxes with regular stock of necessary supplies.

A.3.1 Laboratory (Lab) Building

The Lab Building was opened with all new equipment in January 2000. Since then several updates to the systems and hardware had taken place. The following labs are located in the Lab Building.

Computer Lab

The computer lab in the Lab building is a classroom consisting of 24 student workstations and an instructor workstation. It is also open after hours for students. More information regarding the computer hardware and software will be provided in section B.

Chemistry Lab

Equipment and computers in this lab serves 24 students. The Chemistry Laboratory is equipped with standard general chemistry laboratory equipment to support experiential student learning. In addition to standard chemistry glassware and equipment, students use Vernier LabQuest 2® standalone interfaces in combination with a variety of sensors including spectrophotometers, colorimeters, pH meters, and temperature probes.

Physics Lab

The physics lab contains a variety of equipment for conducting the 13 lab activities that typically comprise the PHY200L course. In addition to a variety of small tools such as springs, meter sticks, and stopwatches, the general, and activity specific equipment housed in the physics lab includes:

General:

- 10 computers with a variety of software including LabVIEW, MS Office, and Arduino
- 15 Arduino microcontrollers

- 12 PocketLab wireless sensors
- 10 sets of graduated masses
- 8 triple beam balances
- 8 air tracks with 16 associated floating carts

Activity Specific:
- 8 force tables
- 8 sets of projectile rails
- 8 aluminum friction tracks with clamped pulleys
- 8 sets of standard density materials
- 8 ballistic pendula with spring loaded projectile launchers
- 8 motorized chucks coupled through a tunable radius friction clutch

Material/Mechanical Lab

This is the laboratory that supports primarily the ET 230/230L Properties of Material Lecture/ Lab. It houses the following equipment:

- Universal Tensile Test Machine (with electrohydraulic control and data acquisition with a dedicated computer)
- Manual Tensile Test apparatus with Brinell Hardness Tester
- Rockwell Hardness Test Machine
- Charpy Impact Test Machine
- Creep Test Machine
- Rotating Beam Fatigue Test Machine
- Two 1000 ºC ovens
- Fixture for Jominy Testing
- Abrasive saw
- Mounting press
- Grinder/Polisher
- Microscope with camera
- Three mobile computer workstations with LABVIEW data acquisition hardware and software.
- Strain gages and accessories for installation
- Bridge completion and differential channel interface units
- Accelerometers and simple devices for calibration
- ECP Rectilinear Plant: for vibration experiments
- Unbalanced motor vibrational experimental apparatus

Fluid/Thermal Lab

The fluid thermal lab is well equipped with a variety of facilities to perform demonstration of the principles for fluid mechanics and thermodynamics. This lab primarily supports the ET 340L Fluids Lab. The equipment that is housed in this lab includes:

- Two wind tunnels. The tunnel features a 12” x 12” test section, variable speed with a maximum velocity of 145 ft/s.
- Particle image velocimetry experiment. The experiment (Dantec EduPIV) is designed to measure flow velocities inside a water tank for various user defined flows.
- Heat exchanger test stand with double pipe, shell and tube configurations
- Thermal conduction experiment
- Pipe flow experiment
- Internal combustion gas engine experiment
- 2 PCs with data acquisition systems and LabView
- Instrumentation in the above experiments include
    - Pressure transducers
    - Particle image velocimetry
    - Manometer
    - Lift and Drag force measurement (wind tunnel)
    - Thin film heat transfer gages
    - Thermocouples
    - Flow rate measurement (heat exchanger)
    - x-y positioning instrument (wind tunnel)
    - Optical pyrometer

Instrumentation and Controls Lab

This laboratory primarily supports the ET 400L (Instrumentation and Measurement Lab), ET 460L (Automation Lab). It houses the following equipment:

- Six student workstations consisting of:
    - PC workstations with LABVIEW
    - Data acquisition hardware
    - Power supply
    - Function generator
    - Handheld multimeter
- Six power supplies
- Instructor computer workstation
- Six PLC Trainers
- Tecquipment Servo Trainer
- Ball and Beam Control trainer
- Several printed Circuit Trainers

A.3.2 Technology (TECH) Building

The Technology Center, renovated and expanded in 2003 at a cost of $6.8 Million, includes the following labs:

Electrical Circuits and Electronics Lab

This laboratory primarily supports the ET 250L (Electrical Circuits Lab) and ET 370L (Electronics Lab) and ET 350L (Electrical Machinery Lab). It houses the following equipment:

- Ten student workstations plus one instructor work station each with:
  - PC workstation
  - Tektronix DPO2012B Oscilloscope
  - HP bench top digital multimeter
  - HP dual, 0-30V, regulated power supply
  - Function generator

- Five Hampden electric machine workstations each with:
  - DC/AC 3 phase variable voltage power supplies
  - Dynamometer with digital torque and speed readouts
  - DC instrumentation set
  - AC instrumentation set with watt meters
  - DC load bank
  - DC machine
  - 3-phase Synchronous machine
  - 3-phase induction motor
  - 1-phase induction motor
  - Hitachi 3-phase, variable frequency drive

Power Lab

The Power Lab houses several operational and several display (static) power generation units. This lab primarily supports ET 490L (Power Engineering Technology Lab) and EPO 312 (Turbines). The working equipment includes:

- Alturdyne 80 kW gas turbine
- 200 kW Three Phase Resistive Load Bank
- Southwest WindPower 200 W Wind Turbine with 3 phase resistive load and anemometer (located on the roof)
- Solar photovoltaic panel (100 W) on a rotating frame with load bank
- Parabolic Solar Steam Generator
- Student-built Wind Tunnel (3 ft by 3 ft test section, 0-30 mph wind speed) to support the Collegiate Wind Competition
- Computer with LABVIEW data acquisition to measure wind speed and output power

The display equipment includes:

- 12 cylinder locomotive Diesel engine
- Steam Turbine with Reduction Gear

A.4 Simulators

CSUM has several simulation facilities which are used to train the USCG license students, as well as those seeking careers in the Power Industry. The use of marine and facilities simulators allows the faculty to work with the students on scenarios and simulations that are difficult or unsafe to replicate on a working vessel. This gives students the experience and confidence they need to work on varied types of power plants as graduates – whether as an operating engineer or as a design engineer.

The simulators support specialized practical training courses that are required for the MET and FET programs and the ME License Option. These courses are not required of all ME students and are not considered part of the Core ME Program. For the students that do take them, these courses provide "value added" to their ME training. They teach students to understand how complicated the energy systems work, how they react when a fault is introduced, and how to diagnose and troubleshoot them. The students work in small teams in these courses and alternate as the leader or "Chief Engineer" who is responsible for the systems and their safe and efficient operation. Hence these courses are also opportunities for the students to develop and practice their teamwork and leadership skills.

CSUM also has a Simulation Center which opened in 2008. While this building serves primarily students in other majors, the building represents the joint interest and dedication of CSUM and the California State University (CSU) for establishing state of the art, hands on facilities on this campus. A $13 Million project, the Center includes Ship-handling Simulators, a Crisis Management Simulator, and LNG and Tank-Loading Simulators, among others. The following simulators are located in the Technology Center or in the stand alone Steam Simulation Building.

Steam Plant Simulator

The Steam Plant Simulator is the only one of its kind, and the only full mission simulator at any of the seven US Maritime Academies. The Full Mission (FM) Simulator consists of four main areas: The engine control room, the main engine room, the emergency generator room, and the instructor station. The engine control room houses the controls and most automation consoles for propulsion, boiler operation and electrical generation and distribution. The engine room houses two marine boiler fronts, with two burners each, and associated equipment such as pumps and control valves. The emergency generator room houses the emergency generator and associated distribution panels. The instructor station is behind one-way glass and is where the instructor can introduce the issues for the students to resolve during the simulation.

The Steam Simulator also includes six computer workstations containing the same power plant system as the Full Mission Simulator. The students work independently on these workstations prior to working as a team in the FM Simulator on similar simulation scenarios. Students are assessed both independently and as a team.

Students take two courses in the steam simulation. The first introduces them to the systems, where they essentially enter a ship that has just been released from a shipyard and has no power. During the semester, the students run through and are assed on their ability to establish electrical power throughout the vessel, light the boilers, raise steam, create vacuum in the condenser and get steam to the main propulsion turbines and electrical generators. During the second semester, the students must bring the ship to sea readiness, and then troubleshoot and resolve a myriad of engineering plant problems and situations.

Additionally, the simulation building holds a full mockup of a typical marine boiler with cutaways to allow visual access to its internal components, as well as steam valve cutaways and various steam turbine parts.

Diesel Plant Simulator

Cal Maritime has two Marine Diesel Simulators. The first is a four-room system. One room has eight computer workstations where students simulate different modes of operation of a diesel engine. An instructor's control workstation is in the next room, where he or she can monitor and present different scenarios for the student to answer. A one-way mirror allows the instructor to view student progress. On the other side of the instructor's workstation is a full-mission room, where there is a mockup of a shipboard engine room operating system console, and seven different generator consoles. One-way mirrors allow the instructor to look into this room. Upstairs from the full-mission room are simulators for local engine room control, the emergency diesel generator, a shipboard electrical distribution circuit breaker panel, and panels for monitoring the bilge and sludge system, and fuel and lube oil purification.

The second Marine Diesel Simulator was designed, built, and installed on the Cal Maritime Campus by Chevron Shipping. While this simulator is used primarily for active Marine Engineers, for training and education, the Cal Maritime Faculty have access to use this simulator to work alongside active industry professionals and bring other educational opportunities to the students.

A.5 Manufacturing Spaces

Manufacturing is one of the key aspects of the ET Program. The university has two facilities where manufacturing instruction occur and another one that will begin in Fall 2019.

All ET students take EPO 215 Manufacturing Processes I, where they learn to safely use the machine shop, EPO 213 Welding Lab, and EPO 315 Manufacturing Processes II, where they learn advanced fabrication techniques and specialized methods bearing safety.

Machine Shop

The Machine Shop currently houses
- Three-axis CNC machine
- Two-axis CNC lathe
- Five milling machines
- Three drill presses
- Two band saws
- Ten bench grinders and a surface grinder

The Machine Shop will receive new equipment in Fall 2019 using the courteous alumni donation, which will include five axis CNC machine and new lathes.

Weld Shop

The Weld Shop is used to train students in welding processes. It has 20 workstations, with each workstation tied to its own arc welder and each station vented to a common dust and fume collector. Each station is also plumbed with oxygen and acetylene lines for brazing and cutting operations. The Weld Shop also has a two-axis CNC plasma cutter, a metal shear, a sheet metal brake, a hydraulic press and a bench grinder. All Engineering Technology students receive training to safely use the Machine Shop in EPO 215 (Manufacturing Processes I), EPO 315 (Manufacturing Processes II) and EPO 213 (Welding Lab). Upon completion of these courses, students are then allowed to use the facility for classes and projects that require welding ensuring safety with appropriate supervision.

Maker Space

Opening in Fall 2019, the Maker Space is designed to provide students at CSUM a facility to gain experience with rapid prototyping processes, such as additive manufacturing. The space will have two Flashforge Creator Pro and one MakerBot Replicator fused deposition modeling 3D printers. In addition, it will also contain electronic fabrication stations as well as tools and craft supplies needed for student projects. The current plan is to make the facility open to all students upon completion of the appropriate training.

A.6 Training Ship

The Training Ship Golden Bear (TSGB) is a 500-foot vessel that Cal Maritime uses for shipboard training of cadets, both in-port and at-sea. The vessel makes a sea-going voyage each year. The voyage is around two months in duration. During this time, the ship is used as a real-life working platform to train cadets in watch standing, operations, repairs and maneuvering.

Aboard the TSGB there are several laboratories and classrooms used for hands-on and academic instruction of curricula. The Engineering Lab offers hands-on training in the troubleshooting, maintenance and repair of various shipboard components such as diesel engines, water-making evaporators, oil and fuel purifiers, air and refrigeration compressors, and various valve and pump-types. Classrooms aboard the vessel offer space to work on smaller projects such as breadboard assembly of electronic components. There is also a Machine Shop with a welding area onboard. The Machine Shop has one engine lathe and one knee-type milling machine, along with a bench grinder. The welding area offers a platen with a curtain for stick welding and oxygen/acetylene gas operations to be performed.

Not to be discounted is the vessel's engine room itself, with two Enterprise R5 V-16 direct-reversing, medium-speed diesel engines. There are three MaK diesel generator sets, three A/C refrigeration chiller units, three oil purifiers, two fuel purifiers, three oil-water separators of various types, three air compressors for starting and reversing engines, a friction-type clutch, reduction gear set, Kingsbury thrust bearing, and numerous pumps, valves and actuators of various types. An automated centralized control system console affords watch standers the opportunity to monitor and control most every system in the engine room. In other spaces there are two steam generators, an emergency diesel generator, a battery room, steering gear room with two 7-cylinder piston rocker cam hydraulic pumps and rams, three ship's service rotary air compressors and various winches and windlasses. All of these and many other components and systems are monitored and maintained by engineering cadets.

Each student in the School of Engineering is required to participate in at least one cruise on the TSGB and take a series of operational training classes. Whether CSUM graduates choose design or operations, the experience aboard the TSGB is paramount in their engineering education. This training, occurring during the summer after their first year of classes, brings engineering systems to life. Here the students learn how equipment, machinery and controls work in synergy and gain an appreciation for the sights, sounds and feel of operational systems. The faculty stress a safety culture, and emphasize engine room management, leadership and teamwork skills.

B. Computing Resources

Describe any computing resources (workstations, servers, storage, networks including software) in addition to those described in the laboratories in Part A, which are used by the students in the program. Include a discussion of the accessibility of university-wide computing resources available to all students via various locations such as student housing, library, student union, off-campus, etc. State the hours the various computing facilities are open to students. Assess the adequacy of these facilities to support the scholarly and professional activities of the students and faculty in the program.

B.1 Network Infrastructure

Cal Maritime has a full redundant network infrastructure that has 10Gbps backbones and 10Gbps connectivity through wired Ethernet connections throughout the campus. These landline connections provide internet service to all classrooms and labs as well as staff and faculty offices. In addition, WiFi access points located throughout the campus provide wireless internet access to all students, staff, faculty, and guests. The Training Ship Golden Bear has its own independent internet connection and network. While docked on campus, this connection is provided by a physical connection. While at sea, this connection is provided by a satellite internet access. The ship has its own internal network infrastructure that includes wireless access through most of the common access areas.

B.2 Software

A standard image is used for all student-accessed workstations on campus. These workstations run the Windows 7 operating system and have their hard drives refreshed with a standard hard disk image at the beginning of every academic year. The following is a list of software currently on the image:

- Adobe Creative Cloud (Including Acrobat)

- ArcGIS / ESRI Arc
- Arduino + Processing
- Atmel Studio
- Audacity
- AutoCAD 2018
- Basic Stamp
- CargoMax 2
- Comic Life 2
- Creo
- Eagle
- EES
- Garmin BaseCamp
- Google Earth Pro
- HSMWorks Ultimate
- IIS
- InfraRecorder
- Ltspice IV
- Lyx, MiKTeX, TeXstudio
- Mathematica
- MATLAB & Simulink
- Microsoft Office 365
- OpenCPN
- Read&Write
- Rhino 5
- RStudio
- SnagIt
- Solar Energy System Analysis
- SPSS
- SOLIDWORKS
- TI Connect
- VI Package Manager
- Zotero Standalone

Faculty may request that software be installed on their Cal Maritime issued computer as well. Faculty machines run Windows 7 or 10 or Mac OS X.

B.3 Workstation Access

The campus has two main computer laboratories, Classroom 105 and Lab 101. These computer labs each have one instructor workstation and 24 student workstations. Classroom 105 was refurbished in 2015 and includes two projectors and three TV screens, as well as a new sound system, acoustic tiling, and new furnishings. The computers in Classroom 105 are Dell Optiplex 7040 desktops with Intel Core i7 processors, 16GB RAM, and 1 TB HDD. Lab 101 has one projector and a sound system. The computers in Lab 101 are Dell Optiplex 9010 desktops with Intel Core i5 processors, 16GB RAM, and 1TB HDD.

The computer labs are used for instruction throughout out the day. Classroom 105 is available to students 24 hours, 7 days a week via ID card access outside of hours where the classroom is being used for instruction. Lab 101 is available to students during school hours (except during instruction) as well as Sunday through Thursday from 7pm to 11pm. The computers in the Lab 101 are Dell Optiplex 790 desktops with Intel Core i5 processors, 8GB RAM, and 500 GB HDD.

In addition to the computer labs, students have access to workstations in other campus facilities. Computers are available in the Student Engagement & Academic Success (SEAS) Center, Library, and in smaller numbers at various locations throughout the campus. The SEAS Center is equipped with five Windows 7 workstations. Students have access to these computers during school hours and Sunday through Thursday from 7pm - 11pm. Students have access to 14 Windows 7 workstations in the library which is open 82 hours a week during the semester and remains open an additional 28 hours a week during finals. Hours during the semester are Monday through Thursday 7:30am - 11pm, Friday 7:30am – 5:30pm, Saturday 10:30am – 4:30pm, and Sunday 2:00pm – 10pm. In addition, students may check out one of 29 Windows 7 laptops for use outside of the library. This access to the laptops has been helpful as a resource when computing is required in classes that are not held in the computer labs. Small banks of 2-6 workstations can be found in the Student Services Building and the 2nd Floor of the Laboratory Building, which are available during school hours.

The campus provides a WePA print kiosk service for students with kiosks located in various locations across campus where students congregate. Students can submit their print jobs to the printer from their computer or at the kiosk.

B.4 Adequacy of Computing Resources

Since the last ABET visit, the IT Department has worked with Academic Affairs to help improve the computing resources available to faculty, not only for teaching, but for scholarly and professional activities as well. Due to the size of the campus, initiatives aimed at improving computer resources in general for faculty, apply to the ability to carry out scholarly and professional activities. Following an external review of campus IT in 2014, additional resources were provided to the IT Help Desk to better support not only the faculty, but the campus community as a whole. Currently, the Help Desk has four full time personnel and several student assistants. In addition, there is a dedicated Help Desk employee supporting the simulation facilities. In addition, there is a Director of Academic Technology who supports the Brightspace learning management (LMS) system. Another policy that came out of the review was the establishment of a Computer Refresh Program for all faculty. Faculty are provided a new computer on a regular interval of 5 years. This allows faculty to have up to date computing capabilities and also allows IT to ensure that faculty can run the most recent software versions. Lastly, the IT Department supports the growing software demands of the faculty by leveraging software agreements available to the entire CSU system, providing opportunities that would otherwise be unavailable to a campus this size. An example of this would be the academic license of MATLAB, which has allowed faculty to work on MATLAB related scholarly and professional activities.

C. Guidance

Describe how students in the program are provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories.

Guidance for the use of tools, equipment, and laboratories mostly occurs in the classroom because these are the integral part of several courses. First and foremost, safety training is a standard critical part of student training. In the labs, the instructor will show the students how to use equipment safely and then supervise as they take over. In some instances, deemed as higher risk of danger to the students or the equipment, the instructor will operate the equipment while the students collect data.

For the Machine Shop and Weld Shop, students receive guidance in courses dedicated to machining and welding. Students in EPO 215: Manufacturing Processes I are given a briefing on safe working practices in the machine shop and the safe operation of each type of machine tool in the shop. Similarly, students are required to take EPO 213: Welding, during their freshman year, in which they are trained to use the tools in the Welding Shop. Students must pass EPO 213 and 215 before they are able to use the Machine and Weld Shops for projects in future courses. Even with the training, students are only allowed to use these shops with appropriate supervision.

Guidance in terms of computing resources are more distributed over the students' academic career. During freshman orientation, they are introduced to the campus network, email system, course registration and records system (PeopleSoft), learning management system (Brightspace) and other computer resources. During their sophomore year, the students complete COM 220L: Programming, Applications for Engineering Technology Majors Lab. The instructor of this course provides the necessary computing skills so that by the end of the course, the students can demonstrate competency in the usage of skills that will be recurrently used in the curriculum of ET program. If there are hardware or software related issues regarding campus infrastructure (network, email, anti-virus, licensing, etc.) they can contact (phone or email) IT Support, and an IT staff member will assist them. If there is an issue regarding software use, then students' can resolve it by contacting the professor during the lecture/lab or office hours.

D. Maintenance and Upgrading of Facilities

Describe the policies and procedures for maintaining and upgrading the tools, equipment, computing resources, and laboratories used by students and faculty in the program.

The ET program and School of Engineering on the whole has to ensure that the tools, equipment, labs, and additional resources meet the needs and demands of engineering education for the current environment. This has been and continues to be achieved through strategic planning, fund raising, and development of relationships. A major change since the last accreditation visit is that primary responsibility of planning and maintenance of engineering related facilities falls under the School of Engineering. This change in management has allowed the development of a more focused plan for engineering, which provides a detailed planning for upgrading the laboratory facilities.

The School of Engineering has identified all facilities and equipment that will need maintenance or repair and prioritized them. Priority is decided by factors such as safety, number of students impacted, and alternative resources available. As funding becomes available, the identified items are addressed. Recent developments in this regard are, the development of the Maker Space, replacement of the oscilloscopes in the Instrumentation Lab, and the addition of a particle image velocimetry experiment to the Fluid Mechanics Lab. Complementing the campus funds, the School of Engineering is committed to raise funding for facilities and equipment through charitable gifts working with the Office of University Advancement. In 2019, a significant donation have been made to the School of Engineering by an alumnus from the engineering program who is certainly interested in enhancing the quality engineering education offered at CSUM. This donation allowed the school to cover a major upgrade of our machining and welding labs, such as the addition of a new 5-axis CNC machine, 3 new vertical mills, and 20 new welding helmets.

The policies and procedures for computing resources are primarily controlled by the IT Department with close collaboration with the School of Engineering. For example, while the software needed for campus computing is acquired and updated by the IT Department, the identification of the software is done in close conjunction with Academic Affairs and School of Engineering. Similarly, the software image that is pushed out during the annual refresh is a coordinated effort between the IT Department, Manager of Learning Technologies, and the faculty. The actual maintenance and upgrading of the computing resources on the campus is carried out by the IT Department. Similarly, the refresh of computers for both students and faculty are managed by the IT Department as well.

Moving forward, both the School of Engineering and the ET program are committed to address and update the maintenance and growth of the facilities that are in place. The School will also continue to participate in the Campus Physical Master Plan to help shape the development of the new academic facilities. This not only includes the planning of the classrooms and lab spaces, but ensure that these spaces include the necessary equipment to meet the changing needs of the engineering industry.

E. Library Services

Describe and evaluate the capability of the library (or libraries) to serve the program including the adequacy of the library's technical collection relative to the needs of the program and the faculty, the adequacy of the process by which faculty may request the library to order books or subscriptions, the library's systems for locating and obtaining electronic information, and any other library services relevant to the needs of the program.

The CSUM Library supports the learning and research needs of the School of Engineering students and faculty by offering a wide array of services and resources. The Library provides a variety of spaces for quiet study, collaborative group work, and research. The library features seating for 100 students, including two group study rooms. In addition, there is a library classroom with seating for 25 students. The library is open 82 hours a week during the semester and remains open an additional 28 hours a week during finals. With an average gate count of 500 visitors per day during the academic year, the library is a popular place for students due to its central location on campus. It is equipped with tools to facilitate research and study, including 14 desktop and 29 laptop computers, charging stations, wireless printing, and mobile white boards. The computers contain the same software as other campus labs that support engineering courses, such as Arduino, SolidWorks, and AutoCAD. The course reserve collection contains textbooks provided by professors and study materials for professional licensing exams.

The Library's physical collection consists of approximately 50,000 books and media items. The Library's online subscriptions include over 50 research databases covering the general education and discipline-specific curriculum and research interests of students and faculty. Key engineering-specific databases include Engineering Village and Science Direct. Students, faculty, and staff may also borrow books and media from a shared collection of over 29 million titles via CSU+, a resource sharing service made up of the 23 California State University campus libraries. These materials are usually delivered in two to four business days. For material not available within our CSU network, the library facilitates requests via the national WorldCat service. To develop a collection relevant to our users, the library welcomes acquisition requests from students, faculty, and staff. The Library also manages a popular equipment-lending program, including cameras, calculators, and iPads.

The library's website, http://library.csum.edu, is the portal for discovering the resources available to the campus community. It also provides remote access to subscription databases. The Library website includes a "discovery" system (Ex Libris' Primo) that allows searching across multiple library resources at once, including the catalog and most databases. The website also provides instructional content in the form of subject and course research guides.

The Library's staff includes two faculty librarians, with approval to hire a third in 2018-19. With the addition of a third faculty librarian, each of Cal Maritime's three schools will have a dedicated liaison librarian with relevant subject knowledge for all areas of library services. The School of Engineering liaison librarian is Amber Janssen, MLIS.

Students and faculty have many options to get help with their research. Librarians and staff are available in-person on a drop-in or appointment basis, or by email or phone. Students may also access many instructional and research guides via the library's website.

The Library's instruction program includes credit-based courses, curriculum-integrated instruction, online tutorials and research guides, and one-on-one consultations. Instructional librarians collaborate with other faculty to address specific information literacy learning outcomes throughout the curriculum of each major and department. For engineering students, the Library offers engineering-specific, in-class research workshops integrated across the curriculum. The Engineering Technology students take a required 2-unit information fluency course (LIB 100) in their freshman year.

F. Overall Comments on Facilities

Describe how the program ensures the facilities, tools, and equipment used in the program are safe for their intended purposes. (See the 2019-2020 APPM section I.E.5.b.(1).)

Safety is a critical part of all operations in the School of Engineering. This can be challenging at times, given the fact that students are not only in the labs and machine shops, but spend two summer cruises aboard the TSGB. The safety policies and procedures in place are discussed below as well as steps the School is taking to strengthen safety practices and address any future issues that may arise.

The Machine Shop and Welding Laboratory have additional support given the safety risks associated with those facilities. A key part of safety is to ensure that the students are fully trained to use the facility. Students using the Machine Shop and Welding Laboratory are required to complete training in courses that are a part of the program's curriculum (EPO213: Welding, EPO215: Manufacturing Processes). However, the staff employed for these facilities are not only responsible for teaching courses but also to ensure that all facilities are maintained in full and safe working order. They develop safety protocols and ensure that students and faculty observe those safety protocols. Regular walkthroughs are conducted by the staff to help identify potential safety hazards. For example, in a recent walkthrough, a potential safety hazard was identified at an exit that, while accessible, has limited clearance. This issue was remedied immediately and illustrates the value of regular safety reviews. Other changes have been implemented to address potential safety concerns foreseeing possible issues. In AY 2018-19, the welding helmets used by the students were replaced with auto-darkening welding helmets, addressing concerns about visual access prior to and during welding.

In addition to internal safety monitoring, all facilities on the Cal Maritime campus meet the safety requirements set forth by the California State University system. This includes regular audit and inspection by the Office of the Chancellor, the last of which was conducted in 2019. The audit inspected the campus facilities, including laboratory spaces.

An area of ongoing improvement is to ensure safety during the out of class hours for the Machine Shop and Welding Shop. The School of Engineering is currently working to balance access to these facilities for projects and availability of trained personnel to ensure safety of the students. Procedures currently require that one of these staff be present when students want to use either facility, which does limit the hours of access to these facilities. The School is actively working to secure funding for a dedicated full time staff to the shops and whose responsibility would be solely to the facility without teaching, thereby expanding the time the facilities would be available to the students.

CRITERION 8. INSTITUTIONAL SUPPORT

A. Leadership

Describe the leadership of the program and discuss its adequacy to ensure the quality and continuity of the program and how the leadership is involved in decisions that affect the program.

Cal Maritime has recently (Summer 2018) implemented a significant change in its academic leadership organization. Until that time, all academic departments and programs were under one Academic Dean who reported directly to the Provost and VP Academic Affairs. As the campus grew and became more complex, it became clear that this was not an effective leadership model for different departments and programs with different needs and missions to be under one dean. Therefore after several years of debate and discussion, the President approved the organizational change to a 3-school model.

The School of Engineering comprises both the Mechanical Engineering Department and the Engineering Technology Department. A Dean of Engineering was hired and took over leadership of the School in June 2018.

The department chair is responsible for the administration of the department. These duties include:

- Providing information and advice on the budget to the dean
- Managing the department budget
- Approving expenditures by the department
- Working to ensure that faculty receive the support needed to teach effectively
- Providing reviews of faculty performance and recommendations for retention, tenure and promotion (as one part of a larger process which is currently under review due to the new Schools)
- Facilitating the assessment process and its use to improve curriculum
- Scheduling classes and faculty assignments in coordination with the dean
- Serving as the department representative on various committees
- Serving as the liaison between the department and its constituencies (industry, students, and alumni)

Regular department meetings are scheduled on a bi-weekly basis during which any program related issues are discussed by all the faculty of the department. All the faculty members discuss and approve any proposed changes to the program based on a vote. In addition, School of Engineering (SoE) meetings headed by the dean are scheduled once at the start of each semester and once at the end of the semester, with additional meetings based on need. At SoE meetings all the matters concerned with, the upgrade of lab facilities to ensure the safety of students, assessment evaluation data of student learning outcomes, review of the program educational objectives based on industry and alumni input are discussed. Based on the discussions, a plan of action may be developed and implemented to address issues and provide a continuous quality improvement.

B. Program Budget and Financial Support

1. Describe the process used to establish the program's budget and provide evidence of continuity of institutional support for the program. Include the sources of financial support including both permanent (recurring) and temporary (one-time) funds.

2. Describe how teaching is supported by the institution in terms of graders, teaching assistants, teaching workshops, etc.

3. To the extent not described above, describe how resources are provided to acquire, maintain, and upgrade the infrastructures, facilities, and equipment used in the program.

4. Assess the adequacy of the resources described in this section with respect to the students in the program being able to attain the student outcomes.

California State University Maritime Academy (CSUM) has a comprehensive budgeting process with a high level of transparency. With the recent division of the academic programs into three schools, this process is being replicated at a finer level within each school. The timeline, including the State of California and the California State University budget development, is illustrated in the Figure 8.1 as depicted below.

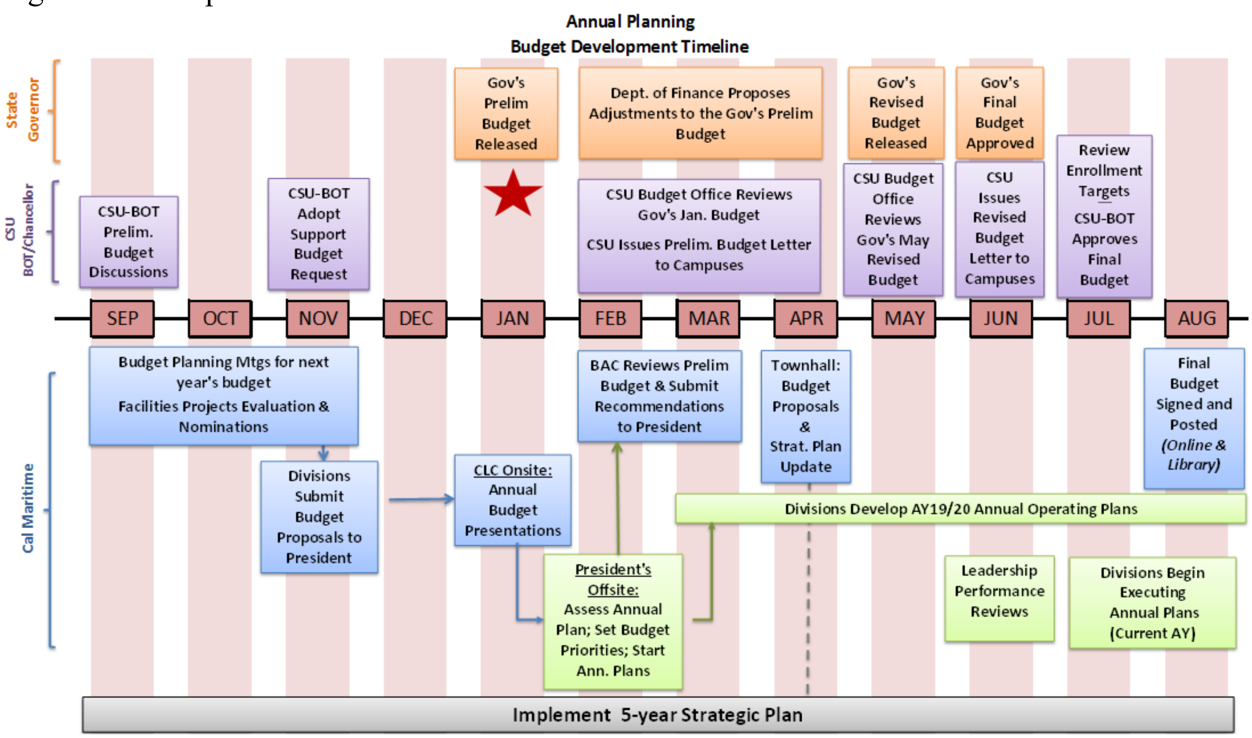


Figure 8.1: Budget process timeline.

The budgets for the campus divisions of Academic Affairs, Student Affairs, Administration and Finance, Advancement, and Marine Programs are created from the up-flow of requests to the Vice Presidents (VPs) from departments, and in cabinet the Vice Presidents address division-level priorities in accordance with strategic planning priorities. The President retains central year-end operating balances to be used for campus-wide, non-recurring strategic initiatives. These budget proposals are assessed at a campus cabinet offsite meeting. At this meeting, a preliminary budget is created. The preliminary budget then moves to the Budget Advisory Committee (BAC), which is designed to advise the President on budget allocation issues. The BAC consists of two faculty appointed by the Academic Senate, one student appointed by ASCMA, one student appointed by the Corps leadership, two staff members and the President's Cabinet. The BAC meets at least once per semester, but generally in February and March meets every week. The committee's budget proposal is presented at the Budget Town Hall in April to the campus. Vice presidents present their budget requests (which are tied to the strategic plan) and feedback is invited. The feedback is used to refine the budget. The finalized university budget is placed on online and in reserve in the library.

Once the allocation to the division of Academic affairs is established, the Provost and Vice-President of Academic Affairs, with input from the School Deans, allocates the funding for the academic programs. There is a certain amount funded annually for operations of the School of Engineering. With the new three-school divisions, departmental spending has been tracked closely in the 2018-2019 AY (with the engineering dean involved in all spending decisions) so that realistic budgets can be predicted going forward, when more control will fall to the department chairs.

The engineering dean works with the department chair on the allocation of the operational or program budget. This money is allocated on the basis of need rather than any formula derived process such as FTE or other objective restriction. Because of this process, the Engineering Technology and Mechanical Engineering departments get the lion's share of support in areas such as lab consumables and supplies. Funds are also allocated for items such as travel, student assistant support, accreditation expenses, specialized training (conferences) and other supplies. The dean covers all costs for items such as paper and other office supplies.

Recurring funding sources are dominated by the State of California's contributions. The School of Engineering controls an approximately \$3M endowment from ABS which generates approximately \$52k each year.

One-time funding from philanthropy has increased in recent years due to a focused attention on cultivating alumni and industry relationships by the CSUM Foundation. Approximately \$290k was secured for the 2019-2020 AY for School of Engineering equipment upgrades.

Teaching at CSUM is rarely supported by graders or teaching assistants, the general philosophy being that class sizes should be small enough that faculty do not need assistants.

Instructors are supported in a variety of ways if they seek to improve their teaching effectiveness. Instructional Related Activities (IRA) funds can be used to support any teaching related activities (ET 370L/ET 350L project related material supplies; Transportation related costs for students travel to Association of Facilities Engineers annual meeting; Transportation related costs for students travel to SNAME conference etc.). Faculty development funds can be used to support outside activities, and while they are often targeted at research activities, they are also used for training in teaching, assessment, and other instructional related topics. The Faculty Development Coordinator is a part-time faculty appointment tasked with organizing on-campus instructor training activities in a wide variety of topics, from training on advising software to faculty learning communities that explore topics of interest as a group.

The Engineering Technology Program is one of only 6 degree programs at CSUM, and typically includes 20 to 25% of the entire student body. As such, the program is an integral component of the academy mission, and receives appropriate consideration in all aspects including support for services, recruiting, equipment, travel and faculty development.

The senior administration officials of the Academy, including the President, the Provost and Vice-President of Academic Affairs, Associate Provost and the School Dean strongly support the educational goals and objectives of the department and have shown tremendous support for the program to obtain and maintain ETAC/ABET Accreditation. The President and the School of Engineering Dean have degrees in Engineering, and fully understand the extra support needed for this type of high cost education. They are also committed to allocating the resources needed to run such programs.

The ET program has strongly benefited from responsive leadership and support at the university level by the President, Four Vice Presidents, Ship Captain, Associate Provost and School Deans. This leadership encourages and facilitates mutually benefited collaborations across disciplinary boundaries with the schools and throughout the university. Of course, there is always more that can be done with greater resources, but the ET department has been very successful in the past few years to be funded at an adequate level to its needs in order to support the attainment of student learning outcomes, when compared to the overall resources of the campus as a whole.

C. Staffing

Describe the adequacy of the staff (administrative, instructional, and technical) and institutional services provided to the program. Discuss methods used to retain and train staff.

There is a wide variety of staff (administrative, instructional and technical) and services provided to the Engineering Technology (ET) program. The staffing and support are adequate for the requirements of the program.

Administrative Staff

The School of Engineering has an administrative support coordinator who helps coordinate the dean's activities as well as departmental purchases, faculty travel, student evaluations, and a large number of similar tasks. In addition to the engineering support coordinator there are other administrative staff who assist the program in particular roles, such as coordinating faculty development funding and overseeing the curriculum change process.

Instructional Staff

Faculty in the Engineering Technology have the primary role of instruction. Cal Maritime's typically small class sizes mean that there is not a large dependency on support staff for direct instruction. The faculty are supported by staff to assist with on-line course preparation, as well as staff who maintain and troubleshoot instructional electronics, computer hardware, and laboratory equipment.

Technical Staff

Currently, the laboratory and simulator technician, is the program's technical support. This prson maintains and upgrades laboratory equipment, and purchases supplies for instructional laboratories. There is a planned support staff position to be filled in the AY 2019-2020 who will be overseeing the machine shop, welding shop, and the new makerspace, in order to reduce the reliance on instructors to allow students to work on projects outside of class hours, and to ensure consistent safety and access policies. The current technical support staff will be retiring at the end of June 2019. As a result, a search to fill this position is also underway. By the submission of this report both job positions will be advertised.

Staff Training and Retention

Cal Maritime staff are supported in training and professional development through the Department of Human Resources, with an overarching goal "to provide quality training and professional development opportunities that enhance knowledge, develop skills, and enrich both the employee and the organization."

The professional development activities available to staff (and all employees) include compliance training, continuing education, and professional development. There is university-wide funding to support professional development for faculty and staff from the office of the President.

Institutional Services

University Advising

Since 2016, university advisors have been available to support student success by helping students navigate university requirements, policies, and resources to achieve their academic goals. Students also meet with faculty academic advisors for degree and course advising, while the university advisors focus on:

- Developing a plan to complete all university requirements for graduation in an efficient and timely manner.
- College management skills, goal setting, time management, etc.
- Informing students about campus resources and services.
- Partnering together with Faculty/Program Advisors for academic and major course advisement.

Career Services

Career Services continues to be a great asset to our engineering students. Career services assists engineering students in finding full time jobs and summer co-ops/internships. There is a dedicated shore side Assistant Director which has added great value to the engineering program. Career services holds workshops, trainings, and other engineering focused career related meetings to prepare engineering graduates for employment. With the career services assistance in Career Fairs and on-campus employment our engineering graduates are obtaining nearly ~90% employment each year within four months of graduation.

Academic Technology

Computer use on campus is intensive, and the needs of the ET department are being met. Staff to assist faculty with on-line course preparation, as well as staff to maintain and troubleshoot electronics and computer hardware are available.

D. Faculty Hiring and Retention

1. Describe the process for hiring of new faculty.

2. Describe strategies used to retain current qualified faculty.

The faculty hiring process generally begins with the identification of a need. This identification typically begins in the department, through discussion among faculty members and the chair. From these discussions, a set of criteria are defined for the new position. The chair will then make a recommendation to the school dean for a new hire. The justifications for the new position are considered, as well as the budgetary considerations.

As part of the campus budget process, the three school deans work with the Provost to determine the greatest campus needs for tenure track faculty and make recommendations to the President and cabinet for a final decision of university wide new faculty hires.

Once the request has been approved, a search committee is created, and the chair of the search committee completes the training on running an unbiased faculty search. The search committee, department chair and the dean will work with Human Resources (HR) to create an advertisement for the position and determine a marketing strategy as far as using a search firm or where to advertise for the position. Then, the search committee comes up with a plan for the interview process and determine a screening criteria. The interview questions are prepared and HR approval is obtained. The search committee will then review applications and choose a list of candidates to be interviewed. Based on phone interviews, a short list is developed and the viable candidates are invited for campus interview. During the campus interview, the candidates meet with the search committee, dean and provost. Candidates are also typically required to provide a teaching demonstration, and to meet with students and faculty from the department. Electronic or written feedback is sought from all people who interact with the candidate. Based on the feedback from all the sources, the search committee creates a list of acceptable candidates, along with their strengths and weaknesses, and makes a recommendation for hire and checks references. Following additional background checks, an offer of employment is then made by the School Dean after consultation with the Provost and Vice President of Academic Affairs. Once the candidate signs the contract, he/she is welcomed as a new faculty member.

Adjunct faculty and lecturers who are not on the tenure track follow a simpler and modified process. These faculty are hired based on either past practice (faculty union contracts) or immediate needs due to other openings for course offerings. The department chair and the dean handle these openings on a case by case basis with discussion with the provost as needed.

The School of Engineering faculty has been very stable. It is rare for a faculty member to leave the department, except through retirement. The strong retention rate seems to be the result of hiring faculty that are attracted to the small size, the emphasis on undergraduate teaching, and the practical applications that are part of the curriculum at CSUM. The small size allows for close interactions and support among faculty, close contact between students and faculty, and a sense that the faculty have a strong input to the direction of the program. New faculty are given reduced teaching load and some start-up funds to possibly pursue a higher degree and are strongly encouraged to enhance their teaching skills. They are also provided feedback through periodic evaluations. In future, ET department plans to assign a tenured faculty member or committee as a mentor for each tenure-track faculty.

Faculty Development funds are available for conference travel and some release for scholarship or other efforts for the overall benefit of the campus. The campus adheres as much as possible to the contracted sabbatical policy and School of Engineering faculty have been able to take advantage of this program.

E. Support of Faculty Professional Development

Describe the adequacy of support for faculty professional development, how such activities such as sabbaticals, travel, workshops, seminars, etc., are planned and supported.

Faculty development (FD) funds are primarily used for travel to conferences and other scholarly activities. At the beginning of the academic year, a set amount is available for the department chairs to award to their faculty. The ET department received $3000 in AY 2018-2019. This funding (Departmental Faculty Development Fund) provides a low-effort means for faculty to secure funding for development.

At the midpoint of the academic year, leftover departmental funds and other sources of funding are “swept” into the Academy-Wide Faculty Development Fund. These funds are awarded by the Provost with the recommendation of the Faculty Development Committee. Faculty use a common application to request these funds. For the last few years, nearly every application has been approved. Table 8.1 shows the University-wide totals for the last few years.

Table 8.1: University-wide FD funds awarded for the last four academic years.

Faculty Development Awards	
Academic Year	Total Awarded
2017-2018	$119,288
2016-2017	$79,754
2015-2016	$81,484
2014-2015	$50,715

Figure 8.2 depicts a flow chart summarizing professional development activities available for the faculty. In addition to the faculty development funds, which are primarily used for the dissemination of research results, there are other sources dedicated to the generation of research and the professional development necessary to advance the expertise of the faculty member.

Cal Maritime faculty members seeking internal money for research may apply for Research, Scholarship, and Creative Activity (RSCA) funds. The sources for this fund are the Chancellor's Office and Cal Maritime. These funds, provided by the Office of the Chancellor and Cal Maritime, are distributed to each CSU campus based on FTEF and are to be used for research, scholarship and creative activity in support of the undergraduate and graduate instructional mission of the CSU. Of course, faculty are also encouraged to seek outside funding.

Faculty members seeking money for professional development (skills development, professional-competencies, pedagogical enhancement, curriculum redesign, etc.) are encouraged to apply through the University-wide Professional Development Fund. These applications are reviewed by the Coordinator for Faculty Development and the Library Dean, who make a recommendation to the Provost.

The President's Mission Achievement Grant program is designed to provide resources to the faculty to engage in activity that facilitates our institutional mission. Each year the Foundation will set aside a certain amount to be added to this effort, the amount being determined by Foundation performance in the previous year. The maximum amount will be $5,000 per grant.
Initial priority will be placed on applications that:

a. Provide significant benefit to the institution not just the grantee (i.e. projects that will have institution-wide as well as personal impact regarding the mission)

b. Promote Intellectual Learning in our students, facilitate Leadership Development in students, or enhance the ability of the institution and students to function with Global Awareness

c. Have matching resources as evidence of commitment (e.g. faculty development funds, departmental funds, personal funds, outside funding sources, in-kind contributions).

The Academy supports faculty who are eligible to receive sabbatical leaves to conduct research, scholarly and creative activity, instructional improvement or faculty retraining. Any full-time faculty member, including lecturers, is eligible for a sabbatical leave if he/she has served full-time for six years at the Academy. The sabbatical leaves may occur in either the fall or the spring semester at full-pay or at half-pay for both the fall and spring semester.

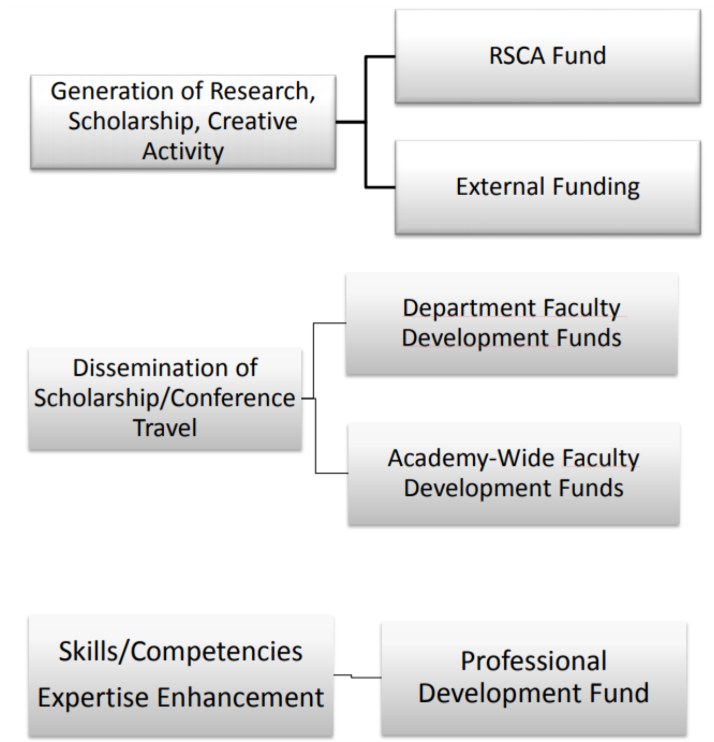


Figure 8.2: Flow-chart summarizing professional development opportunities for faculty.

PROGRAM CRITERIA

Describe how the program satisfies any applicable program criteria. If already covered elsewhere in the self-study report, provide appropriate references.

[NOTE: It can be useful to list the program criteria requirements and then include a description or reference for how the program satisfies each of those requirements. The applicable program criteria could include statements that add specificity to the requirements for student outcomes found in Criterion 3. These statements differentiate the discipline designated by the program's title and should be included in the mapping to the program's student outcomes. The applicable program criteria could also include statements that add specificity to the curricular requirements found in Criterion 5 to differentiate the discipline implied by the title of the program criteria. These should be included in the program's required coursework.]

This section can consist of the listing of required topics and indicating which courses contain that content. The program should expect to provide examples of student work in each topic area to validate that the students are doing work related to each topic.

The 2018-19 ETAC program criteria for Facilities Engineering Technology are:

Objectives: To prepare graduates with the technical and leadership skills necessary to enter a variety of different careers in the field of facilities engineering technology. Baccalaureate degree graduates must have strengths in their knowledge of operations, maintenance, and manufacturing, while also being well prepared for design and management in facilities engineering technology.

Outcomes: The program must demonstrate that

- the baccalaureate degree graduates are proficient in applying the principles of college-level physics and chemistry to problems associated with facility systems and structures. The nature and level of proficiency must be appropriate to the program objectives.
- graduates are proficient in applying the principles of fluid mechanics, materials, dynamics, thermodynamics and energy systems to facility systems and structures. The nature and level of proficiency must be appropriate to the program objectives.
- graduates are proficient in (a) the use and application of instrumentation for measuring physical phenomena related to facilities engineering technology, and (b) the design of experiments, data collection, analysis, and formal report writing.
- graduates are proficient in the operation, maintenance, analysis, design and management of modern power plants and facility systems. The program must also demonstrate that graduates are proficient in the use of design manuals, material/equipment specifications, and industry regulations applicable to facilities engineering technology. The nature and level of proficiency must be appropriate to the program objectives.

The Facilities Engineering Technology Program has met the program criteria as demonstrated in this self-study, through its curriculum and faculty expertise.

A. Curriculum

The Department of Engineering Technology provides students well-balanced required courses in Facilities Engineering Technology (FET) and Marine Engineering Technology (MET). The objective of the program criterion is to prepare students to well attain the Student Learning Outcomes before graduation, then ultimately, fulfill the Program Educational Objectives. A discussion on the curricular areas to satisfy the Facilities Engineering Technology (FET) and Marine Engineering Technology (MET) programs is discussed in Criterion 5, Section A.4. Although there are many required courses that are common between the FET and MET programs. The unique required courses for each program are,

FET (Unique required courses compared to MET program)

- CEP 270/370 (Co-Ops)
- CHE 205 (Chemistry of Plant Processes)
- EPO 319 (Facilities Engineering Diagnostic Lab)
- EPO 321 (Introduction to Power Generation Plants)
- ET 442/442L (Heating, Ventilation, and A/C Lecture and Lab)
- ENG 472 (Facilities Management)

MET (Unique required courses compared to FET program)

- EPO 235 (Steam Plant Watch Team Management)
- CRU 250/350 (Sea Training)
- EPO 322/322L (Diesel Engineering II/Simulator Lecture and Lab)
- ENG 430 (Naval Architecture)
- EPO 217 (Shipboard Medical)

B. Faculty

The Engineering Technology (ET) faculty members, due to their diverse background and experience, are well-versed with the curricular topics and regularly supply the necessary instructions and mentorship to students. Criterion 6, Table 6-1 shows a summary of faculty background and credentials along with their level of activities in professional societies, scholarship and consulting. The CVs of the faculty members in the ET Department are presented in Appendix B and they shed more light on the experience and credentials of each faculty member.

Tenure-track faculty members are under probationary status and are reviewed every other year starting in the second year of their employment. The tenured faculty members are reviewed every five years. Faculty members are reviewed in teaching, scholarly and creative activities, and service to the students, department, school and/or campus and greater community. These regular reviews assess the competency of faculty in their respective areas of responsibilities. This process in turn ensures a consistent level of performance in all areas by the faculty.

APPENDICES

APPENDIX A – COURSE SYLLABI

1. *Course number and name:* CHE 110, General Chemistry

2. *Credits and contact hours:* 3 units, 3 contact hours/week

3. *Instructor's or course coordinator's name:* Steven Runyon

4. *Text book, title, author, and year:* P. Flowers, Klaus Theopold, R. Langley, W. R. Robinson, and O. College, **Chemistry**. Houston, Texas: Openstax, Rice University, 2018.
    a. Homework: https://www.saplinglearning.com/

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    This course is an in-depth introduction to fundamental chemical principles and scientific thought. Topics covered include scientific method, scientific calculations, properties of matter, periodic trends, atomic and molecular structure, chemical reactions and stoichiometry, thermochemistry, gases, solutions, and radioactivity.
    b. *Prerequisites:* None
    Co-requisites: CHE 110L
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Use theories, principles, and models, in conjunction with the scientific method to analyze problems in chemistry.
    b. Describe, explain, and model chemical and physical process at the atomic and molecular level in order to explain macroscopic properties.
    c. Solve quantitative problems in chemistry to demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process. Check results to make sure they are physically reasonable.
    d. Make connections between chemical theories and principles to real-world applications.

7. *Brief list of topics to be covered*
    a. Scientific method
    b. Scientific calculations
    c. Properties of matter
    d. Periodic trends
    e. Atomic and molecular structure
    f. Chemical reactions and stoichiometry, Gases
    g. Thermochemistry, Solutions

1. *Course number and name:* CHE 110L, General Chemistry Lab

2. *Credits and contact hours:* 1 units, 3 contact hours/week

3. *Instructor's or course coordinator's name:* Steven Runyon

4. *Text book, title, author, and year:* S. Runyon, **General Chemistry Laboratory Manual: 2nd Edition**. Vallejo, CA, 2017.

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    This course is an in-depth introduction to fundamental chemical principles and scientific thought. Topics covered include scientific method, scientific calculations, properties of matter, periodic trends, atomic and molecular structure, chemical reactions and stoichiometry, thermochemistry, gases, solutions, and radioactivity.
    b. *Prerequisites:* None
    Co-requisites: CHE 110
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. Specific goals for the course
    a. Perform general chemistry laboratory experiments using standard chemistry glassware and equipment.
    b. Demonstrate appropriate safety procedures.
    c. Apply basic experimental techniques to verify scientific principles introduced in CHE 110.
    d. Navigate safely and effectively around the chemistry lab.
    e. Document experimental approach and results in a laboratory notebook.
    f. Discuss scientific results and propagation of errors in written form in formal laboratory reports.

7. Brief list of topics to be covered
    a. Scientific method
    b. Scientific measurement and uncertainty
    c. Error analysis
    d. Density
    e. Electrolytes and solutions
    f. Qualitative chemical analysis
    g. Reaction stoichiometry
    h. Acid/base titration
    i. Gas stoichiometry
    j. Thermochemistry
    k. Atomic spectroscopy
    l. Visible spectroscopy
    m. Laboratory safety

1. *Course number and name:* CHE 205, Chemistry of Power Plant Processes

2. *Credits and contact hours:* 3 units, 3 contact hours/week

3. *Instructor's or course coordinator's name:* Steven Runyon

4. *Text book, title, author, and year:* P. Flowers, Klaus Theopold, R. Langley, W. R. Robinson, and O. College, **Chemistry**. Houston, Texas: Openstax, Rice University, 2018.
    a. Homework: https://www.saplinglearning.com/

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    This course examines the role that water plays in both production and power plant processes. Emphases within the course focus on the nature of liquid mixtures, including equilibrium concepts as they relate to solution chemistry, sources and types of organic and inorganic water contamination, the quantification of water contamination and the pre-treatment and post-treatment of water utilized in plant processes.
    b. *Prerequisites:* CHE 110, CHE 110L
    Co-requisites: None
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Understand the basic concepts of water chemistry.
    b. Describe, explain, and model chemical and physical properties of water and aqueous solutions at the molecular level in order to explain macroscopic properties.
    c. Understand basic analytical techniques used to assess water quality.
    d. Understand basic techniques of water treatment to remove undesirable constituents.
    e. Understand the basic processes pre-treatment and post-treatment of water utilized in plant processes.

7. *Brief list of topics to be covered*
    a. Atomic & molecular structure
    b. Intermolecular forces, properties of liquids
    c. Solutions & solubility
    d. Kinetics
    e. Chemical equilibrium, Ion exchange
    f. Salt effects on pH, polyprotic acids, buffers
    g. Structural aspects of acid strength and buffers
    h. Water hardness and alkalinity
    i. Colloids, coagulation & flocculation
    j. Sedimentation & filtration
    k. Activated carbon
    l. Corrosion control, stability indices, and degasification

1. *Course number and name:* MTH 100, College Algebra and Trigonometry

2. *Credits and contact hours:* 4 units, 4 contact hours/week

3. *Instructor's or course coordinator's name:* Brent Pohlmann

4. *Text book, title, author, and year:* J. P. Abramson et al., Algebra and Trigonometry. Houston, Texas: Openstax, 2017.

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    Combines the necessary elements of college algebra and trigonometry to prepare students for subsequent study of calculus, computer programming, navigation and the physical sciences. Topic coverage includes linear, quadratic and higher polynomial equations, rational logarithmic and exponential functions and equations, trigonometric functions and their inverses and equations, with graphical representation of all of the above. Other topics are generalized and periodic functional relationships, multivariable systems with matrix algebra including inversion and determinants, complex numbers, vectors and appropriate computational methods, the rapid computation of values in plane triangles and various functions using the pocket calculator.
    b. *Prerequisites:* Two years of high school algebra or MTH 001, or passing score on ELM, or otherwise exempt from remediation
    Co-requisites: None
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Perform arithmetic operations on real numbers, rational and polynomial expressions.
    b. Solve linear and quadratic equations and inequalities.
    c. Model situations with linear equations and quadratic equations.
    d. Derive linear equations using the point-slope and slope-intercept formulas.
    e. Understand the concepts of parallel and perpendicular lines and how their slopes are related.
    f. Determine the range and domain of the function.
    g. Graph linear functions, quadratic function and polynomial functions.8
    h. Solve problems involving real and rational zeros of polynomials.
    i. Solve problems involving rational function.
    j. Solve polynomial inequalities and rational inequalities.
    k. Convert from radian to degree measure and vice-versa.
    l. Define an exponential and logarithmic functions.
    m. Simplify exponential and logarithmic functions.
    n. Solve problems involving exponential and logarithmic functions.
    o. Define six trigonometric functions.
    p. Graph all six trigonometric functions.
    q. Use the basic trigonometric identities to verify other trigonometric identities.

r. Solve problems using the law of sines and the law of cosines.
s. Solve vector-related problems.
t. Solve systems of linear equations using Gauss-Jordan Method.

7. *Brief list of topics to be covered*
   a. Exponential, radicals and rational expressions
   b. Polynomials
   c. Rational expressions
   d. Linear equations and its applications
   e. Quadratic equations and its applications
   f. Linear inequalities
   g. Equations of a line
   h. Functions and notations of functions
   i. Domain and range of functions
   j. Behavior of graphs
   k. Linear functions
   l. Piecewise functions
   m. Composition and transformation of functions
   n. Inverse functions
   o. Quadratic functions
   p. Polynomial functions and their graphs
   q. Dividing polynomials
   r. Zeroes of polynomial functions
   s. Rational functions
   t. Polynomial and rational inequalities
   u. Exponential and logarithmic functions and their graphs
   v. Logarithmic properties
   w. Exponential and logarithmic equations
   x. Angles and their measure
   y. Right triangle trigonometry
   z. Unit circle
   aa. Trigonometric functions
   bb. Basic trigonometric identities
   cc. Law of Sines and Cosines
   dd. Vectors
   ee. Systems of linear equations: two variables and three variables
   ff. Solving systems with Gauss-Jordan Elimination Method

1. *Course number and name:* MTH 210, Calculus I

2. *Credits and contact hours:* 4 units, 4 contact hours/week

3. *Instructor's or course coordinator's name:* Brent Pohlmann

4. *Text book, title, author, and year:* G. B, **Thomas' calculus. Early Transcendentals. Single Variable, 12th ed.** Boston, MA: Addison-Wesley, 2010.

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)* Introduction of functions and limits, differentiation, applications of differentiation, integration, and applications of the definite integral.
    b. *Prerequisites:* MTH 100 or equivalent with a C- or higher *Co-requisites:* None
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Understand functions, including exponential, logarithmic, trigonometric, and inverse trigonometric functions.
    b. Understand and compute limits and their geometrical consequences.
    c. Compute derivatives, using various techniques.
    d. Comprehend derivatives and understand how they relate to the real world.
    e. Apply derivatives to actual problems from engineering.
    f. Apply derivatives to actual problems from engineering.

7. *Brief list of topics to be covered*
    a. Elementary functions
    b. Limits
    c. Continuity
    d. Derivatives
    e. Techniques for Evaluating Derivatives
    f. Applications of the Derivative
    g. Introduction to Integration
    h. Riemann sums
    i. Fundamental theorem of calculus

1. *Course number and name:* MTH 211, Calculus II

2. *Credits and contact hours:* 4 units, 4 contact hours/week

3. *Instructor's or course coordinator's name:* Taiyo Inoue

4. *Text book, title, author, and year:* G. Strang, E. Herman, and O. College, **Calculus. Volume 2**. Houston, Texas: Openstax, Rice University, 2016.

5. *Specific course information*
   a. *Brief description of the content of the course (catalog description)*
      An introduction to additional methods of integration and improper integrals. Presented are trigonometric and hyperbolic functions and their inverses; infinite sequences and series; and a brief introduction to linear, ordinary first, and second-order differential equations.
   b. *Prerequisites:* MTH 210 or equivalent with a C- or higher
      Co-requisites: None
   c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
   a. Apply definite integrals in the solution of practical problems in geometry, science and engineering.
   b. Evaluate integrals by using different integration methods.
   c. Understand differential equations and use them in mathematical modeling.
   d. Comprehend and evaluate infinite sequences and series and be able to determine whether they converge or diverge.
   e. Use analytic geometry in practical problems in science and mathematics.

7. *Brief list of topics to be covered*
   a. Review of limits
   b. Continuity
   c. Derivatives
   d. Important classes of functions
   e. Integration and the fundamental theorems of calculus which link integration to derivatives.
   f. Some geometric applications of the definite integral.
   g. Scientific applications of the integral.
   h. Methods of integration such as integration by parts, partial fraction decomposition, numerical integration.
   i. Elementary functions
   j. Differential equations: first and second order linear differential equations
   k. Infinite sequences and series: tests for convergence, Taylor series
   l. Introductory analytic geometry
   m. Numerical techniques

1. *Course number and name:* PHY 200, Engineering Physics I

2. *Credits and contact hours:* 3 units, 3 contact hours/week

3. *Instructor's or course coordinator's name:* Jaya Punglia

4. *Text book, title, author, and year:* None

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    Covered are forces, torques, and static equilibrium; constant, accelerated, and periodic linear and rotational dynamics; gravity; fluid statics and dynamics; elasticity; temperature, thermal expansion, and heat transfer.
    b. *Prerequisites:* MTH 210
    Co-requisites: PHY 200L
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Demonstrate addition and subtraction of vector quantities using the component vectors in two or three dimensions.
    b. Set up and solve velocity and acceleration problems by applying the one and two dimensional kinematic equations and vector addition.
    c. Demonstrate mastery of Newton's laws by solving problems involving statics, including friction and normal forces.
    d. Develop specific scenarios, such as designing a water slide or roller coaster that will demonstrate their mastery of the energy concepts.
    e. Determine the momentum of a bullet or a car, and determine the initial velocity of a bullet that is fired into a ballistic pendulum using the conservation of linear momentum.
    f. Determine the mass of the moon, the mass of the sun, and the magnitude of the forces that hold the earth in orbit around the sun and the moon in orbit around the Earth using Newton's Law of Gravitation.
    g. Construct on paper different gearing ratios to accomplish desired angular velocities and accelerations and to be able to see the relation between the linear and rotational motion.
    h. Determine the kinetic energy, moment of inertia, and total mechanical energy of an object that is rotating while it is undergoing 2-D translation
    i. Predict the periodic motion of oscillating systems such as a mass on a spring and pendulum.

7. *Brief list of topics to be covered*
    a. Introduction to mathematical concepts and dimensional analysis
    b. Vector addition
    c. Kinematics in 1-D
    d. Kinematics in 2-D
    e. Forces and Newton's Laws of Motion

f. Work and energy
g. Impulse and momentum
h. Rotational kinematics
i. Rotational dynamics
j. Simple harmonic motion
k. Fluids and Archimedes Principle

1. *Course number and name:* PHY 200L, Engineering Physics I Lab

2. *Credits and contact hours:* 1 unit, 2 contact hours/week

3. *Instructor's or course coordinator's name:* Nelson Coates

4. *Text book, title, author, and year:* None

5. *Specific course information*
    a. *Brief description of the content of the course (catalog description)*
    Laboratory physics course designed to enhance conceptual learning of physics by adding a hands-on learning component. The course will cover experiments based on the theory provided in PHY 200, including the study of forces, torques and static equilibrium; constant, accelerated, periodic, linear and rotational dynamics; gravity; fluid statics and dynamics; elasticity; temperature, thermal expansion and heat transfer.
    b. *Prerequisites:* MTH 210
    Co-requisites: PHY 200
    c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
    a. Understand scientific principles and their relationship to the physical universe.
    b. Use theories, principles and models, in conjunction with the scientific method to analyze problems in science.
    c. Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in science.
    d. Be more proficient independent learners and effective communicators.

7. *Brief list of topics to be covered*
    a. Introduction to Physics Lab
    b. Linear Motion: Position, Velocity, and Acceleration
    c. Composition and Resolution of Vectors
    d. Measurement of Gravity with a Pendulum
    e. Projectile Motion
    f. Frictional Forces
    g. Archimedes' Principle
    h. Conservation of Energy with Two Objects
    i. The Ballistic Pendulum and Collisions
    j. Uniform Circular Motion
    k. Torque and Equilibrium

1. *Course number and name:* PHY 205, Engineering Physics II

2. *Credits and contact hours:* 4 units, 4 contact hours/week

3. *Instructor's or course coordinator's name:* Nelson Coates

4. *Text book, title, author, and year:* None

5. *Specific course information*
   a. *Brief description of the content of the course (catalog description)*
      Laws of thermodynamics and the thermodynamics process; electrostatic and electromagnetic fields and forces; electric potential; capacitance, resistance and inductance; direct current circuits and instruments; R-L-C exponential circuits, alternating current circuits, and electromagnetic waves.
   b. *Prerequisites:* MTH 211
      Co-requisites: PHY 200
   c. *Required, elective, or selected elective (as per Table 5-1):* Required

6. *Specific goals for the course*
   a. Understand scientific principles and their relationship to the physical universe.
   b. Use theories, principles and models, in conjunction with the scientific method to analyze problems in science.
   c. Acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in science.
   d. Be more proficient independent learners and effective communicators.
   e. Do well in Fundamentals of Engineering Exam, Circuits and related courses.

7. *Brief list of topics to be covered*
   a. Structure of the Atom, Conductors, Insulators
   b. Coulombs law, Electric Fields and Lines
   c. Calculating Electric Fields, Dipoles, Electric Flux
   d. Electric Flux and Gauss's Law
   e. Gauss's Law Review
   f. Electric Potential Energy and Electric Field
   g. Capacitors and Capacitance,
   h. Energy in Capacitors, Current and Resistance
   i. Ohms Law and Electrical Energy and Power
   j. DC Circuits, Resistors in Series and Parallel, Kirchoff's Rules
   k. RC Circuits, Magnetic Fields, Lines, and Forces
   l. Torque in DC Motors, Sources of Magnetic Fields
   m. Biot-Savart Law, Ampères Law, Solenoids
   n. Electromagnetic Induction, Faraday's Law
   o. Faraday's Law, Lenz's Law
   p. Maxwell's Equations and Electromagnetic Waves

1. CHE 205: Chemistry of Plant Processes

2. 3 credit hours and 45 contact hours

3. Instructor: Steve Runyon

4. Text book: Flowers et al. Chemistry, 1st Edition, OpenStax College, 2015.

    a. other supplemental materials: Materials posted on Brightspace

5. Specific course information

    a. This course examines the role that water plays in both production and power plant processes. Emphases within the course focus on the nature of liquid mixtures, including equilibrium concepts as they relate to solution chemistry, sources and types of organic and inorganic water contamination, the quantification of water contamination and the pre-treatment and post-treatment of water utilized in plant processes.

    b. Prerequisites or Co-requisites: NONE

    c. Required Course (only for FETs)

6. Specific goals for the course

    a. Upon successful completion of this course, students will be able to:

        - Understand the basic concepts of water chemistry.
        - Describe, explain, and model chemical and physical properties of water and aqueous solutions at the molecular level in order to explain macroscopic properties.
        - Understand basic analytical techniques used to assess water quality.
        - Understand basic techniques of water treatment to remove undesirable constituents.
        - Understand the basic processes pre-treatment and post-treatment of water utilized in plant processes.

    b. SLOs covered by this course:

        - FET SLO (h): Respect for diversity and a knowledge of contemporary professional, societal and global issues.

7. Brief list of topics to be covered
    - Intermolecular Forces, Properties of Liquids
    - Colligative Properties
    - Chemical Kinetics
    - Equilibrium – Le Chatelier's principle, Acid/Base Equilibria
    - Salt effects on pH, Polytropic Acids, Buffers, Alkalinity, CaCO3 Stability
    - Colloids, Coagulation & Flocculation, Activate Carbon, Ion Exchange, Corrosion Control, Stability Indices, Degasification

1. EPO 110: Plant Operations I
2. 1 credit hours and 30 contact hours
3. Instructor: Mike Andrews
4. Text book: None
    a. other supplemental materials: Materials posted on Brightspace
5. Specific course information
    a. A laboratory class directly involved in the inspection, maintenance, and repair of marine machinery and systems aboard the training ship. Emphasis is the safe and proper use of hand and power tools and the identification and repair of valves, pumps, fittings, piping, switches, controllers, and circuit breakers. Lab reports will be completed on work performed.
    b. Prerequisites or Co-requisites: NONE
    c. Required Course
6. Specific goals for the course
    a. Upon successful completion of this course, students will be able to:
        - Safely use tools and equipment
        - Develop skills needed in the practical maintenance and repair of industrial machinery, electric motors, and large diesel engines.
    b. SLOs covered by this course:
        - FET SLO (h): Respect for diversity and a knowledge of contemporary professional, societal and global issues.
        - FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.
7. Brief list of topics to be covered
    - Safety
    - Painting, Lubrication and Repair Procedures
    - Shipboard waste management and disposal
    - Marine Pollution
    - Electrical and Equipment Tag-Out

1. EPO125: Introduction to Marine Engineering

2. 3 Credit hours, 2.5 contact hours/week

3. Instructor's or course coordinator's name
   Doug Rigg, Fay Plummer

4. Text book, title, author, and year
   Principals of Naval Engineering, NAVPERS, 1970
   Machinist's Mate 3&2 (Surface), NAVEDTRA, 1997
   Engineman 3 , NAVEDTRA, 2003
   Basic Machines , NAVEDTRA, 1994
   a. other supplemental materials
      Department Generated Handbook

5. Specific course information
   a. brief description of the content of the course (catalog description)
      An introductory course in Marine Engineering that develops a basic understanding of common shipboard systems: their functions, arrangement, major components and principles of operation. Hands-on studies of the engineering systems aboard *Training Ship GOLDEN BEAR* reinforce engineering system concepts discussed in class. Completion of shipboard practical training requirements familiarize the student with the watch routine and safety equipment in preparation for the follow-on practical training at sea.
   b. prerequisites or co-requisites
      EPO125-L MET & FET only
   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program
      Required for MET, FET, ME Unlicensed and ME-USCG License

6. Specific goals for the course
   a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.
      a. Identify types of heat exchangers
      b. Identify types of valves , pipe fittings , tubing connection fittings
      c. Identify types of pumps and their use on the Training Ship Golden Bear.
      d. Understand the basics of diesel engines
      e. Understand the parts and function of the drive train on the Golden Bear
      f. A basic understanding of the steering gear on the Golden Bear
      g. A basic understanding of steam and condensate systems on the Golden Bear
      h. A basic understanding of Ship Service Generators and electrical production aboard
      i. The Training ship Golden Bear.

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
SLO1 Stand a competent watch as a Cadet during the summer training cruise.
SLO2 Be academically prepared for CRU-150 and EPO-220 Diesels 1

7. Brief list of topics to be covered

Week	**Date**	**Topics**
1	Aug. 20	Heat Exchangers , Main SW system
2	Aug. 27	Aux SW system , anti- fouling systems, types of valves **Test 1**
3	Sept.3	Types of valves, tubing and pipe fittings, control valves **Test 2**
4	Sept. 10	Start centrifugal pumps.
5	Sept. 17	Centrifugal pump parts and maintenance Bearings, start positive displacement pumps. **Test 3**
6	Sept. 24	Start Diesels, fuel pumps.
7	Oct. 1	TSGB main engines and systems **Test 4**
8	Oct. 8	Drive Train on the TSGB
9	Oct. 15	Steering Gear **Test 5**
10	Oct. 22	Steam and boilers
11	Oct.29	Traps and condensate systems on TSGB **Test 6**
12	Nov. 5	Ships Service Generators , electrical basics.
13	Nov. 19	Ship Service Generators –automatic voltage regulator-basic
14	Nov. 26	Electrical distribution-basic
15	Dec. 3	Emergency Diesel Generator on the TSGB Review ***if*** time allows
Final Exam	**?**	Venue and Time TBA in class when published. **Final Exam will count as 2 Tests , 25% of total grade.**

1. EPO 213: Welding Lab
2. 1 credit hours and 30 contact hours
3. Instructor: Ken Levan
4. Text book: None
    a. other supplemental materials: Welding Instruction Manual
5. Specific course information
    a. A laboratory course that provides the experience in welding, brazing, cutting, and burning techniques sufficient to effect emergency repairs and routine maintenance of engineering structures and systems.
    b. prerequisites or co-requisites: NONE
    c. Required Course
6. Specific goals for the course
    a. Upon successful completion of this course, students will be:
        - Proper set-up and use of electric shielded metal arc welding equipment.
        - Proper set-up and use of Oxy/Fuel welding and cutting equipment.
        - Proficient at stick welding and electrode selection
        - Proficient at Oxy/Fuel cutting and brazing
        - Proficient at proper welding shop safety procedures
    b. SLOs covered by this course:
        - FET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.
        - FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.
        - MET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology.
7. Brief list of topics to be covered
    - Horizontal Arc Welding Projects
    - Arc Welding and Cutting Projects
    - Gas Welding and Cutting Projects

1. CRU 150: Sea Training I (Engine) Cruise

2. 8 credit hours and 60 days

3. Instructor: Mike Andrews

4. Text book: Electricity, Fluid Power, and Mechanical Systems for Industrial Maintenance, Thomas Kissell, Prentice Hall, 1st Edition, 1999.

   a. other supplemental materials: None

5. Specific course information

   a. First at-sea experience on the training ship. Introduction to the fundamentals of engineering systems operations and shipboard routine, including operation and monitoring techniques for diesel propulsion, electrical power generation, and evaporators and support equipment. Duties during emergency situations such as fire, abandon ship, and rescue are also learned. By the end of the cruise, the student will have demonstrated the required STCW competencies and understand basic power plant operation and maintenance.

   b. Prerequisites: DL 105/105L/105X, EPO 110, EPO 125 ; Co-requisites: NONE

   c. Required Course

6. Specific goals for the course

   a. Upon successful completion of this course, students shall:

      - Demonstrate proficiency in watch-standing, day work, and in practical skills grounded in modern marine engineering principles
      - Demonstrate the capacity to gather and process engineering information, and to integrate and transfer this information to all activities the student may encounter in their professional career
      - Gain competency in engineering skills useful to future course work at CMA and to a successful career in marine engineering

   b. SLOs covered by this course:

      - FET SLO (h): Respect for diversity and a knowledge of contemporary professional, societal and global issues.
      - MET SLO (d): An ability to function effectively as a member or leader on a technical team.
      - MET SLO (g): An ability to understand and apply concepts of professional, ethical and social responsibilities.
      - MET SLO (h): Respect for diversity and a knowledge of contemporary professional, societal and global issues.

- MET SLO (i): Ability to receive a USCG License as Third Assistant Engineer.

7. Brief list of topics to be covered

   - Main Engine
   - Clutch, Reduction Gear, Thrust Bearing, Shaft, and Propeller
   - Auxiliary Systems
   - Ballast Systems
   - Fire-fighting and Life-saving equipment's

1. *Course number and name*

COM220L: Programming Applications for Engineering Technology Majors Lab

2. *Credits and contact hours*

1.0 Credits (Hybrid Online format: in-person contact: 4hrs, asynchronous: 22hrs)

3. *Instructor's or course coordinator's name*

Jon Fischer

4. *Text book, title, author, and year*

None

a. *other supplemental materials*

TI-89 Calculator

5. *Specific course information*

a. brief description of the content of the course (catalog description)

Covers data representation, data analysis, and programming using Microsoft Excel. Advanced operations of the TI-89 calculator. Prepares Engineering Technology students for advanced level coursework.

b. Prerequisites or Co-requisites

None

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

In Microsoft Excel

1. Import data from instrumentation and files.
2. Generate professional grade charts, plots, and graphs.
3. Call advanced logical, mathematical, and boolean functions in a spreadsheet.

TI89 Graphing Calculator

1. Understanding calculator syntax & settings, evaluating expressions
2. Plotting equations and manipulating graphs to solve problems
3. Using the equation solver to solve linear equations and systems for engineering applications

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Program Outcome 1-2: Demonstrated ability to operate computer tools and automation systems

7. Brief list of topics to be covered

Excel Orientation
Absolute and relative cell referencing, smart dragging
Setting up independent variables
Basic Scatter Plotting & Formatting
Adding data sets to plots & combining data sets
Working with constants
Adding data sets to plots & combining data sets
Importing data from text files
Working with constants
Logarithmic Plotting
Adding a secondary y-axis
Using Excel to add a trendline
Using R2 value to asses the strength of the trendline
Use trendline equation to make predictions/calculations.
Calculate sums, averages, min, max of a data set
Use the COUNT family of functions
Use the COUNTIF to make targeted counts of data
Plot Pie Charts and Histograms
Use IF statement to display conditional contents
Use Boolean and search functions to program logical tests
Use IF statement to display conditional contents
Use Boolean and search functions to program logical tests
RANK function
Excel sorting capability
Absolute vs relative references with $
Use nested functions
Combine functions to process complex data sets
Create complex histograms and bar charts
Use Excel concepts with Google Doc architecture to create:
Simple webpages
Interactive Online Forms
Programmable back end architecture that consolidates, manipulates, and displays user data.
Learning Goals Turning on/off
Modifiers
Other Keys
Apps: Shortcuts
Catalog/Custom/Home
MODE
Decimal/radian
Pretty print
Exact/Auto/Approximate
Comma, Parentheses, Brackets, Equal
Insert/ Delete Mode
STO

Ans/entry
Basic Calculations
Fractions/Rational Functions
Addition/Subtraction/Multiplication/Division
Trig
Log/Exponents
Radicals
Clearing Variables
Simplify and solve single variable equations using the TI89.
Simplify and solve simultaneous linear equations using the TI89.
Derivative function
Definition
Open-ended derivatives
Evaluating derivatives at a point
Integrate function
Definite Integrals
Indefinite Integrals
Use calculus functions to solve Projectile Motion Problem graphically

1. EPO 210: Plant Operations II
2. 1 credit hours and 30 contact hours
3. Instructor: Mike Andrews
4. Text book: None
    a. other supplemental materials: Materials posted on Brightspace
5. Specific course information
    a. Continuation of the practical work performed on the training ship or in facilities maintenance lab. Equipment maintenance is emphasized with work on diesel engines, air compressors, generators, electrical equipment and pumps. Lab reports will be completed on work performed.
    b. prerequisites: EPO 110 ; co-requisites: EPO 315
    c. Required Course
6. Specific goals for the course
    a. Upon successful completion of this course, students will be able to:
        - Use tools properly and safely to accomplish assigned tasks
        - Demonstrate proper maintenance techniques
        - Understand safety hazards and need for personal protective equipment
        - Provide written reports detailing work performed
        - Perform maintenance actions as described in technical manuals
    b. SLOs covered by this course:
        - FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.
7. Brief list of topics to be covered
    - Safety Planning, Work Procedures
    - Pumps and Controls, Overhaul Valves
    - Reciprocal Pumps, Gear Pumps
    - Detect Grounds, BCOP Deck Machinery

1. EPO 214: Boilers
2. 3 credit hours and 45 contact hours
3. Instructor: Scott Green
4. Text book: Everett B. Woodruff, et al. Steam Plant Operations, 8th, 9th, or 10th edition, 2016
    a. other supplemental materials: Online Course Content Posted on Brightspace
5. Specific course information
    a. Comprehensive study of fossil fuel steam generators, with emphasis on marine propulsion plants. Studies include the principles of boiler design and construction, boiler auxiliaries, principles of combustion, heat recovery equipment, automated boiler controls, and boiler water treatment. In addition, the course prepares students for the steam plant section of the U.S. Coast Guard Third Assistant Engineer's Exam.
    b. prerequisites: EPO 125/125L and CRU 150; co-requisites: EPO 230
    c. Required Course
6. Specific goals for the course
    a. Upon successful completion of this course, students will be:
        - Relate the principles of fluid mechanics, thermodynamics and physics to the operation of a large propulsion plant.
        - Understand the principles of fossil fuel combustion and constructional details of burners and fuel systems for marine, propulsion, industrial and auxiliary boilers. In addition, the student will become familiar with stack gas constituents and the measures taken to control harmful emissions.
        - Explain the principles of operation and constructional details of marine propulsion boilers, auxiliary boilers and feed water systems, as well as an introduction to the principles of operation and construction of industrial boilers.
        - Identify and explain the arrangement and operation of steam generation and propulsion plant systems, including typical periodic maintenance and inspection activities.
        - Explain the principles of operation of propulsion plant and boiler control and automation systems.
        - Begin preparation for the steam vessels sections of the U.S. Coast Guard examination for licensure as a Third Assistant Engineer, Unlimited Horsepower.
    b. SLOs covered by this course:

- FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.
- MET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to marine equipment, systems and vehicles.
- FET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to facilities equipment, systems and structures.

7. Brief list of topics to be covered

- Thermodynamics and Definitions
- Principles of Rankine Steam Cycle
- Condensate System and Regenerative Heating
- Automation of the Condensate System
- Combustion Principles
- Fuel Oil Service System
- Combustion Control Automation
- Combustion Air Systems; Registers; Air and Emission Control
- Emissions Control Technologies
- Feed Water Control Systems and Automation
- Boiler Classifications and Boiler Construction
- Burner Management Systems and Operation Casualty Response
- Feed Water Treatment and Chemistry

1. EPO 215: Manufacturing Processes I
2. 1 credit hours and 30 contact hours
3. Instructor: Steffan Long
4. Text book: None
    a. other supplemental materials: Instruction Manual
5. Specific course information
    a. An introduction to machine shop practices utilizing the engine lathe, milling machine, precision measuring instruments, hand and power tools, and some metal hardening.
    b. Prerequisites or Co-requisites: NONE
    c. Required Course
6. Specific goals for the course
    a. Upon successful completion of this course, students will be:
        - Proper and safe use of hand tools for metalworking
        - Proper and safe use of bench grinder for grinding tool bits
        - Proper and accurate use of precision measurement instruments
        - Proper and safe use of lathes in manufacturing a part from a drawing
    b. SLOs covered by this course:
        - FET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.
        - FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.
        - MET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology.
7. Brief list of topics to be covered
    - Safety
    - Precision Measurement, Tool Grinding
    - Manufacturing Processes: Hammer Head, Knurled Hammer Head, Harden Hammer Head, Hammer Handle Stem

1. Course number and name **EPO 230, Steam Plant Systems Operation**

2. Credits and contact hours **1 Credit hour, 2 contact hours/week (nominal) 30 hours per semester.**

3. Instructor's or course coordinator's name **Scott Green Course Coordinator, Keir Moorhead, Steve Kreta Instructors**

4. Text book, title, author, and year

    a. other supplemental materials **Department Generated Handbook**

5. Specific course information

    a. brief description of the content of the course (catalog description)

    A hands-on learning experience in the Steam Plant Simulator. An introduction to the engineering systems, operating and emergency procedures, and watch requirements of a steam propulsion plant.

    b. prerequisites or co-requisites

Prerequisites:	**EPO-125 Introduction to Marine Engineering** **EPO-125L Marine Systems Lab**
Co-requisites	**EPO-214 Boilers (may be taken prior)**

    c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program **Required for MET, FET and ME-USCG License**

6. Specific goals for the course

    a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

    1. Demonstrated ability to operate marine power plants
    2. Demonstrated ability to operate computer tools and automation system
    3. Demonstrated understanding of issues in working in a team
    4. Demonstrated ability to function as a member of a small team including individual contribution to the team.
    5. Demonstrated ability to lead a team.
    6. Demonstrated understanding of issues of pollution from ships.
    7. Demonstrated understanding of safety as it relates to the maritime industry

    b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

The listed outcomes apply most directly to outcomes 1,3 & 5 of Criterion 3:

(1) an ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline;
(3) an ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature;
(5) an ability to function effectively as a member as well as a leader on technical teams.

7. Brief list of topics to be covered

   Students simulate starting a steam power plant from a "dead ship" through ready for the ship to maneuver from the port. This includes:
   - **starting the emergency generator, and the ship service diesel generator,**
   - **setting fuel and water systems to light a boiler and raise steam in a boiler,**
   - **start feed pumps and steam turbine generators**
   - **line up all the systems involved in raising a condenser vacuum and**
   - **putting superheated steam to the main propulsion turbines.**

1. EPO 235: Steam Plant Watch Team Management

2. 1 credit hours and 30 contact hours

3. Instructor: Scott Green

4. Text book: Everett C. Hunt et al. Modern Marine Engineering Manual, 3rd edition, 1999

   a. other supplemental materials: Online Course Content Posted on Brightspace

5. Specific course information

   a. A hands-on learning experience in the Steam Plant Simulator. Develops fault analysis techniques for steam propulsion plants, communication skills in a work environment, and management abilities.

   b. Prerequisites: EPO 214, EPO 230, and CRU 150; Co-requisites: EPO 312

   c. Required Course

6. Specific goals for the course

   a. Upon successful completion of this course, students will gain:

      - Enhanced knowledge of the techniques, skills and modern equipment used aboard typical ocean-going commercial vessels.
      - The ability to apply current knowledge and critical thinking to problems associated with propulsion, vessel and auxiliary plant operations.
      - The ability to apply casualty analysis and response techniques in managing various vessel status situations.
      - The ability to function effectively within and to lead engineering watch teams.
      - The ability to apply the principles of fluid mechanics, thermodynamics and physics to the operation of a large crude oil tanker propulsion plant.
      - The ability to communicate effectively in a technical environment through written and spoken word.
      - Skills in situational awareness principles and crisis response techniques during potentially stressful situations.

   b. SLOs covered by this course:

      - FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.
      - FET SLO (d): An ability to function effectively as a member or leader on a technical team.
      - MET SLO (i): Ability to receive a USCG License as Third Assistant Engineer.
      - MET SLO (j): Ability to engage in the operation, maintenance, analysis and management of modern marine power plants, associated equipment and systems.

7. Brief list of topics to be covered

   - Preparing the main engine steam turbines for operation
   - Monitor the operation of the main engine steam turbines
   - Secure the main engine steam turbines
   - Perform casualty control procedures for a turbine plant
   - Respond to boiler high/low water alarm
   - Maintain boiler steam pressure
   - Situational awareness
   - Team Experience

1. EPO 312: Turbines
2. 3 credit hours and 45 contact hours
3. Instructor: Ryan Storz
4. Text book: Everett C. Hunt et al. Modern Marine Engineering Manual, 3rd edition, 1999
   a. other supplemental materials: Online Course Content Posted on Brightspace
5. Specific course information
   a. Comprehensive study of steam turbines, condensers, reduction gears, propulsion shafting, and gas turbines, with emphasis on marine propulsion plants. Steam and gas turbine controls and the thermodynamic principles of efficient steam plant operation are also included. Through the course, students will gain the knowledge to operate and maintain turbines and their auxiliary systems. In addition, the course prepares students for the steam plant section of the U.S. Coast Guard Third Assistant Engineer's Exam.
   b. prerequisites: EPO 214 ; co-requisites: EPO 235
   c. Required Course
6. Specific goals for the course
   a. Upon successful completion of this course, students will be able to:
      - Explain the principles of operation and describe the basic construction of steam and gas turbines, condensers, steam turbine auxiliary systems, reduction gears and propulsion shafting.
      - Explain the principles of operation and describe the basic design of control systems and safety devices for propulsion and auxiliary steam turbines and gas turbines.
      - Know the general precautions and procedures for operation of steam and gas turbines and associated auxiliary systems, and be able to describe the actions to be taken in the event of equipment failure.
      - Familiar with periodic inspections and maintenance routines performed to evaluate the material condition of steam turbine and gas turbines, associated auxiliary equipment, propulsion shafting and propellers.
      - Explain the principles of thermodynamics and mechanical engineering related to the design of steam turbines and gas turbines. In addition, the student will become familiar with the factors affecting overall efficiency of the expansion system, and the measures taken to optimize the performance of a steam and gas turbine propulsion plant.
      - Exposed to the body of knowledge tested in the steam vessel section of the U.S. Coast Guard third assistant engineer examination.

b. SLOs covered by this course:

- MET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to marine equipment, systems and vehicles.

7. Brief list of topics to be covered

- Steam Cycle
- Steam Turbines
- Bearings and Lubricating Oil Systems
- Main Propulsion Reduction Gear
- Main Propulsion Power Train
- Gas Turbines
- Casualty Control Procedures

1. Course number and name
ET232, Statics

2. Credits and contact hours
3.0 credits and 45 contact hours

3. Instructor's or course coordinator's name
Jon Fischer

4. Text book, title, author, and year
Mechanics: Statics 12/E by Hibbeler (c) 2010 ISBN: 0136077900

a. other supplemental materials
TI-89 Calculator

5. Specific course information

a. brief description of the content of the course (catalog description)
Force systems and the conditions of equilibrium for particles and rigid-bodies are studied in two and three dimensions. The principles of equilibrium, moments, and dry friction are applied to engineering system components and structures.

b. Prerequisites or Co-requisites

Technical Calculus 1 (MTH 210)
Engineering Physics I (PHY 200 and 200L)
c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program required

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

1. Learn how to add force vectors and resolve them into components, express force and position in Cartesian vector form and determine vector magnitude and direction.
2. Become familiar with the concept of the free body diagram and learn how to solve particle equilibrium problems.
3. Become familiar with the concept of a moment of a force and learn how to calculate moments in two and three dimensions.
4. Become familiar with the conditions for rigid body equilibrium and learn how to perform structural analysis of rigid bodies in equilibrium.
5. Learn how to determine the forces in the members of a truss using the method of joints and sections.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Outcome 2-1: Demonstrated ability to apply mathematical tools to solving marine engineering problems
Outcome 1-2: Demonstrated ability to use computer tools
Outcome 3-2: Demonstrated ability to use instruments for measuring
Outcome 3-4: Demonstrated ability to analyze and interpret results of experiments
Outcome 3- 5: Demonstrated ability to improve process and design.
Outcome 5- 1: Demonstrated understanding of issues in working on a team.
Outcome 5- 2: Demonstrated ability to function as a member of a small team including providing individual contributions to the team.
Outcome 5- 3: Demonstrated ability to lead a team
Outcome 6-1: Demonstrated ability to apply engineering principles of thermodynamics, fluid mechanics, statics, dynamics, mechanics of materials and electrical circuits to marine engineering problems.

7. Brief list of topics to be covered

Vector Operations
Vector Addition of Forces
Cartesian Vectors
Position Vectors
Force Vectors
Dot Product
Conditions of Particle Equilibrium
Coplanar Force Systems
Three Dimensional Force Systems
Moment of a Force – Scalar Formulation
Cross Product
Moment of a Force – Vector Formulation
Principle of Moments
Distributed Loading
Principle of Moments
Conditions for Rigid Body Equilibrium
Free Body Diagrams and Equations of Equilibrium
2 and 3 Force Members
3D Problems
Structural Analysis: Simple Trusses
Method of Joints

1. EPO 319: Facilities Engineering Diagnostics Lab

2. 1 credit hour and 30 contact hours

3. Instructor: Robert Jackson

4. Text book: Practical Machinery Vibration Analysis & Predictive Maintenance, Cornelius Scheffer and Paresh Girdhar, 1st Edition, 2004.

   a. other supplemental materials: Online Course Content Posted on Brightspace

5. Specific course information

   a. Examines the theory and application to machinery maintenance of vibration analysis, oil analysis, machinery alignment, thermography, and overall plant performance analysis. Includes the study of various machinery maintenance programs applied to facilities engineering systems, including machinery history, trend analysis, and predictive maintenance.

   b. Prerequisites: CRU 150 ; Co-Requisites: None

   c. Required Course

6. Specific goals for the course

   a. Upon successful completion of this course, students will be able to:

      - Gain an understanding of the major maintenance programs used in facilities today.
      - Gain an understanding of diagnostic tools currently in use and how diagnostic tools are part of an overall maintenance program.

   b. SLOs covered by this course:

      - FET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.

7. Brief list of topics to be covered

   - Introduction to Maintenance
   - Types of Maintenance
   - Vibration
   - Fluke Vibration Lab
   - Alignment
   - Tribology
   - Non-Destructive Testing

1. ET 230 - Properties of Materials

2. 2 credits and 30 contact hours

3. Mr. Michael Strange

4. Askeland, Donald R. & Wright, Wendelin J., *Essentials of Materials Science and Engineering (paperback)*, 3nd ed., Florence, KY, Cengage Learning, 2014, Print, ISBN-13: 978-1-11157685-1.

5. Specific course information

    a. The course is an examination of the properties of materials from the atomic to the macroscopic levels, looking from the basic atomic structures of materials to the application of materials in engineering systems. Emphasis is on metals, but nonmetals are also discussed. Atomic Structures, mass transport, mechanical properties, creep, fatigue, corrosion and failure characteristics are covered. Applications of advanced materials and their processing is also discussed.

    b. Prerequisites: CHEM 110 – General Chemistry, CHEM 110L – General Chemistry Laboratory, MATH 210 – Calculus I

    c. Required course

6. Specific goals for the course

    a. Upon completion of this course, a successful student will have developed competency in:

        LO1: Exposure to the knowledge, techniques, skills and modern tools used in the field of material science engineering.

        LO2: The ability to apply current knowledge and emerging applications of mathematics, science, engineering and technology to problems associated with material science engineering.

        LO3: The ability to evaluate and analyze the contribution of materials to mechanical components and determine critical design parameters.

        LO4: The ability to apply material science concepts in the analysis and design of systems, components or processes in the marine environment.

7. Brief list of topics to be covered

    - Atomic Structure & Bonding
    - Crystalline Solids
    - Imperfections in Solids & Dislocations
    - Diffusion, Mass Transport and Time Dependent Processes

- Mechanical Properties
- Strengthening Mechanisms
- Failure, Fracture and Fatigue
- Phase Diagrams
- Phase Transformations and Microstructure Kinetics
- Corrosion Mechanisms
- Polymeric Materials
- Selection, Application, Processing and Design of Materials

1. ET 230L Properties of Materials Lab
2. 1 unit; 30 contact hours
3. Instructors: Michael Kazek, Tom Clyatt
4. Askelad, Donald R. and Wright, Wendelin J., *Essentials of Materials Science and Engineering*, Third Edition, Toronto: Cengage Learning, 2014, 2009.
   ISBN: 978-1-111- 57695-1.

   a. There is a laboratory guide posted to BrightSpace as well as individual lab syllabi. Other supplemental information can also be found on BrightSpace.

5. Specific course information

   a. Investigates the physical characteristics of materials through testing, data acquisition, and calculations. Tests conducted include tensile, fatigue, creep, impact energy, and hardenability. Students learn how the properties described in ET 230 are derived.

   b. ET 230, Properties of Materials

   c. Required

6. Specific goals for the course

   a. Upon successful completion of this course, students will gain the following learning outcomes:

   LO1: The ability to use proper practices and instrumentation for measuring physical phenomena in the laboratory setting; to analyze and interpret experiments and apply experimental results to improve processes and design.

   LO2: The ability to function effectively, work collaboratively and lead teams.

   LO3: The ability to communicate effectively in a technical environment.

   LO4: The ability to understand and apply the concepts of professional ethics and social responsibilities.

   b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

   MET PO 1: Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology

   MET PO 3: An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes and design.

MET PO 4: An ability to function effectively as a member or leader on a technical team.

MET PO 6: An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.

7. Brief list of topics to be covered:

Laboratory Procedures and Safety Measures
Identification of Metals
Hardness Testing
Charpy Impact Testing
Fatigue Testing
Microscopy
Creep Testing
Metal Tensile Testing
Plastic Tensile Testing

1. ET 250, Electrical Circuits

2. 3 Credits, 45 Contact Hours

3. Instructor: Dr. Evan Chang-Siu

4. "Electrical Engineering, Principles & Applications," 6th edition by A.R. Hambley 2013

5. Specific course information

   a. Principles and applications of DC and AC circuit analysis, node and mesh equations, Thevenin equivalent circuits, maximum power transfer, first order transients, simple filters and amplifiers, phasors, power, power factor, and reactive power in single and three phase systems.

   b. MTH 211 Calculus II, PHY 205 Engineering Physics II, ET 250L Electric Circuits Lab.

   c. Required

6. Specific goals for the course

   a. Upon successful completion of this course, students will be able to:

      Apply their knowledge to support the Student Learning Outcomes in ET 370/370L and ET 350/350L
      Analyze simple ac and dc circuits using network reduction and nodal analysis
      Apply the voltage and current dividers to ac and dc circuits
      Produce a set of reference voltages from a given dc source
      Describe RC, RL, & RLC circuit behavior; circuit time constant and performance
      Use the Thevenin and Norton equivalent circuit to model real voltage sources
      Make and use phasor representations of sinusoidal voltages and currents
      Calculate apparent, real and reactive power and power factor in ac circuits
      Specify circuit modifications to adjust circuit power factor
      Specify components for simple RC high and low-pass filters
      Use oscilloscopes, power meters, volt and amp meters in a variety of applications
      Write technical reports that are clear, concise, correct and complete
      Produce professional quality technical reports using Word and Excel
      Apply course material to practice: heater, hoist, flash unit, timing, amplification, filtering

7. Brief list of topics to be covered:

   Ohm's Law
   Power
   Kirchoff's Voltage Laws

KCL, Nodal Analysis
Resistor Networks
Thevenin/Norton
Voltage/Current Divider
Superposition
Inductors
Capacitors
DC/AC electricity
Single and Three Phase AC
AC Power
Power Triangle

1. ET 250L, Electrical Circuits

2. 1 Credit, 30 Contact Hours

3. Instructor: Dr. Evan Chang-Siu

4. "Electrical Engineering, Principles & Applications," 6th edition by A.R. Hambley 2013

5. Specific course information

    a. Principles and applications of DC and AC circuit analysis, node and mesh equations, Thevenin equivalent circuits, maximum power transfer, first order transients, simple filters and amplifiers, phasors, power, power factor, and reactive power in single and three phase systems.

    b. MTH 211 Calculus II, PHY 205 Engineering Physics II, ET 250 Electric Circuits

    c. Required

6. Specific goals for the course

    a. Upon successful completion of this course, students will be able to:

    Apply their knowledge to support the Student Learning Outcomes in ET 370/370L and ET 350/350L
    Analyze simple ac and dc circuits using network reduction and nodal analysis
    Apply the voltage and current dividers to ac and dc circuits
    Produce a set of reference voltages from a given dc source
    Describe RC, RL, & RLC circuit behavior; circuit time constant and performance
    Use the Thevenin and Norton equivalent circuit to model real voltage sources
    Make and use phasor representations of sinusoidal voltages and currents
    Calculate apparent, real and reactive power and power factor in ac circuits
    Specify circuit modifications to adjust circuit power factor
    Specify components for simple RC high and low-pass filters
    Use oscilloscopes, power meters, volt and amp meters in a variety of applications
    Write technical reports that are clear, concise, correct and complete
    Produce professional quality technical reports using Word and Excel
    Apply course material to practice: heater, hoist, flash unit, timing, amplification, filtering

7. Brief list of topics to be covered:

    Ohm's Law
    Power
    Kirchoff's Voltage Laws
    KCL, Nodal Analysis
    Resistor Networks

Thevenin/Norton
Voltage/Current Divider
Superposition
Inductors
Capacitors
DC/AC electricity
Single and Three Phase AC
AC Power
Power Triangle

1. Course number and name

   ET 330 (Dynamics)

2. Credits and contact hours

   3 credits and 45 contact hours

3. Instructor's or course coordinator's name

   Dr. Dinesh Pinisetty

4. Text book, title, author, and year

   Engineering Mechanics: Statics and Dynamics, 13th Edition, R. C. Hibbeler, Pearson-Prentice Hall, ISBN: 0-13-291548-9, 2013.

   a. other supplemental materials

      None

5. Specific course information

   a. brief description of the content of the course (catalog description)

   Force systems and motion of particles and rigid-bodies are studied in two or three dimensions. ***.*** *The principles of dependent and relative motion, work and energy, conservation of energy, and impulse and momentum are applied to engineering system components.*

   b. prerequisites or co-requisites

   Prerequisites: ET 232 (Statics); Co-requisites: None

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

   Required course

6. Specific goals for the course

   a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

   Students will learn how to model real engineering systems as particles and/or rigid bodies.

Students will learn how to methodically apply Newton's and Euler's Laws to calculate forces and motions of mechanical systems.

Students will learn how to methodically apply Energy methods to calculate forces and motions of mechanical systems.

Students will develop the ability to decide which methods of analysis to use for various types of problems.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

FET SLO (b): An ability to gain knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems associated with facilities, equipment, systems and vehicles.

FET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to facilities equipment, systems and structures.

MET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to marine equipment, systems and vehicles.

7. Brief list of topics to be covered

- Unit Systems
- Kinematics of a Particle
- Kinematics of a Particle: Force and Acceleration
- Kinetics of a Particle: Work and Energy
- Kinetics of a Particle: Impulse and Momentum
- Planar Kinematics of a Rigid Body
- Planar Kinetics of a Rigid Body: Force and Acceleration

1. Course number and name

   ET 344 (Thermodynamics)

2. Credits and contact hours

   3 credits and 45 contact hours

3. Instructor's or course coordinator's name

   Dr. Dinesh Pinisetty

4. Text book, title, author, and year

   Moran, Michael J., Shapiro, Howard N., Boettner, Daisie D., and Bailey, Margaret B., Fundamentals of Engineering Thermodynamics. 7th ed. Hoboken, NJ: John Wiley & Sons, Inc., ISBN 978-0470-49590-2, 2011.

   a. other supplemental materials

   None

5. Specific course information

   a. brief description of the content of the course (catalog description)

   A study of the basic laws of thermodynamics and their applications to heat-power machinery applied on shipboard heat-power plants, steam and gas turbines, internal combustion engines, and vapor-compression refrigeration systems.

   b. Prerequisites or Co-requisites

   Prerequisites: PHY 200 (Physics I) and PHY 200L (Physics I Lab); Co-requisites: None

   c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

   Required course

6. Specific goals for the course

   a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

   The use of closed system energy balances for analysis of systems undergoing thermodynamic cycles.

Retrieval of property data, sketching T-s, p-v, p-T and h-s diagrams and locating principal states, evaluating properties of two-phase liquid-vapor mixtures, and using the incompressible substance model and ideal gas model for thermodynamic analysis.

Steady-state control volume analysis, using appropriate assumptions and property data.

The use of the Second Law of Thermodynamics to assess heat engine and refrigeration cycles.

Retrieval of entropy data, sketching T-s and h-s diagrams and locating principal states, and evaluating isentropic efficiencies for turbines, nozzles, compressors and pumps.

Thermodynamic analysis of vapor power systems, internal combustion engines, gas turbine power plants and vapor-compression refrigeration systems.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

FET SLO (b): An ability to gain knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems associated with facilities, equipment, systems and vehicles.

FET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to facilities equipment, systems and structures.

MET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to marine equipment, systems and vehicles.

MET SLO (j): Ability to engage in the operation, maintenance, analysis and management of modern marine power plants, associated equipment and systems.

7. Brief list of topics to be covered

- Unit Systems
- Closed and Open Systems; Properties; Specific Volume; Pressure; Temperature
- First Law of Thermodynamics: Closed and Open Systems
- Evaluating Properties
- Ideal Gas Model
- Second Law of Thermodynamics
- Entropy
- Vapor Power Systems

1. ET 332 - Strength of Materials

2. 3 credits and 45 contact hours

3. Mr. Michael Strange

4. Philpot, Timothy A., *Mechanics of Materials: An Integrated Learning System, 3nd Edition*, John Wiley & Sons, Inc., ISBN: 978-1-118-08347-5, 2013.

5. Specific course information

   a. Strength of Materials is fundamental to the understanding of how components and members behave under service loads. It provides us with methodology to predict the mechanical performance and even the failure of components we depend on. The basic science taught allows for predicting the strength of a component in service. It allows us to design components accounting for variability in loads, materials and environments. A thorough understanding Strength of Materials is required, particularly in the shipping industry, due to the typically dangerous nature associated in practicing the profession. Basic techniques taught will be applicable to many situations and are routinely used in at component and system levels.

   b. Prerequisites: MTH 211 – Calculus II, ET 232 – Statics, Co-requisite: ET 230L – Properties of Materials Laboratory

   c. Required course

6. Specific goals for the course

   b. Upon completion of this course, a successful student will have developed competency in:

      LO1: Exposure to the knowledge, techniques, skills and modern tools used in the field of mechanics of materials.

      LO2: The ability to apply current knowledge and emerging applications of mathematics, science, engineering and technology to problems associated with mechanics of materials.

      LO3: The ability to evaluate and analyze the contribution of solid mechanics to mechanical components and determine critical design parameters.

      LO4: The ability to apply creativity in the design of systems, components or processes in the marine environment.

7. Brief list of topics to be covered

- Sectional Properties, Centroids and Moments of Inertia
- Review of Statics
- Concepts of Stress-Strain
- Mechanical Properties of Materials
- Normal, Axial Stresses
- Stress Concentrations
- Residual Stresses
- Twisting, Torsional Stresses
- Bending Stresses
- Shearing Stresses
- Combined Stresses
- Stress Transformations (Mohr's Circle)
- Design of Components
- Factors of Safety
- Deflection of Components
- Buckling of Columns

1. EPO 310: Plant Operations III

2. 1 credit hours and 30 contact hours

3. Instructor: Mike Andrews

4. Text book: None

a.other supplemental materials: Materials posted on Brightspace

5. Specific course information

   a. A continuation of the practical work performed on the training ship or in facilities maintenance lab. Supervision of equipment maintenance is emphasized. The students rotate in working on main propulsion, electrical and auxiliary equipment. Lab reports will be completed on work performed.

   b. Prerequisites: EPO 210 ;   Co-requisites: NONE

   c. Required Course

6. Specific goals for the course

   a.Upon successful completion of this course, students will be able to:
   - Use tools properly and safely to accomplish assigned tasks
   - Demonstrate proper maintenance techniques
   - Understand safety hazards and need for personal protective equipment
   - Provide written reports detailing work performed
   - Perform maintenance actions as described in technical manuals

   b.SLOs covered by this course:
   - FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.

7. Brief list of topics to be covered
   - Safety Planning, Work Procedures
   - HVAC Climate Control, Potable Water System, Ballast System
   - Seaworthiness dewatering, Pollution Control
   - Engineering Logistics Maintenance Systems

1. EPO 315: Manufacturing Processes II

2. 1 credit hours and 30 contact hours

3. Instructor: Steffan Long

4. Text book: None
    a. other supplemental materials: Instruction Manual

5. Specific course information

    a. A continuation of EPO 215: Manufacturing Processes I, emphasizing machine shop practices utilizing the metal lathe and vertical milling machine.

    b. Prerequisites: EPO 215; Co-requisites: NONE

    c. Required Course

6. Specific goals for the course

    a. Upon successful completion of this course, students will be:

    • Demonstrate good work and safe habits when using hand tools for metalworking and when using machine tools.
    • Perform basic machining operations on engine lathes, milling machines, drill presses and bench grinders.
    • Perform proper and accurate use of precision measurement instruments.
    • Read engineering drawings and sketches to accomplish required operations on machine tools.

    b. SLOs covered by this course:

    • FET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.
    • FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.
    • MET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology.

7. Brief list of topics to be covered

    • Safety
    • Precision Measurement, Tool Grinding
    • Manufacturing Processes: Wrench body, Ratchet Wheel, Pawl, Square Drive, Knurled Handle, Lever

1. EPO 321: Introduction to Power Generating Plants

2. 1 credit hour and 30 contact hours

3. Instructor: Ryan Storz

4.Text book: Everett C. Hunt et al. Modern Marine Engineering Manual, 3rd edition, 1999
a.other supplemental materials: Online Course Content Posted on Brightspace

5. Specific course information

a.The student will be given an introduction to the operation, performance and maintenance of simple cycle gas turbine and medium-speed reciprocating power generation systems, combined cycle gas turbine and steam turbine power plants. The course consists of lecture and practical training in engineering systems and proper operating procedures. This course will expose the student to gas and liquid fired reciprocating engines, simple cycle gas turbine as well as combined cycle plants. The emphasis of this course is Power Plant Management and will train the students in common power plant systems and how they interact with each other.

b. Prerequisites: EPO 220 ; Co-Requisites: None

c. Required Course

6. Specific goals for the course

a.Upon successful completion of this course, students will be able to:

• Understand the function and operation of all the various engineering systems found at modern power plants.
• Control and monitor power plant.
• Perform normal maintenance, operation parameters and fault analysis for each engineering system.

b.SLOs covered by this course:

• FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.
• FET SLO (d): An ability to function effectively as a member or leader on a technical team.

7. Brief list of topics to be covered

• Kongsberg PTT Simulator
• Kongsberg Full Mission Simulator Orientation
• Water Cooling Systems, Boiler Light-Off and Raising Steam
• Energizing Main and Emergency Switchboards
• Steam Systems, Safety

1. Course number and name

ET 340 (Fluid Mechanics)

2. Credits and contact hours

3 credits and 45 contact hours

3. Instructor's or course coordinator's name

Dr. Dinesh Pinisetty

4. Text book, title, author, and year

Applied Fluid Mechanics, 6th Edition, Robert L. Mott, Pearson-Pentice Hall, ISBN: 0-13-114680-7, 2006.

a. other supplemental materials

None

5. Specific course information

a.brief description of the content of the course (catalog description)

The application of principles of incompressible fluid flow. Topics include forces in static fluids and fluids in motion, applications of Bernoulli's equation, pressure losses in pipe systems, open channel flows, pump selection, and air flow in ducts.

b. prerequisites or co-requisites

Prerequisites: PHY 205 (Physics I) and MTH 211 (Calculus II); Co-requisites: None

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required course

6.Specific goals for the course

a.specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

- *The students learn about the properties of fluids including density, specific weight and viscosity and how they are used.*

- *The student gains an understanding of the principles of fluid mechanics including fluid forces, buoyancy, stability of floating and submerged objects, the General Energy Equation, flow in series and parallel pipes and open channels, duct flow, the forces fluids exert on pipes and other objects and lift and drag equations.*
- *The student learns how to select equipment for fluid power systems including pumps, piping, fittings, fans, ducts and instrumentation.*

b.explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

- *FET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to facilities equipment, systems and structures.*
- *MET SLO (e): An ability to design systems, components, or processes meeting specific needs for broadly defined engineering problems appropriate to marine equipment, systems and vehicles.*

7.Brief list of topics to be covered

- Unit Systems
- Density; Specific Weight; Specific Gravity
- Viscosity
- Pressure Measurement
- Forces due to Static Fluids
- Buoyancy and Stability
- Bernoulli's Equation
- General Energy Equation
- Reynolds Number, Laminar and Turbulent Flows
- Losses Due to Friction and Minor Losses
- Series and Parallel Pipeline Systems
- Pump Selection
- Forces due to Fluids in Motion
- Lift and Drag

1. Course number and name

ET 340L (Fluid Mechanics Lab)

2. Credits and contact hours

1 credit and 30 contact hours

3. Instructor's or course coordinator's name

Dr. Dinesh Pinisetty

4. Text book, title, author, and year

Applied Fluid Mechanics, 6th Edition, Robert L. Mott, Pearson-Pentice Hall, ISBN: 0-13-114680-7, 2006.

a. other supplemental materials

Fluids Laboratory Manual

5.Specific course information

a.brief description of the content of the course (catalog description)

The course compliments the learning objectives and course outcomes in ET 340, Fluid Mechanics. Students will apply the principles of incompressible fluid flow; investigate forces in static and dynamic fluids; apply Bernoulli's equation; determine pressure losses in piping systems and across valves; explore lift and drag forces across an air foil; determine air flow in duct work; and develop pump curves. The different experiments are outlined in the Fluid Mechanics Laboratory Manual.

b. Prerequisites or Co-requisites

Prerequisites: PHY 205 (Physics II) and MTH 211 (Calculus II); Co-requisites: ET 340

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required course

6.Specific goals for the course
a.specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

- *The ability in the laboratory setting to use and develop proper practices and procedures, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improve processes and design.*
- *The ability to function effectively and lead teams.*
- *The ability to communicate effectively in a technical environment.*

b.explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

- *FET SLO (c): An ability to conduct standard tests, measurements, and experiments and to analyze and the results to improve processes and design.*
- *FET SLO (d): An ability to function effectively as a member or leader on a technical team.*
- *FET SLO (f): An ability to apply written, oral, and graphical communication in broadly defined technical and non-technical environments and an ability to identify and use appropriate technical literature.*
- *MET SLO (c): An ability to conduct standard tests, measurements, and experiments and to analyze and the results to improve processes and design.*

7.Brief list of topics to be covered

- Viscosity
- Buoyancy
- Air Flow
- Bernoulli
- Series Flow
- Parallel Flow
- Pump Power
- Forces on a Bend
- Lift and Drag

1. ET-342, Refrigeration and Air Conditioning
2. 2 credits and 30 contact hours
3. Instructor: Thomas Clyatt
4. Modern Refrigeration and Air Conditioning, Althouse, Turnquist, Bracciano, 20th Edition
    a. Miscellaneous course materials from various sources added to Brightspace LMS when appropriate.
5. Course information
    a. Introduction to basic refrigeration and air conditioning principles and equipment. Included are the theory and application of direct and indirect refrigeration cycles commonly found on merchant ships and ashore including main cargo freezers, air conditional systems, chill water systems, absorption systems, refrigerated vans, and ice machines.
    b. Prerequisite ET 344, Thermodynamics. Co-requisite ET 342L, Refrigeration and air conditioning lab.
    c. Required course
6. Course goals
    a. Students will demonstrate their ability to:
        i. Understand AC&R systems, operations and maintenance
        ii. Perform load calculations
        iii. Use Psychometric and Pressure-enthalpy diagrams
        iv. Understand heating system design
        v. Understand refrigeration systems and their management
        vi. Understand compression and absorption AC&R systems
        vii. Understand AC&R control systems
        viii. Understand AC&R systems design
        ix. Understand troubleshooting techniques for AC&R systems
    b. Outcomes:
        i. SLO1: Demonstrate the ability to apply mathematical tools to solving marine engineering problems.
        ii. SLO2: Demonstrate the ability to design mechanical systems.
        iii. SLO3: Demonstrate the ability to apply engineering principles of thermodynamics, fluid mechanics, statics, dynamics, mechanics of materials and electrical circuits to marine engineering problems.
7. Topics covered:
    a. Basic refrigeration systems
    b. Heat load calculations
    c. Compressors and compressor controls
    d. Controls, TXV's, accessory hardware
    e. Motors and motor controls
    f. Refrigerant laws and types of refrigerants

g. Compressor oils
h. HVAC systems and related design criteria
i. Psychometrics
j. Troubleshooting

1. ET 370/370L, Electronics/Electronics Lab

2. 3 Credits, 45 Contact Hours

3. Instructor: Dr. Evan Chang-Siu

4.Textbook: “Electrical Engineering, Principles & Applications,” 6th edition by A.R. Hambley2013

5. Specific course information

a. Principles and application of electronic circuits and components, microcontrollers, operational amplifiers, comparators, peak detectors, active filters, timer circuits, AD conversion, serial communication, and micro electro-mechanical systems.

b.ET 250/ET 250L Electrical Circuits, ET 370L Electronics Lab.

c.Required

6.Specific goals for the course

a. Upon successful completion of this course, students will be able to:

- Demonstrated ability to develop computer tools and automation systems. Demonstrated ability to design electronic circuits to perform a desired task.
- Introduction to semiconductor devices
- Introduction to Transistors; FETs, MOSFETs and BJTs
- Logic circuits; Representation of numerical data in binary, decimal, octal and hexa--decimal forms; Complement arithmetic; Combinatorial logic circuits; Decoders, Encoders and Translators
- Computers and Microcontrollers; Digital Process control
- Measurement concepts and sensors
- Introduction to Fourier analysis, Filters and Transfer Functions
- Decibels, Cascaded networks, Logarithmic frequency scales and Bode plots
- Operational amplifiers

7. Brief list of topics to be covered:
- PN Junction, Diodes, and Zener Diodes
- Rectifiers
- Bipolar Junction Transistors
- Binary and Logic Circuits
- H bridge
- MOSFETS
- CMOS
- Truth Tables, Shift Registers

1. ENG 470: Engineering Management

2. 3 credit hours and 45 contact hours

3. Instructor: Ryan Storz

4. Text book: None
a. other supplemental materials: Online Course Content Posted on Brightspace

5. Specific course information

a. Begins with a brief introduction to the engineering profession and then focuses on total quality management, personnel management and communications, project management and legal concerns. Topics such as professional liability and ethics will provide the student with a sense of his or her responsibility. In addition, numerous case studies enhance student understanding.

b. Prerequisites: ELEC 20; Co-Requisites: None

c. Required Course

6. Specific goals for the course

a. Upon successful completion of this course, students will be:
- Exposed to organizational structure, explore other managerial supportive roles and be able to describe the purpose of those organizational functions.
- Familiar with various managerial and leadership skills and use these skills to research and assess applicable case studies.
- Familiar with project management, systems engineering, lean operations, and their respective professional organizations.
- Understand employer's annual review process, how to document recommendations for the next review cycle, and what it means to be a professional at Kaizen.

b. SLOs covered by this course:
- FET SLO (b): An ability to gain knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly defined engineering problems associated with facilities, equipment, systems and vehicles.
- FET SLO (d): An ability to function effectively as a member or leader on a technical team.
- FET SLO (g): An ability to understand and apply concepts of professional, ethical and social responsibilities.
- FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.

7. Brief list of topics to be covered
- Management Basics
- Experiential Discussions
- Managing Conflict

- Management Styles
- Organizational Structure
- Corporate Social Responsibility and Project Management

1. ET 350/350L, Electrical Machinery/Electrical Machinery Lab

2. 3 Credits, 45 Contact Hours

3. Dr. Evan Chang-Siu

4. “Electrical Engineering, Principles & Applications,” 6th edition by A.R. Hambley 2013
“Electrical Machines, Drives, and Power Systems, 6ed”, by Theodore Wildi 2005

5. Specific course information

a. Principles and application of magnetic circuits and transformers, three phase power, power factor correction, DC motors and generators, three phase AC motors and alternators, single-phase motors, stepper motors, electronic motor control, and circuit protection devices.

b. ET 250/ET 250L Electrical Circuits, ET 370L Electronics Lab.

c. Required

6. Specific goals for the course

a. Upon successful completion of this course, students will be able to:

- Demonstrated ability to apply mathematical tools to solving marine engineering problems. Demonstrated understanding of the design requirements of complex marine systems. Demonstrated ability to apply engineering principles of thermodynamics, fluid mechanics, statics, dynamics, mechanics of materials and electrical circuits to marine engineering problems. Demonstrated ability to conduct a professional presentation.

b. Students will recognize the difference in construction of various motor/generator types.

- Students will be able to connect power to DC machines with separately excited, shunt and series connected fields.
- Students will be able to control the speed of DC machines.
- Students will be able to connect power to 3-phase synchronous motors and induction motors.
- Students will be able to instrument both DC and 3 phase AC machines and take voltage, current, power, torque and speed measurements.
- Students will be able to use measurements to conduct power balances and efficiency calculations for DC machines on a spreadsheet.
- Students will be able to use measurements to conduct power balances and efficiency calculations for 3 phase AC machines on a spreadsheet.
- Students will understand different transformer technologies and details like autotransformers and nameplate convention.

7. Brief list of topics to be covered:

- Magnetics Fields
- Lorentz Force
- Maxwell's Equations
- DC Machines
- DC torque/speed
- Self Inductance
- Mutual Inductance
- Ideal Transformers
- Dot Convention
- Permanent Magnet
- BH Curve
- Core Losses
- Impedance Transformation
- Induction Machines
- Synchronous Machines

1. Course number and name

ET 400 /400L, Instrumentation and Measurement/Lab

2. Credits and contact hours

Lecture: 3.0 credits (45 contact hours)
Lab: 1.0 credits (30 contact hours)

3. Instructor's or course coordinator's name

Jon Fischer

4. Text book, title, author, and year

Process Control Instrumentation Technology 8th Ed. Curtis D. Johnson, Prentice Hall Publishers, ISBN-10: 0131194577

a. other supplemental materials

- o Parallax Board of Education Kit (USB Version) Item 28832
- o TI-89 Calculator

5. Specific course information

a. brief description of the content of the course (catalog description)

This course is a study of instrumentation devices and their implementation in monitoring and controlling engineering processes. Instruments studied include devices that measure temperature, pressure, flow, level, position, and motion, as well as several others. In addition, principles of process control and signal conditioning are studied including: op-amp applications, analog filtering, applications to pneumatic systems, and digital signal conditioning.

b. Prerequisites or Co-requisites

ET 370, ET 370L: Electronics and Electronics Lab
(Except in special cases, ET 400 and 400L are co-requisites)

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

1. Develop an ability to draw a block diagram of an automated process control loop and identify each element.
2. Explain in detail the difference between analog and digital control signals.
3. Design and fabricate analog signal conditioning circuits including op-amps, bridges, and filters.

4. Determine behavior of digital-to-analog convertors (DACs) and analog-to-digital convertors (ADCs).
5. Design circuits to operate various thermal sensors (including RTDs and thermocouples) to specific temperature measurement problems.
6. Implement data acquisition technology to measure, analyze, and interpret signals from sensors.
7. Work in teams to synthesize experimental procedures, analysis, results, and conclusions in a lab report.
8. Design and implement microcontroller applications using BASICSTAMP.
9. Construct a portable thermal probe with real time digital display.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.
1-2: Ability to use computer tools
2-2: Ability to understand emerging technologies
2-3: Ability to apply emerging technologies to marine projects
3-1: Ability to develop lab procedures
3-2: Ability to use instruments for measuring
3-3: Ability to write a technical report
3-4: Ability to analyze and interpret results of experiments
3-5: Ability to improve process and design
5-2: Ability to function as a member of a small team
5-3: Ability to lead a team
6-2: Ability to apply electrical and electronics skills to marine engineering systems especially automatic controls

7. Brief list of topics to be covered

- Introduction to Process Control: Intro and Theory
- Introduction to Process Control: Control System Evaluation. Analog vs Digital
- Analog Signal Conditioning: Intro and Theory, Time Response
- Lab 1: Data Acquisition with LABVIEW
- LABOR DAY NO CLASS MONDAY
- Analog Signal Conditioning: Dividers and Bridges
- Lab 2: Measuring a time constant
- Analog Signal Conditioning: Bridges and Filters
- Lab 3: Resistance detecting w/Wheatstone Bridge
- Analog Signal Conditioning: Filters
- Lab 4: Filtering
- Analog Signal Conditioning: Op-Amps
- Lab 5: Amplifying a Bridge
- Analog Signal Conditioning: Op-Amp Applications, Common Mode Rejection Ratio
- Digital Signal Conditioning: Intro and Theory
- Lab 6: Boolean Logic
- Digital Signal Conditioning: ADCs
- BASICSTAMP LAB 1: Intro, Make a flashlight

- Digital Signal Conditioning: ADCs and DACs
- BASICSTAMP LAB 2: Make an LED Button Counter
- Thermal Sensors: Theory and Intro
- BASICSTAMP LAB 3: Three Digit LED
- Thermal Sensors: RTDs and Thermocouples
- BASICSTAMP LAB 4: Temperature Measurement w/ ADC
- Veterans Day No Class Monday
- Thermal Sensors: Thermocouples
- BASICSTAMP LAB 5: Putting it all together
- Thermal Sensors: Thermocouple Applications

1. ENG 472: Facilities Management

2. 3 credit hours and 45 contact hours

3. Instructor: Ryan Storz

4. Text book: None
a. other supplemental materials: Online Course Content Posted on Brightspace

5. Specific course information
a. Topics from various engineering and technology disciplines are covered and integrated into a structure consistent with the understanding and experiences needed in the facilities engineering management profession. This course is the introductory course to the Facilities Engineering profession.

b. Prerequisites: CEP 250 or CEP 270 ; Co-Requisites: None

c. Required Course

6. Specific goals for the course
a. Upon successful completion of this course, students will be able to understand:

- The facilities department within an organization.
- The facilities manager's role of planning, finance, and budgeting.
- Real estate management.
- Sustainability.
- Facility emergency preparedness and business continuity.
- Facility security management (cyber and physical)
- Operations and maintenance.
- Facility management practice

b. SLOs covered by this course:

- FET SLO (a): Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.
- FET SLO (g): An ability to understand and apply concepts of professional, ethical and social responsibilities.
- FET SLO (h): Respect for diversity and a knowledge of contemporary professional, societal and global issues.
- FET SLO (i): Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation.
- FET SLO (j): Commitment to quality, safety, timeliness and continuous improvement.

7. Brief list of topics to be covered

- Nature of Facility Management
- Organization of Facilities Management Department

- Financial Management and Space Planning Management
- Real Estate
- Sustainability
- Design Build Process
- Security Goals and Responsibilities
- Maintenance and Repair
- Administering the Department
- The Future of Facilities Management

1. Course number and name

ET460 & 460L, Automation and Automation Lab

2. Credits and contact hours

Lecture: 3.0 credits (45 contact hours)
Lab: 1.0 credits (30 contact hours)

3. Instructor's or course coordinator's name

Jon Fischer

4. Text book, title, author, and year

Process Control Instrumentation Technology 8th Ed.
Curtis D. Johnson, Prentice Hall Publishers
ISBN-10: 0131194577

a. other supplemental materials

5. Specific course information

a. brief description of the content of the course (catalog description)

This course is a continuation of ET 400 and includes a study of automation in power plants, engineering processes, and manufacturing processes leading to an understanding of modern control systems. Principles of control elements and actuators are studied as well as the principles of analog and digital control systems including pneumatic, PID, and programmable logic controller applications.

b. prerequisites or co-requisites

ET 400/400L Instrumentation and
Measurement/Lab MTH 201 Technical Calculus II

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required

6. Specific goals for the course

a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.

1. Students will gain an understanding of process control final elements and actuators.
2. Students will be able to determine proper fluid valve sizes for process control applications and analyze actuator performance.
3. Students will be able to evaluate PID control response based upon process error curves.
4. Students will be able to analyze ladder logic programs associated with programmable logic controllers (PLC's).

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

PC 1-2: Demonstrated ability to use computer tools

PC 1-3: Demonstrated ability to use and program PLC based automation systems.
PC 2-1: Demonstrated ability to apply mathematical tools to solving marine engineering problems.
PC 3-1: Demonstrated ability to develop lab procedures given the desired results.
PC 3-2: Demonstrated ability to use instruments for measuring
PC 3-3: Demonstrated ability to write a technical report
PC 3-4: Demonstrated ability to analyze and interpret results of experiments
PC 3-5: Demonstrated ability to improve process and design
PC 5-1: Demonstrated understanding of issues in working on a team.
PC 5-2: Demonstrated ability to function as a member of a small team including providing individual contributions to the team.
PC 5-3: Demonstrated ability to lead a team ET460/460L Page 3
PC 6-2: Demonstrated ability to apply electrical and electronics to marine engineering systems especially automatic controls.

7. Brief list of topics to be covered

- Mechanical Sensors: Displacement, Position
- Mechanical Sensors: Strain Gauges
- Motion Sensors and Accelerometers
- Final Control
- Final Control: Power Electronics
- Final Control: Power Electronics & Actuators
- Final Control: Valves
- Discrete State Process Control (Ladder Logic)
- Controller Principles: Discontinuous Control
- Controller Principles: Composite Control
- Controller Principles: PID Control

1. Course number and name:
ET490 Power Engineering Technology

2. Credits and contact hours
3 credit hours and 45 contact hours

3. Instructor's or course coordinator's name
Danielle Dragon

4. Text book: None

Other supplemental: Engineering graph paper and scientific or graphing calculator

5. Specific course information
a. brief description of the content of the course (catalog description)

A capstone course in engineering technology in which students apply the engineering fundamentals of previous thermodynamics and electrical machinery coursework to studies of combustion processes, combustion by-products and emission abatement and electrical distribution and transmissions systems commonly found in modern marine propulsion plants and the power industry. Additionally, through guest lecturer presentations and/or field trips, students will become familiar with renewable energy resources. As a research project, students will conduct an energy audit of a virtual facility and develop an engineering model for application of "green" technologies to improve energy efficiency and reduce the carbon footprint.

b. Prerequisites or Co-requisites
Prerequisites: ET344, ET350, ET350L
Co-requisite: ET490L

c. indicate whether a required, elective, or selected elective (as per Table 5-1) course in the program

Required

6. Specific goals for the course
a. specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.
b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Student Learning Outcomes (SLO) SLOs describe what a student should be able to know at the end of a course or program. Upon successful completion of this course, students will have an understanding of:

- California Electrical Transmission, Generation, and Distribution Generation Systems
- various local, state, and federal energy regulating authorities
- high voltage safety, ArcFlash, and PPE (NFPA 70E)
- how a diesel electric ship operates
- “Green” Technologies

7. Brief list of topics to be covered

- _Electric Rates
- _Transmission & Distribution lines and the grid
- _Fossil fuel power plants
- _Solar Photovoltaic systems
- _Multiple Guest Speaker topics: Cogeneration, Energy Efficiency, Hydro plants, Ships
- _Codes and standards (example: Title 24)
- _Microgrids
- _Other Renewable sources: wind turbines, marine current turbines, etc.

1. HUM 310, Engineering Ethics

2. 3 Credits, 45 Contact Hours

3. Instructor: Prof Michael Kazek, CDR, USCG (Ret)

4. Ibo van de Poel and Lamber Royakkers, Ethics, Technology and Engineering, An Introduction. (West Sussex, United Kingdom: John Wiley & Sons, 2011).
See course syllabus for a list of "other readings" that supplement the course text.

5. Specific course information

a. Addresses the major concepts of ethics as applied to the discipline and practice of engineering. Topics include the scope and aims of engineering ethics, moral reasoning and ethical theories, engineering and society, ethics and the law, the engineer's responsibility for safety, engineers and the corporation, conflict of interest/crime in the workplace, rights of engineers/rules of professional conduct, ethics, global ethical issues involving the engineering community, engineering ethics in the computer age, environmental ethics, engineers as managers and leaders, engineers as expert witnesses, and steps to principled reasoning/common rationalizations.

b. EGL 220, Critical Thinking

c. Required

6. Specific goals for the course:

The task of this course is to reflect on the ethical responsibilities of engineers. We will develop an ethical framework and examine the ethical challenges that confront engineers working within organizations. We will consider issues such as the social responsibility of engineers, disclosure, whistle-blowing, professionalism, global ethics, and risk-assessment. To focus on these and other issues, we will undertake analysis of a number of cases, which we will analyze individually, in small groups, and in-class discussions.

Analyzing cases in engineering ethics is, I think, the best way to develop analytical ability, so we will devote significant amounts of class time to this. Ethical lessons are often learned only after something has been overlooked or has gone wrong. While there is no wholly adequate substitute for experience, reflecting on realistic cases can provide some preparation for dealing with ethical issues you will likely face once you begin your career. In a sense, this is a course in preventative (ethical considerations formulated by rules) and aspirational ethics (producing a better life for humankind through technology), in which you are encouraged to think about ethical issues before things go amiss. By doing so, you may be able to anticipate the consequences of your actions and/or justify your actions so that more serious problems can be avoided.

SLO1: To read and think critically.
SLO2: To develop moral reasoning skills.
SLO3: To improve writing skills in an engineering context.

SLO4: To understand multiple perspectives and to respect others of diverse persuasions.
SLO5: To study the fundamental structure of human personhood, the grounding of moral action, and the development of moral character as the precondition of integral performance in a profession.

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

- MET PO 6: An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
- MET PO 7: Ability to understand a apply concepts of professional, ethical and social responsibilities
- MET PO 8: Respect for diversity and a knowledge of contemporary professional, societal and global issues.

7. Brief list of topics to be covered

- The Responsibilities of Engineers
- Codes of Conduct
- Normative Ethics
- Normative Argumentation
- The Ethical Cycle
- Ethical Questions in the Design of Technology
- Designing Morality
- Ethical Aspects of Technical Risks
- The Distribution of Responsibility in Engineering
- Sustainability, Ethics and Technology

APPENDIX B – FACULTY VITAE

1. **Name**

    Michael E. Strange

2. **Education**

    MS Mechanical Engineering, Stanford University, 1986
    BS Mechanical Engineering, San Diego State University, 1985

3. **Academic experience**

    Chairperson, Engineering Technology Department, California State University – Maritime Academy, 2016-2019
    Faculty, California State University – Maritime Academy, 2008-Present
    Adjunct Faculty, School of Engineering, San Francisco State University, 2002-2008
    Assistant Professor through Associate Professor, tenured at California State University – Maritime Academy

4. Non-academic experience

Consultant, Engineering Services, Media Production (Savage Builds), 2018-Present
Engineering Consultant, (BattleBots), 2017-Present,
Consultant, Engineering Services, Media Production (MythBusters Jr.), 2018-2019
Consultant, Engineering Services, Media Production (MythBusters – The Search), 2016 -2017
Engineering Consultant, Pediatric Device Consortium, University of California, San Francisco, 2005-2009
Consultant, Engineering Services, Media Production (MythBusters), 2005-2016
Engineering Consultant, Various Media Productions (commercials, one-offs, etc., 2006-Present
Manager of Facilities, School of Engineering, San Francisco State University, 2002-2008

5. **Certifications or professional registrations**

    Engineer in Training, State of California, 1986

6. **Current membership in professional organizations**

    Member, ASEE

Member, Society of Port Engineers of San Francisco

7. Honors and awards

Fish Teaching Award for Excellence in Teaching, California State University – Maritime Academy - 2010

8. Service activities (within and outside of the institution)

President, Board of Directors, Tau Alpha Pi – National Engineering Technology Honor Society (ASEE)
Multiple Campus Committees

9. Recent Publications

10. Briefly list the most recent professional development activities

1. **Name: Michael S. Kazek, CDR, USCG (Ret)**

2. **Education:**

- B.S. Degree in Marine Engineering, USCG Academy, New London, CT (1984)
- M.S.E. Degree in Mechanical Engineering, University of Michigan, Ann Arbor, MI (1988)
- M.S.E. Degree in Naval Architecture and Marine Engineering, *University of Michigan, Ann Arbor, MI* (1988)

3. **Academic Experience:**

- California Maritime Academy; Full Time Lecturer; Fall 2008 to 2015
- California Maritime Academy; Associate Professor; Fall 2015 to Present
- California Maritime Academy; Course Coordinator for ET 110, ET 230 L, HUM 310, ET 340 L, ENG 430

4. **Non-academic Experience:**

- California Maritime Academy; Director, USCG Licensing Programs; 2013 to Present
- California Maritime Academy; Deputy Director, Department of Leadership Development, Aug 2005 to Aug 2008, Full Time
- USCG, Naval Engineering Support Unit Boston, Commanding Officer, 2003-2005, Full Time
- USCG, Coast Guard Cutter Boutwell, Executive Officer, 2001-2003, Full Time
- USCG, Naval Engineering Support Unit Alameda, Executive Officer, 1998-2001, Full Time
- USCG, Vessel Support Branch, Maintenance & Logistics Command Pacific, Naval Engineering Division, Assistant Branch Chief, 1996-1998, Full Time
- USCG, Specifications Branch, Maintenance & Logistics Command Pacific, Naval Engineering Division, Hull Section Chief, 1994-1996, Full Time
- USCG, Coast Guard Cutter Seneca, Chief Engineer, 1991-1994, Full Time
- USCG, Coast Guard Group Key West, Engineer Officer, 1988-1991, Full Time
- USCG, Coast Guard Cutter Venturous, Student Engineer, 1984-1986, Full Time

5. **Certifications or Professional Registrations:**

- Damage Control Assistant School, Treasure Island, CA, Apr 1985
- Hazardous Waste Site Survey Training, Univ of Florida, Nov 1988
- Hazardous Waste Management Training, Lion Technology, Orlando, FL, Jan 1990
- EO-16, USCG Engineering Administration, Yorktown, VA, Mar 1991
- MK-29, USCG Main Propulsion Console School, Yorktown, VA, Apr 1991
- MK-27, USCG Waste Heat/Evaporator School, Yorktown, VA, Apr 1991

- Advanced Shiphandling School, Navy Amphibious School Little Creek, Jun 1992
- Drydock Technology and Operation, Marine Design Services, Sept 1995
- USCG Civilian Supervisor School, Alameda, CA, Jan 1996
- USCG Propulsion Shaft Alignment, Alameda, CA, Jan 1996
- Unit Safety Coordinator Training, USCG Training Center Petaluma, Feb 1999
- Oil Spill Prevention, Response, Control and Clean-up, Florida State Department of Natural Resources, Aug 2000
- Naval Tactical Warfare Overview School, FCTCPAC San Diego, CA Apr 2001
- USCG PCO/PXO School, Coast Guard Academy, New London, CT, Apr 2001
- CGC-207, SCCS Decision Maker Training, Portsmouth, VA, Jul 2001
- Step up to Leadership, Dale Carnegie Training, San Francisco, CA, Nov 2005
- Myers-Briggs Type Indicator Qualifying Workshop, Fairfax, VA, Jan 2006
- Proactive Management, Ethics Regs & the Conflict of Interest Code, Sept 2007
- Covey's 7 Habits for Highly Effective People, Sept 2007
- Covey's Leadership Foundations, A Workshop for Emerging Leaders, Feb 2008

6. Current Membership in Professional Organizations:

- Level 2 Certification, American Swimming Coaches Association
- Level 3 Certification, United States Masters Swimming Coaches Association
- Member, Society of Naval Architects and Marine Engineers, 2010 to Present

7. Honors and Awards:

- California Maritime Academy, Presidential Team Achievement Award, 2017
- Pacific Masters Swimming, Coach of the Year Award, 2016
- California Maritime Academy, Outstanding Service Award, 2015
- California Maritime Academy, Presidential Award, 2014
- Society of Naval Architects & Marine Engineers, Faculty Advisor of the Year Award, 2014
- United States Masters Swimming, Kerry O'Brien Coaching Award, 2013

8. Service Activities:

- Acting Commandant, Training Ship GOLDEN BEAR cruises (2005-2008; 4 cruises)
- National Incident Command System, Planning Section Chief (Oct 06 to Dec 10)
- Facilitator / Chair, Disciplinary Review & Hearing Committee (May 06 to Present)
- Head Coach, Cal Maritime Academy Master's Swimming Team (Jan 2006 to Present)
- Faculty Advisor, California Maritime Academy Student Section, Society of Naval Architects and Marine Engineers (Mar 10 to Present)

9. Publications and Presentations: (None)

10. Professional Development Activities:

- Completed Curricula for Officers' Licenses with Academic Degrees, International Association of Maritime Universities (IAMU), Oct 2017
- Received USCG Program Approval for Cal Maritime's Deck and Engine Programs, April 2019. Program submitted to the USCG for approval in Sept 2018.
- Contributor to the Standard Operating Procedures for the Coast Guard's Interaction with State and Federal Maritime Academies, July 2017

1. **Name:** Jonathan Fischer

2. Education:

B.S. Bioengineering, University of Pittsburgh – 2001
B.A. History and Philosophy of Science, University of Pittsburgh – 2001
M.S. Mechanical Engineering, University of California, Berkeley - 2005

3. Academic Experience:

California Maritime Academy, Associate Professor, 2013-present, full time
California Maritime Academy, Assistant Professor - 2007-2013, full time
California Maritime Academy, Lecturer - 2006-2007, full time
Sonoma College, Lecturer, 2005-2006, part time

4. Non Academic Experience:

Drexel University Dept of Anatomy & Neurobiology, Research Engineer, 2002, full time
Invented a robotic technique to study the biomechanics of the human elbow joint.
Wrote a complete set of software tools for motion capture.
Ivy West Educational Services, Lead Trainer, 2005-2006, part time.
Trained tutor for one of the elite Northern California Companies.

5. Certifications or professional registrations:

C.S.U. Quality Online Learning and Teaching (QOLT)

6. Membership Professional Organizations:

American Society for Engineering Education (2012-2015)
Instrumentation and Automation Society (2007-2012)

7. Honors and awards:

2014 Outstanding Teacher Award (one of 26 in the C.S.U.)
2009 Richard Fish Award for commitment to excellence in teaching.

8. Service Activities:

Faculty Development Committee 2016-present (* in 2018)
Department of Engineering Technology Retention, Tenure, and Promotion Committee (2012*,2013*,2014*,2015* ,2017*,2018*,2019*)
Academic Leave Committee (2013,2014*)
Executive Committee--Academic Senate 2013-2015
Faculty Advisor - Tau Alpha Pi Honor Society
Faculty Advisor – CMA Chapter of Instrumentation and Automation Society (2006-2012)
Member – Policy Committee (2007-2012)
*-chair
Paper Reviewer: 2013 ASEE Annual Conference (Engineering Technology Division) Atlanta, GA.
San Francisco Little Opera, 2010-PRESENT, Master Artist Youth Instructor
Grace Cathedral, SAN FRANCISCO, CA | SUMMER 2019, Lead Art Instructor

Root Division, SAN FRANCISCO, CA | 2012, Youth Screenprinting Instructor
San Francisco Boys Chorus | 2012, Art Director: Away Camp
U.C. Berkeley Pre-College Academy BERKELEY, CA | 2005-2009, Lead Instructor

9. Presentations:

Fischer, J. " Project Based Learning in the Busy Engineering Course: Can it Work? A Case Study," The SoTL Commons: A Conference for the Scholarship of Teaching and Learning. Georgia State University, Statesboro, GA, March 2012.

Fischer, J. "A Hands-On Project to Improve Mechanical Analysis Skills: A Comparative Study," American Society for Engineering Education Conference for Industry and Education Collaboration. Orlando, FL, February 2012.

10. Professional Development:

CSU Quality Online Learning and Teaching (QOLT) course & certification.
2019 San Francisco Arts Commission Grant
2016 San Francisco Arts Commission Grant

1. **Name**: Dinesh Pinisetty

2. **Education**

   Ph.D. Mechanical Engineering, Louisiana State University, 2011
   M.S. Mechanical Engineering, Louisiana State University, 2005
   B.Tech. Mechanical Engineering, Jawaharlal Nehru Technological University, India 2002

3. **Academic experience**

   CSU Maritime Academy, Associate Professor, August 2013 – present, full time
   CSU Maritime Academy, Lecturer, January - April 2013, part time
   New York University, Adjunct Professor, January 2011 – December 2012, full time
   Louisiana State University, Summer Intern in Dept. of Chemical Engineering, May – August 2010 and May – August 2009, part time
   Louisiana State University, Research Assistant in Dept. of Mechanical Engineering, August 2005 – December 2010

4. **Non-academic experience**

   None

5. **Certifications or professional registrations**

   None

6. **Current membership in professional organizations**

   TMS (The Minerals, Metals and Materials Society)
   ASEE (American Society of Engineering Education)

7. **Honors and awards**

   Dissertation Fellowship Award, Louisiana State University, 2010
   Best Student Research Presentation, Louisiana State University, 2009 and 2004
   Economic Development Assistantship Award, Louisiana State University, 2005- 2009

8. **Service activities (within and outside of the institution)**

   <u>*Outside of Institution*</u>:

   - Symposium Organizer, 2019 TMS Annual Meeting & Exhibition
   - Reviewer for 10 Journals and Springer Publishing Group
   - Reviewer for International Ph.D. Dissertations

Within the Institution:

- Academic Senate Executive Committee (Elected as Academic Senate Committee Chair between 2019- 2020)
- Engineering Technology Department Hiring Committee
- School of Engineering Dean Hiring Committee
- Retention, Tenure and Promotion Committee

9. Publications and Presentations

Books:

- N. Gupta, V. C. Shunmugasamy and **D. Pinisetty**. "Reinforced polymer matrix syntactic foams: Effect of Nano and Micro-scale Reinforcement", *Springer Briefs in Materials* [http://www.springer.com/materials/special+types/book/978-3- 319-01242-1]

Book Chapters:

- **D. Pinisetty** and R.V. Devireddy. "Microscale thermoelectric devices for use with Biosystems", Chapter 6, *Multiscale Technologies for Cryomedicine*, Eds. X. He and J. C. Bischof, World Scientific Publications, (2016).
- **D. Pinisetty**, V. C. Shunmugasamy and N. Gupta. "Hollow glass microspheres in thermosets", Chapter 6, *Hollow Glass Microspheres for Plastics, Elastomers, and Adhesives Compounds*, Eds. B. Yalcin and S. E. Amos, *Elsevier*, (2015).
- N. Gupta, D. D. Luong and **D. Pinisetty**. "Weight saving potential of metal matrix syntactic foams", Chapter 11, *Metal Matrix Syntactic Foams*, Eds. N. Gupta and P. K. Rohatgi, *DEStech Publications*, (2015).

Journal Publications:

- V. C. Shunmugasamy, Harish Anantharaman, **D. Pinisetty** and N. Gupta. "Unnotched izod impact characterization of glass hollow particle/vinyl ester syntactic foams", *Journal of Composite Materials,* Vol. 49 (2), pp. 185-197 (2015).
- N. Gupta, S. E. Zeltmann, V. C. Shunmugasamy and **D. Pinisetty**. "Applications of polymer matrix syntactic foams", *JOM Journal of the Minerals, Metals And Materials Society,* Vol. 66, pp. 245-254, (2014).
- V. C. Shunmugasamy, **D. Pinisetty** and N. Gupta. "Electrical properties of hollow glass particle filled vinyl ester matrix syntactic foams", *Journal of Materials Science,* Vol. 49, pp. 180-190, (2014).

10. Professional Development Activities

- Institute of Teaching and Learning Symposium on Equity and Diversity, 2019
- GI 2025 Graduation Initiative Symposium at CSU Chancellors office, 2018

1. ***Name:***

   Evan Chang-Siu

2. ***Education:***

   PhD, Mechanical Engineering, University of California Berkeley, 2013
   MS, Mechanical Engineering, University of California Berkeley, 2008
   BS, Mechanical Engineering, University of California Berkeley, 2006

3. ***Academic experience:***

   CSU Maritime Academy, Assistant Professor, 2014-Present, full time.
   UC Berkeley, Lecturer, 2014, part time.

4. ***Non-academic experience:***

   Ekso Bionics, Controls Engineer, Developed and implemented a gait laboratory with a motion capture system, EMG system, and VO2 sensing. Explored estimation algorithms of center-of-mass and center-of-pressure of a user. Investigated sensor fusion methods on high resolution, but low range gyroscopes to improve dead reckoning estimates. Supported new SBIR proposal initiatives in the area of mobile balance rehabilitation and contributed in terms of idea creation, writing, and refinement, 2013, full-time

   PhaseSpace, Consultant, R & D and Technical Sales, Developed marketing strategies to more effectively communicate the technology and create visibility. Assisted in research and development efforts at PhaseSpace from designing planetary gear trains to testing hydro turbine performance. Contributed to the technical leadership for a human skeleton pose estimation product utilizing the marker information to compute biomechanical joint center and angle information, 2013-2014, part-time

5. ***Certifications or professional registrations:***

   High Voltage Training MEBA School 2017

6. ***Current membership in professional organizations:***

   IEEE

7. ***Honors and awards:***

   Department of Energy Collegiate Wind Competition 3rd Place 2019.
   Department of Energy Collegiate Wind Competition 1st Place 2018.
   CSUM Research, Scholarly and Creative Activity Grants 2017 mini grant awarded.
   CSUM Research, Scholarly and Creative Activity Grants 2015 & 2016 mini grant awarded.

Berkeley Big Ideas 2012, 3rd Place $7000 prize, "PikaPen, a force sensing pen used for improving handwriting technique in children with special needs."
Online IGERT Video and Poster Competition 2012, Judges Choice and Community Choice
SICB 2012 Best Poster Presentation Honorable Mention
IROS 2011 Best Paper Award Finalist
NSF CiBER IGERT recipient 2010

8. Service activities:

Initiated a new makerspace on CMA campus. Worked with administration, faculty, staff, students, facilities, contractors, and outside industry to secure space, design the layout, discuss access, purchase furniture and equipment, and secure funding.
Served on faculty hiring committees.
Served on the executive senate committee as secretary.

9. Publications and presentations:

Thomas Libby, Aaron M Johnson, Evan Chang-Siu, R J. Full, and Daniel Koditschek, "Comparative Design, Scaling, and Control of Appendages for Inertial Reorientation", IEEE Transactions on Robotics 32(6), 1380-1398. December 2016.

Chang-Siu, E.; Libby, T.; Brown, M.; Full, R. J.; and Tomizuka, M.; , "A nonlinear feedback controller for aerial self-righting by a tailed robot," Robotics and Automation (ICRA), 2013 IEEE International Conference on , vol., no., pp 32-39, Mar 2013

Chang-Siu, E.; Libby, T.; Tomizuka, M.; and Full, R. J.; , "A lizard-inspired active tail enables rapid maneuvers and dynamic stabilization in a terrestrial robot," Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on , vol., no., pp.1887-1894, 25-30 Sept. 2011

Libby, T.; Moore, T. Y.; Chang-Siu, E.; Li, D.; Cohen, D.J.; Jusufi, A.; and Full, R. J.; , "Tail-assisted pitch control in lizards, robots and dinosaurs," Nature, vol. advance online publication.

Chang-Siu, E.; Tomizuka, M.; and Kong, K.; , "Time-varying complementary filtering for attitude estimation," Intelligent Robots and Systems (IROS), 2011 IEEE/RSJ International Conference on , vol., no., pp.2474-2480, 25-30 Sept. 2011

10. Recent professional development activities:

MEBA School High Voltage and Marine Electric Propulsion Training.
ABET Accreditation Training

1. ***Name*** - Stephen J Kreta

2. ***Education***

    MS Industrial and Systems Engineering, San Jose State University, 1987
    BS Marine Engineering Technology, California Maritime Academy, 1979
    Management and Leadership in Education Institute (MLE), Harvard University, Cambridge Massachusetts, June 2007

3. ***Academic experience***

    Professor Emeritus (Half time Teaching)
    VP Student Affairs (May 2013 – July 2018)
    Associate VP, Academic Affairs (March, 2011 – May 2013)
    Academic Dean (January 1998-March, 2011)
    Dean, Engineering and Technology (July 1996 – December 1997)
    Engineering Department Head - 1994-1996
    Faculty Academic Senate President 1993
    Assistant Professor through Professor, tenured

4. ***Non-academic experience***

    Jan - March 1992 Brown and Caldwell Consulting Engineers, Pleasant Hill, CA
    Commercial HVAC Design
    January 1989 Rosenblatt Naval Architects, San Francisco, CA
    Maritime HVAC Design
    May 1979 - Jan 1984 Engineering Officer, United States Merchant

5. ***Certifications or professional registrations***

    Registered Professional Engineer, Mechanical, State of California
    Chief Engineer, Steam Vessels, any horsepower, United States Coast Guard
    Chief Engineer, Motor Vessels, any horsepower, United States Coast Guard
    Certified Plant Engineer, Association for Facilities Engineering
    Change Management Certificate, Prosci
    Emergency Response Training Certification
    SEMS EOC, ICS 100, ICS 200, NIMS, National Response Framework
    California State University, Emergency Response Organization

6. ***Current membership in professional organizations***

    NASPA – Student Affairs Professional Organization
    ACPA – Student Affairs Professional Organization

7. ***Honors and awards***

Bautzer Faculty - CSU University Advancement Award

8. ***Service activities (within and outside of the institution)***

WASC Regional Accreditation Evaluator Training and team visitor
Campus WASC Steering Committee
Edwards Leadership Development Program Task Force Chair
Academic Calendar Task Force Chair
CSU System wide Committee for Students with Disabilities - Chair
International Charity Metropolitan Committee Chair (IOCC)

9. Recent Publications

October 2017 *Teaching Leadership to the Millennial Generation and Beyond* Proceedings of the 18th Annual General Assembly and Conference, International Association of Maritime Universities. Varna Bulgaria (With Kristen Bloom)

October 2015 *Defining and Designing a Comprehensive Leadership Development Program using the Maritime Model of Leadership.* Proceedings of the 16th Annual General Assembly and Conference, International Association of Maritime Universities. Opatia, Croatia

10. Briefly list the most recent professional development activities

Prosci Change Management Certificate Program – Summer 2018
Center for Creative Leadership – Summer 2016

1. ***Name:***

   Ryan Storz

2. ***Education:***

   M.S., Engineering Management, California State University Maritime Academy, 2013
   B.S., Facilities Engineering Technology, California State University Maritime Academy, 2007

3. ***Academic experience:***

   CSU Maritime Academy, Tenure Track Assistant Professor, 2014-current, full time.

4. ***Non-academic experience:***

   General Electric (GE)-Water & Process Technologies, Account Manager, Martinez, CA, 2011-2014
   Crockett Cogeneration, Operations Maintenance Technician 3, Crockett, CA, 20017-2011

5. ***Certifications or professional registrations:***

   Certified Plant Engineer in Training Certificate (A.F.E.), 2007
   Universal Refrigeration Technician License (R.E.P.A.), 2006

6. ***Current membership in professional organizations:***

   Association of Facilities Engineers (AFE)
   Society of Port Engineer

7. ***Honors and awards:***

   None

8. ***Service activities:***

   Board of Directors for AFE
   Student Fee Advisory Committee
   Sustainability Club Member
   Cal Maritime Alumni Association

9. ***Publications and presentations:***

   None

10. Recent professional development activities:

Project Management Academy 34 hour Project Management Master Certification, 2017
GE Water and Process Technologies 40 hour Basic Refinery Treatment Course, 2012
ITOCHU's 18 hour Management Kaizen, 2010
GE 80 hour Mark V and HMI Gas Turbine Controls School, 2010

1. ***Name:***

   Keir Moorhead

2. ***Education:***

   BS, Mechanical Engineering, California State University Maritime Academy, 2004

3. ***Academic experience:***

   CSU Maritime Academy, MVI II, 2015-current, full time.

4. ***Non-academic experience:***

   Senior Project Engineer, The GBS Group, Virginia Beach, 2014 - current
   Senior Project Engineer/Manager, Hornblower Cruises and Events, 2008-2014
   Applications Engineer, Glacier Bay, Union City, 2006-2008
   Acoustical Engineer, Performance Media Industries, Fairfax CA, 2004- 2006

5. ***Certifications or professional registrations:***

   3rd Assistant Engineer Unlimited, Steam, Diesel, Gas Turbine
   Universal refrigeration technician license

6. ***Current membership in professional organizations:***

   Society of Port Engineers

7. ***Honors and awards:***

   None

8. ***Service activities:***

   Academic Senate Executive Committee
   Cruise Committee
   Engineering Technology Hiring Committee

9. ***Publications and presentations:***

   None

10. ***Recent professional development activities:***

    Firefighting

1) **Name**: Scott Green

2) **Education**:
B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1986

3) **Academic Experience**:
Maritime Vocational Instructor II, 2010-Present, full time
Technical Coordinator for Engineering Simulators, 1997-Present, full time
Maritime Vocational Lecturer II – 1998-2010, full time

4) **Non-Academic Experience**:
Plant Automation Shift Engineer, Honey Hill Farms Dairy
American Merchant Officers Association
3rd Engineer, Masters, Mates and Pilots
Chief Engineer, Limited, Exploration Cruise Lines
3rd Engineer, Scripps Institution of Oceanography, University of California San Diego
Fleet Engineer, Commodore Cruises
Fleet Engineer, Seaway Tug and Towing

5) **Certifications or Professional Registrations**:
Third Assistant Engineer, Steam, Motor Gas Turbine Vessels, Any Horsepower
Second Assistant Engineer, Steam Motor Gas Turbine Vessels, Any Horsepower
USCG – Train-the Trainer
USCG – Crew Resource Management, Oxford Aviation Academy
Advanced Marine Fire Fighting
STCW – 1995-2010
USCG – Basic Safety Training

6) **Current Membership in Professional Organizations**:
International Maritime Lecturers' Association
United States Rowing Association
Political Action Chair, California Faculty Association, The California Maritime Academy

7) **Honors and Awards**: None

8) **Service Activities**:
Curriculum Committee – 2011-Present
Assistant Coach, Rowing Team – 2004-Present
Sub-Committee for Student Evaluations
Simulation Committee – 1997-Present
Historic Ship Preservation Coordinator to USS IOWA – 2012
Coordinator and Orchestrator of Engine Simulation Proctor Programs

9) **Publications and Presentations**: None

10) Recent Professional Development Activities:

Upgrade of USCG License & STCW Certification
Achievement of Crew Resource Management – 2010
Development of Assessment Tools for Person-to-Person – "Talking Engine Room" Pedagogy
Investigation into Revising the Steam Track Course Sequence
Creation of New Joint Course: Integrated Watch Management (MT and MET)
Routine Attendance and Participation in all Academic Senate Retreats, Department Meetings, etc.

1) **Name**: Robert Jackson

2) **Education**:
B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1976

3) **Academic Experience**:
FERP Faculty , Department of Engineering Technology, CSU Maritime Academy, 2017-present, part time
Chair of Dept. of Engineering Technology, The California Maritime Academy, 2013-2016, full time
Tenured Maritime Vocational Instructor, The California Maritime Academy, 2012-2017, full time
Maritime Vocational Instructor, The California Maritime Academy, 2000-2012, full time

4) **Non-Academic Experience**:
Chief Engineer; M/V Cape Orlando, 1997-2000
USCG Assistant Engineer, 1992-1997
Chief Engineer; S/S Cherry Valley & S/S Kenai, 1990-1992
USCG Assistant Engineer, 1976-1990

5) **Certifications or Professional Registrations**:
USCG Chief Engineering License, Steam or Motor Vessels, Serial No. 766651
International Society of Certified Electronics Technicians, Associate Certified Electronics Technician, Associate CET No. AC 30351
ISA Certified Control Systems Technician (CCST), Level 1, CCST registered No.16310

6) **Current Membership in Professional Organizations**:
Society of San Francisco Port Engineers

7) **Honors and Awards**:
Richard W. Fish Memorial Award for unwavering commitment to excellence in teaching

8) **Service Activities**:
Maritime English Initiative at Tokyo University of Marine Science and Technology (TUMSAT):

9) **Publications and Presentations**: None

10) **Recent Professional Development Activities**: None

1) **Name**: Michael Andrews

2) **Education**:
B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1976

3) **Academic Experience**:
Maritime Vocational Instructor IV, The California Maritime Academy, 2010-Present
Engineering Lab Instructor Assistant, 1998
Maritime Engineering Consultant, 1996-1998
17 Training Ship Cruises

4) **Non-Academic Experience**:
Offshore Supply/Pilot Boat Operator, San Francisco Bay, 1976-79
Port Engineer for Crew Supply Vessel Company, San Francisco Bay, 1979-84
Geophysical Vessel Engineering/Operator, Pacific Coast, Mexico-California, 1982-84
Head Engineering Officer Alaskan Cruise Lines – Alaska, Baja, California, Tahiti, 1985-89
Prince William Sound Engineering Officer, Oil Spill Vessel Operations, 1989-90
Professional Alaskan Guide Glacier Bay Fishing Companies, 1990-94
Port Engineer Hornblower Marine Company, 1994-96
California Maritime Academy Consultant/Maritime Vocational Instructor/Licensed Watch Officer

5) **Certifications or Professional Registrations**:
Second Assistant Engineer Unlimited Horsepower Motor/Gas Turbine
Third Assistant Engineer Unlimited Steam
Master 200 Ton

6) **Current Membership in Professional Organizations**: None

7) **Honors and Awards**: None

8) **Service Activities**: None

9) **Publications and Presentations**: None

10) **Recent Professional Development Activities**: None

1. ***Name:***

   Brian Crawford

2. ***Education:***

   MBA, University of Phoenix, 1997
   BS, Marine Systems Engineering, Kings Point, NY, 1992

3. ***Academic experience:***

   CSU Maritime Academy, Assistant Professor, 2018-Present, full time.

4. ***Non-academic experience:***

   Project manager and Marine Engineering Consultant, Telequity Group Services, June 2005-Present
   Senior Network and Technology Manager, New World Network, June 2000-May 2005
   International Network Manager, Pacific Gateway Exchange, March 1998-May 2000
   International Cable Manager, AT & T Communications, October 1996-Feb 1998

5. ***Certifications or professional registrations:***

   USCG License, 2 A/E Motor, 3 A/E Steam and Gas Turbine, Unlimited Horsepower
   Universal Refrigeration Technician (#P486F39B0A9E5DE70)
   Waste Management Best Practices
   NPDES Training for Vessels
   Advanced Marine Firefighting
   Cable Engineering and Construction Safe Working Procedures
   State of NJ-Engineer in Training (EIT#10702)

6. ***Current membership in professional organizations:***

   None

7. ***Honors and awards:***

   MVP (2nd Place @ U.S. National Collegiate Pistol Championships)
   Who's Who Among Students (USMMA)

8. ***Service activities:*** None

9. ***Publications and presentations:*** None

10. ***Recent professional development activities:***
    Japanese (oral/read/write)

1. ***Name:***

    Kenneth LeVan

2. ***Education:***

    BS, Marine Engineering, California State University Maritime Academy, 1982

3. ***Academic experience:***

    CSU Maritime Academy, Lecturer, 2013-2019, full time.

4. ***Non-academic experience:***

    Chief Engineer Horizon Navigator, Horizon Trader, Horizon Fairbanks 2002 to 2013
    Intermittent Port Engineer Horizon Lines 2006-2013
    First Engineer Horizon Lines, CSX Lines and Sea Land 1992 to 2001
    Costume Home Building Contractor 1988 to 2000
    Second Engineer MEBA contracted ships 1980 to 1991
    Assistant Engineer Chevron Shipping 1976 to 1980

5. ***Certifications or professional registrations:***

    Merchant Mariners Document Unlimited Chief Engineer Steam and Diesel expires 2024
    Universal refrigeration certificate
    Advanced fire fighting
    Advanced electrical troubleshooting
    Ships management and related Certs

6. ***Current membership in professional organizations:***

    Society of Port Engineers

7. ***Honors and awards:***

    None

8. ***Service activities:***

    Training Officer for Cadet Cruise Experience
    Provide testing for Cadet Refrigeration Certification
    Support person for Student construction projects

9. ***Publications and presentations:***

    None

10. Recent professional development activities:

Attended Schooling for renewal of Coast Guard Licenses 16hr to 40hr each in
Firefighting
Advanced Fire fighting
Emergency medical response
Watch Team Management
Personnel Management

1. ***Name:***

   Thomas J. Clyatt

2. ***Education:***

   BS, Marine Engineering, California State University Maritime Academy, 1982

3. ***Academic experience:***

   CSU Maritime Academy, Lecturer, 2016-Present, part time.
   UC Berkeley, Lecturer, 2014, part time.

4. ***Non-academic experience:***

   <u>Kaiser Permanente Medical Center, Stationary Engineer</u>
   Analyze utility usage data and implement energy conservation measures. Maintain documentation for regulatory agencies. 2018 – present, part time

   Performed watch rounds and responded to service calls from hospital staff. Completed preventative maintenance on electrical & mechanical equipment. 2010 – 2018 full time

   <u>Clyatt Technical Services, LLC, Consulting Engineer</u>
   Self-employed engineer specializing in the design and construction of automation and mechanical systems for industrial process equipment. 1994-2010, full time

   <u>Mount Shasta Ski Park, Maintenance Electrician</u>
   Maintained and repaired electrical and mechanical equipment and their associated controls for lodges, ski lifts, snow-making systems and ski slope vehicles. 1996-1998, full time

   <u>Controlco Automation Distributors, Design Engineer</u>
   Designed HVAC and industrial process control systems. Performed field startups and commissioning. 1993-1994, full time

   <u>Yamas Controls, Inc., Manager, Service and Balancing Department</u>
   Supervised field personnel for service, installation and repair of HVAC electrical, mechanical and control equipment. Planned and implemented budget for department. Managed contracts for air balancing and energy-saving retrofits. 1990-1993, full time

   <u>Yamas Controls, Inc., HVAC and Control Technician</u>
   Performed service, installation and repair of commercial HVAC mechanical, control and life safety systems. 1985-1993, full time

   <u>Westinghouse Electric Company, Marine Division, Associate Design Engineer</u>
   Failure analysis of shipboard propulsion and missile handling systems, including steam turbine, hydraulic, pneumatic and electric equipment. 1984-1985, full time

San Francisco General Hospital, Stationary Engineer
Maintained and repaired all HVAC and refrigeration equipment. Performed power plant watch-standing duties. 1982-1984, full time

5. ***Certifications or professional registrations:***

AEE Certified Energy Engineer
California State Engineer-in-Training
Universal EPA Technician

6. ***Current membership in professional organizations:***

Association of Energy Engineers

7. ***Honors and awards:***

None

8. ***Service activities:***

United States Coast Guard Auxiliary

9. ***Publications and presentations:***

None

10. ***Recent professional development activities:***

Cal Maritime Faculty Learning Group

1. Name: Danielle Veronica Dragon

2. Education

Bachelor of Science in Mechanical Engineering, thermal-fluid systems, San Francisco State University, 2007
Associate Degree, General Education, City College of San Francisco, 2003

3. Academic experience

Lecturer, Fall 2017, part time
Lecturer, Fall 2018, full time
Lecturer, Spring 2019, full time

4. Non-academic experience

Pacific Gas and Electric Company (PG&E), Senior Product Engineer, developed, updated, reviewed commercial refrigeration and industrial energy efficiency whitepapers, 2017-2018, full time
PG&E, Senior Project Engineer, Developed Integrated Demand Side Management opportunities: energy efficiency, demand response, strategic energy management, self-generation, etc., 2016-2017, full time
PG&E, Supervisor, supervised Custom Implementation Team, 2015-2016, full time
PG&E, Senior Program Engineer, led the Targeted Demand Side management for Transmission & Distribution (T&D) Reliability Initiative, 2014-2015, full time
EnerNOC, Inc., Energy Engineer, led site assessments, surveys, and energy management activities for residential and non-residential energy potential studies, program evaluation projects, and strategic energy management engagements for utilities across America, 2011-2014, full time
BASE Energy, Inc., Project Engineer II, conducted large integrated audits and new construction reviews of industrial, agricultural, commercial, and municipalities, 2006-2011, full time

5. Certifications or professional registrations

Professional Engineer (#36731) – Board For Professional Engineers and Surveyors
Certified Energy Manager (#20227) – Association of Energy Engineers
Certified Demand Side Manager (#2026) – Association of Energy Engineers Certified
Communicator (CC) – Toastmasters International
Competent Leader (CL) – Toastmasters International
Open Water Scuba Diver – Professional Association of Diving Instructors Competent

6. Current membership in professional organizations

Society of Women Engineers (SWE)
American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

Toastmasters International

7. Honors and awards

8. Service activities (within and outside of the institution)

SWE Volunteer
San Francisco Animal Care and Control (SFACC) Volunteer
Toastmaster Mentor Volunteer

9. Publications and Presentations

Various energy efficiency whitepapers (workpapers): http://deeresources.net/workpapers
PGECOPUM106 R0 Water Pump Upgrade
PGECOREF130 R0 Ultra-Low Temperature (ULT) Freezer

10. Professional Development Activities

Currently developing Air Conditioning and Refrigeration workshop and training materials for women and girls in STEM
Currently developing an engineering YouTube channel to inspire women and girls in the STEM field
Taught at California Maritime Academy during Fall 2018 and Spring 2019
Studied the Russian language in St. Petersburg, Russia during Summer 2018
Traveled and explored Thailand (including scuba diving) during Winter 2018

1. **Name:** Steffan Long

2. **Education:**

   Diablo Valley College, machine Technology Certificate, 2002
   University of California at Santa Cruz, BA Language studies 1984-1989
   Education Abroad Program; Grenoble, France 1986-1987
   Language Quarter: Nimes, France 1985

3. **Academic experience**

   CSUM, full-time lecturer, Mechanical Engineering and Engineering Technology Fall 2017-present

4. **Non-academic experience**

   Chris French Metal, Inc, Shop Foreman, August 2009-August 2017
   As the lead fabricator, and shop foreman, I was responsible for all projects being on schedule and within budget. This required continuous communication with management and design teams, collaboratively creating strategies for successful project completion and field installation. To accommodate growth, we move the shop twice, increasing our square footage from 900 to over 10,000. I was heavily involved in the design, layout and set up of each shop. In addition, I administered fabrication tests and consulted with management on new hires.

   Delphi Productions, Metal Shop Supervisor, January 2002-August 2009
   As supervisor, I oversaw daily operations and supervised employees, determined material and consumable needs and procured necessary supplies. In addition, I coordinated with internal departments and project managers to manufacture products within defined budget parameters and timelines.

   Orantes Architectural Metals, Shop Foreman, August 2000-September 2001
   Managed daily operation of shop and supervised employees. I was the lead fabricator on a wide array of architectural projects, as well as being the jobsite foreman on numerous and varied installations

5. **Certifications or professional registrations**

6. **Current membership in professional organizations**

7. **Honors and awards**

8. **Service activities (within and outside of the institution)**

9. **Publications and Presentations**

10. **Professional Development Activities**

    Taught myself G-code programming for CNC milling machine. Spring 2019

1) **Name**: Albert Jefferson

2) **Education**:
M.S., Mechanical Engineering, California State University, Sacramento, CA – 2008
B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1983

3) **Academic Experience**:
Part Time Lecturer, The California Maritime Academy, Vallejo, CA, 2007-Present

4) **Non-Academic Experience**:
Senior Mechanical Engineer, Salas O'Brien Engineers – 2012-Present
Project Manager Design and Construction, AT & T – 2000-2011
Assistant Engineer of Operaitons, City of Fairfield Public Workds – 1990-2000
Mechanical Engineer, Mare Island Naval Shipyard – 1985-1990

5) **Certifications or Professional Registrations**:
Licensed Mechanical Engineer, State of California
LEED Accredited Professional Registration

6) **Current membership in professional organizations**:
American Society of Mechanical Engineers
Association of Heating, Refrigeration and Air Conditioning

7) **Honors and Awards**: None

8) **Service Activities**: None

9) **Publications and presentations**: None

10) **Recent professional development activities**: None

APPENDIX C – EQUIPMENT

Please list the major pieces of equipment used by the program in support of instruction.

All the major equipment used by the Department of Engineering Technology program in support of instruction is listed below. Almost all the information is also provided in Criterion 7.

Computer Lab

The computer lab in the Lab building is a classroom consisting of 24 student workstations and an instructor workstation. It is also open after hours for students. More information regarding the computer hardware and software will be provided in section B.

Chemistry Lab

Equipment and computers in this lab serves 24 students. The Chemistry Laboratory is equipped with standard general chemistry laboratory equipment to support experiential student learning. In addition to standard chemistry glassware and equipment, students use Vernier LabQuest 2® standalone interfaces in combination with a variety of sensors including spectrophotometers, colorimeters, pH meters, and temperature probes.

Physics Lab

The physics lab contains a variety of equipment for conducting the 13 lab activities that typically comprise the PHY200L course. In addition to a variety of small tools such as springs, meter sticks, and stopwatches, the general, and activity specific equipment housed in the physics lab includes:

General:

- 10 computers with a variety of software including LabVIEW, MS Office, and Arduino
- 15 Arduino microcontrollers
- 12 PocketLab wireless sensors
- 10 sets of graduated masses
- 8 triple beam balances
- 8 air tracks with 16 associated floating carts

Activity Specific:

- 8 force tables
- 8 sets of projectile rails
- 8 aluminum friction tracks with clamped pulleys
- 8 sets of standard density materials
- 8 ballistic pendula with spring loaded projectile launchers
- 8 motorized chucks coupled through a tunable radius friction clutch

Material/Mechanical Lab

- Universal Tensile Test Machine (with electrohydraulic control and data acquisition with a dedicated computer)
- Manual Tensile Test apparatus with Brinell Hardness Tester
- Rockwell Hardness Test Machine
- Charpy Impact Test Machine
- Creep Test Machine
- Rotating Beam Fatigue Test Machine
- Two 1000 ºC ovens
- Fixture for Jominy Testing
- Abrasive saw
- Mounting press
- Grinder/Polisher
- Microscope with camera
- Three mobile computer workstations with LABVIEW data acquisition hardware and software.
- Strain gages and accessories for installation
- Bridge completion and differential channel interface units
- Accelerometers and simple devices for calibration
- ECP Rectilinear Plant: for vibration experiments
- Unbalanced motor vibrational experimental apparatus

Fluid/Thermal Lab

- Two wind tunnels. The tunnel features a 12" x 12" test section, variable speed with a maximum velocity of 145 ft/s.
- Particle image velocimetry experiment. The experiment (Dantec EduPIV) is designed to measure flow velocities inside a water tank for various user defined flows.
- Heat exchanger test stand with double pipe, shell and tube configurations
- Thermal conduction experiment
- Pipe flow experiment
- Internal combustion gas engine experiment
- 2 PCs with data acquisition systems and LabView
- Instrumentation in the above experiments include
    - Pressure transducers
    - Particle image velocimetry
    - Manometer
    - Lift and Drag force measurement (wind tunnel)
    - Thin film heat transfer gages
    - Thermocouples
    - Flow rate measurement (heat exchanger)
    - x-y positioning instrument (wind tunnel)
    - Optical pyrometer

Instrumentation and Controls Lab

- Six student workstations consisting of:
  - PC workstations with LABVIEW
  - Data acquisition hardware
  - Power supply
  - Function generator
  - Handheld multimeter
- Six power supplies
- Instructor computer workstation
- Six PLC Trainers
- Tecquipment Servo Trainer
- Ball and Beam Control trainer
- Several printed Circuit Trainers

Electrical Circuits and Electronics Lab

- Ten student workstations plus one instructor work station each with:
  - PC workstation
  - Tektronix DPO2012B Oscilloscope
  - HP bench top digital multimeter
  - HP dual, 0-30V, regulated power supply
  - Function generator

- Five Hampden electric machine workstations each with:
  - DC/AC 3 phase variable voltage power supplies
  - Dynamometer with digital torque and speed readouts
  - DC instrumentation set
  - AC instrumentation set with watt meters
  - DC load bank
  - DC machine
  - 3-phase Synchronous machine
  - 3-phase induction motor
  - 1-phase induction motor
  - Hitachi 3-phase, variable frequency drive

Power Lab

- Alturdyne 80 kW gas turbine
- 200 kW Three Phase Resistive Load Bank
- Southwest WindPower 200 W Wind Turbine with 3 phase resistive load and anemometer (located on the roof)
- Solar photovoltaic panel (100 W) on a rotating frame with load bank

- Parabolic Solar Steam Generator
- Student-built Wind Tunnel (3 ft by 3 ft test section, 0-30 mph wind speed) to support the Collegiate Wind Competition
- Computer with LABVIEW data acquisition to measure wind speed and output power

The display equipment includes:

- 12 cylinder locomotive Diesel engine
- Steam Turbine with Reduction Gear

Simulators

- Steam Plant Simulator
- Diesel Plant Simulator

Machine Shop

The Machine Shop currently houses

- Three-axis CNC machine
- Two-axis CNC lathe
- Five milling machines
- Three drill presses
- Two band saws
- Ten bench grinders and a surface grinder

Weld Shop

The Weld Shop is used to train students in welding processes. It has 20 workstations, with each workstation tied to its own arc welder and each station vented to a common dust and fume collector. Each station is also plumbed with oxygen and acetylene lines for brazing and cutting operations. The Weld Shop also has a two-axis CNC plasma cutter, a metal shear, a sheet metal brake, a hydraulic press and a bench grinder.

Training Ship

The Training Ship Golden Bear (TSGB) is a 500-foot vessel that Cal Maritime uses for shipboard training of cadets, both in-port and at-sea. The vessel makes a sea-going voyage each year. The voyage is around two months in duration. During this time, the ship is used as a real-life working platform to train cadets in watch standing, operations, repairs and maneuvering.

Aboard the TSGB there are several laboratories and classrooms used for hands-on and academic instruction of curricula. The Engineering Lab offers hands-on training in the troubleshooting, maintenance and repair of various shipboard components such as diesel engines, water-making evaporators, oil and fuel purifiers, air and refrigeration compressors, and various valve and pump-types. Classrooms aboard the vessel offer space to work on smaller projects such as breadboard assembly of electronic components. There is also a Machine Shop with a welding area onboard. The Machine Shop has one engine lathe and one knee-type milling machine, along with a bench grinder. The welding area offers a platen with a curtain for stick welding and oxygen/acetylene gas operations to be performed.

Not to be discounted is the vessel's engine room itself, with two Enterprise R5 V-16 direct-reversing, medium-speed diesel engines. There are three MaK diesel generator sets, three A/C refrigeration chiller units, three oil purifiers, two fuel purifiers, three oil-water separators of various types, three air compressors for starting and reversing engines, a friction-type clutch, reduction gear set, Kingsbury thrust bearing, and numerous pumps, valves and actuators of various types. An automated centralized control system console affords watch standers the opportunity to monitor and control most every system in the engine room. In other spaces there are two steam generators, an emergency diesel generator, a battery room, steering gear room with two 7-cylinder piston rocker cam hydraulic pumps and rams, three ship's service rotary air compressors and various winches and windlasses. All of these and many other components and systems are monitored and maintained by engineering cadets.

APPENDIX D – INSTITUTIONAL SUMMARY

Programs are requested to provide the following information.

1. The Institution

a. *Name and address of the institution*
California State University Maritime Academy
200 Maritime Academy Drive
Vallejo, CA 94590

b. *Name and title of the chief executive officer of the institution*
RADM Thomas A. Cropper
President, California State University Maritime Academy

c. *Name and title of the person submitting the Self-Study Report.*
Francelina Neto
Dean, School Engineering

d. *Name the organizations by which the institution is now accredited, and the dates of the initial and most recent accreditation evaluations.*

ABET
EAC: Mechanical Engineering Program
Initial Accreditation: 2002
Most Recent Accreditation: 2014

ETAC: Facilities Engineering Technology Program
Initial Accreditation: 1999
Most Recent Accreditation: 2014

ETAC: Marine Engineering Technology Program
Initial Accreditation: 1977
Most Recent Accreditation: 2014

International Assembly for Collegiate Business Education (IACBE)
For the International Business and Logistics Program
Initial Accreditation: 2002
Most Recent Accreditation: 2014

Western Association of Schools and Colleges (WASC)
For the University
Initial Accreditation: 1974
Most Recent Accreditation: 2013

2. Type of Control

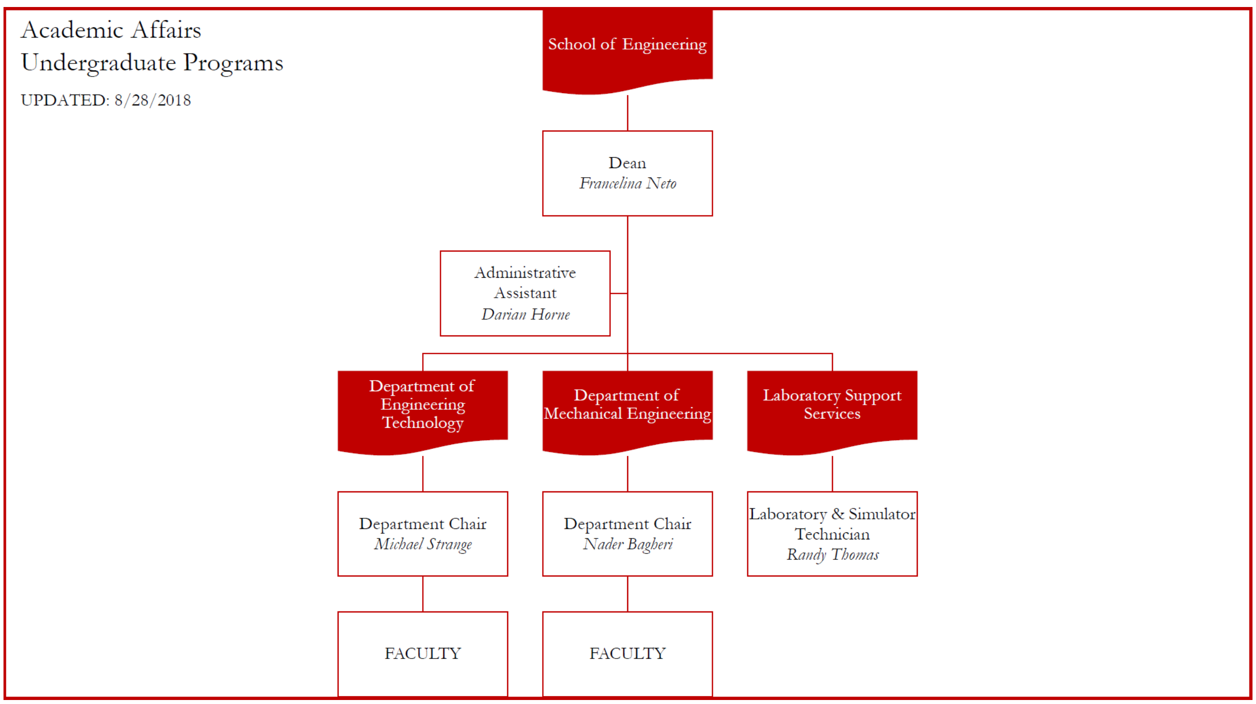
Description of the type of managerial control of the institution, e.g., private-non-profit, private-other, denominational, state, federal, public-other, etc.

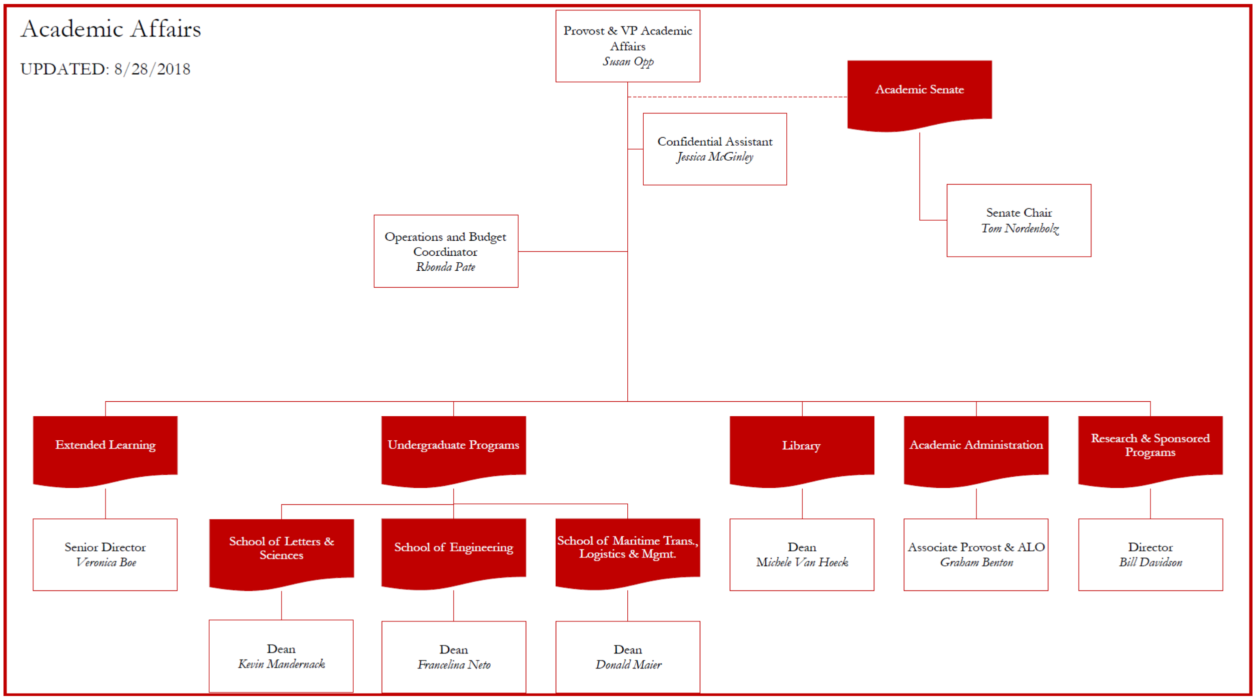
California State University Maritime Academy is a state public institution. It is one of 23 campuses of the California State University system. The system is the responsibility of Chancellor Timothy White and is governed by the 25-member Board of Trustees, of which all but one are appointed by the Governor of the State of California.

3. Educational Unit

Describe the educational unit in which the program is located including the administrative chain of responsibility from the individual responsible for the program to the chief executive officer of the institution. Include names and titles. An organization chart may be included.

The program is headed by the department chair, Michael Strange (term ending on July 1, 2019). The department chair reports to the Dean of Engineering, Francelina Neto. The Dean reports to the Provost, Susan Opp. The Provost reports to the President, RADM Thomas A. Cropper. Organizational charts for Academic Affairs and the School of Engineering.





4. Academic Support Units

List the names and titles of the individuals responsible for each of the units that teach courses required by the program being evaluated, e.g., mathematics, physics, etc.

Nader Bagheri
Chair, Department of Mechanical Engineering

Kevin Mandernack
Dean, School of Letters and Sciences

Cynthia Trevisan
Department Chair, Department of Sciences and Mathematics

Colin Dewey
Department Chair, Department of Culture & Communications

5. Non-academic Support Units

List the names and titles of the individuals responsible for each of the units that provide non-academic support to the program being evaluated, e.g., library, computing facilities, placement, tutoring, etc.

Michele Van Hoeck
Dean, Library

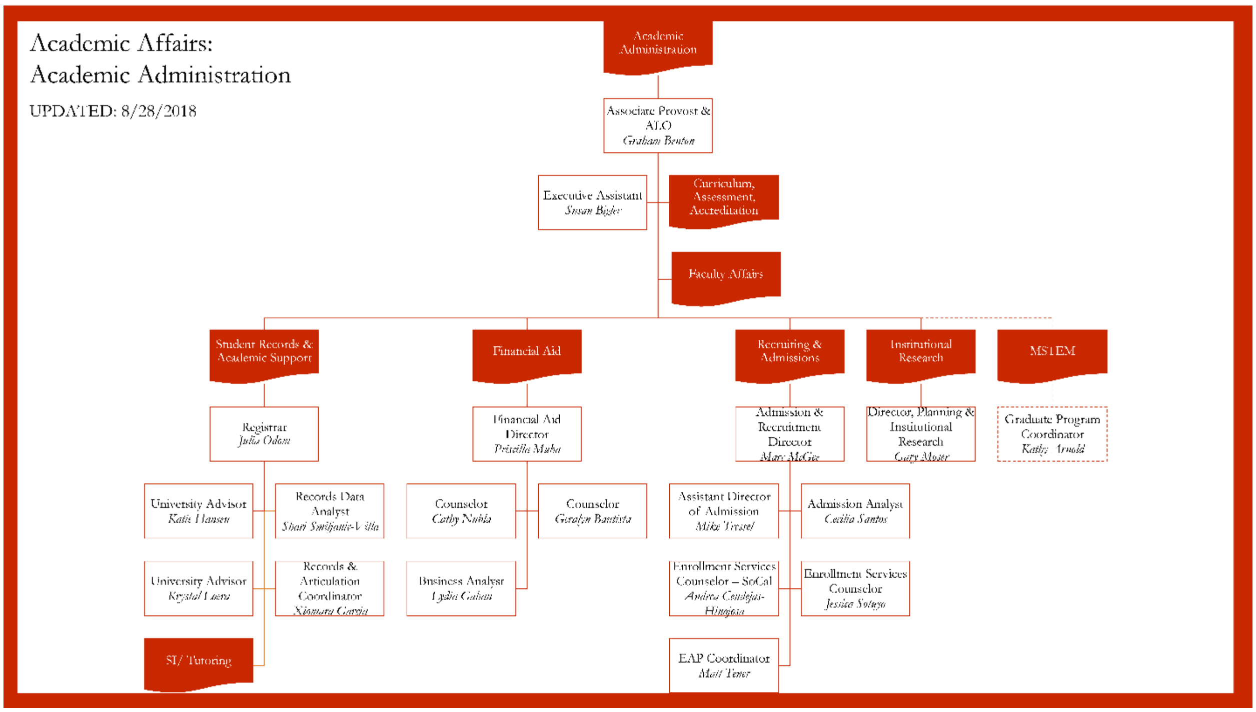
Julianne Tolson
Chief Technology Officer, Information Technology

Julia Odom
Registrar, Student Records & Academic Support

Katie Hansen
University Advisor, Student Records & Academic Support

Wendy Higgins
Director of Career Services, Career Services

Matthew Tener
Interim Tutoring Coordinator, Student Records & Academic Support
EAP Coordinator, Recruiting and Admissions



6. Credit Unit

It is assumed that one semester or quarter credit normally represents one class hour or three laboratory hours per week. One academic year normally represents at least 28 weeks of classes, exclusive of final examinations. If other standards are used for this program, the differences should be indicated.

At Cal Maritime, one semester unit represents one class hour or two laboratory hours. One academic year is 30 weeks of classes, exclusive of final examinations.

7. Tables

Complete the following tables for the program undergoing evaluation.

Table D-1. Program Enrollment and Degree Data

Facilities Engineering Technology

	Academic Year		Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
			1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current Year	18-19	FT	13	8	8	17	1	47	0	0	12	0	0
		PT	0	0	0	3	1	4	0				
1	17-18	FT	7	10	17	8	1	43	0	0	11	0	0
		PT	0	0	1	4	1	6	0				
2	16-17	FT	24	19	8	12	1	64	0	0	11	0	0
		PT	0	1	0	3	0	4	0				
3	15-16	FT	11	18	18	11	1	59	0	0	13	0	0
		PT	3	0	0	0	0	3	0				
4	14-15	FT	24	21	11	4	2	62	0	0	5	0	0
		PT	1	1	2	5	0	9	0				

Give official fall term enrollment figures (head count) for the current and preceding four academic years and undergraduate and graduate degrees conferred during each of those years. The "current" year means the academic year preceding the on-site visit.

FT--full time
PT--part time

Table D-2. Personnel

Engineering Technology

Year[1]: Fall 2018

	HEAD COUNT		FTE[2]
	FT	PT	
Administrative[2]	**1**	**1**	**1.4**
Faculty (tenure-track)[3]	**8**	**1**	**8.6**
Other Faculty (excluding student Assistants)	**5**	**5**	**9.6**
Student Teaching Assistants[4]		**8**	**7.6**
Technicians/Specialists	**1**	**1**	**1.2**
Office/Clerical Employees	**1**		**1**
Others[5]			

Report data for the program being evaluated.

1. Data on this table should be for the fall term immediately preceding the visit. Updated tables for the fall term when the ABET team is visiting are to be prepared and presented to the team when they arrive.

2. Persons holding joint administrative/faculty positions or other combined assignments should be allocated to each category according to the fraction of the appointment assigned to that category.

3. For faculty members, 1 FTE equals what your institution defines as a full-time load.

4. For student teaching assistants, 1 FTE equals 20 hours per week of work (or service). For undergraduate and graduate students, 1 FTE equals 15 semester credit-hours (or 24 quarter credit-hours) per term of institutional course work, meaning all courses — science, humanities and social sciences, etc.

5. Specify any other category considered appropriate, or leave blank.

APPENDIX E – SAMPLES OF EVALUATION REPORTS

CEP 270/370: Co-Op (Summer 2017)							
Student	Performance Evaluation Form (E = 5; VG = 4; G = 3; F = 2; U = 1)						
	Attitude-Willingness to learn and work	Aptitude-Natural ability as a plant engineer	Knowledge-Fundamental understanding of engineering system operations and maintenance	Dependability-Completes assigned tasks on-time	Responsibility-Performs tasks without supervision	Appearance-Personal grooming and dress	Total Average
Student # 1	5	5	5	5	5	5	***5***
Student # 2	5	5	4	5	5	5	***4.8333333***
Student # 3	5	4	5	4	5	4	***4.5***
Student # 4	5	5	4	5	5	5	***4.8333333***
Student # 5	5	5	5	5	5	5	***5***
Student # 6	5	5	5	5	5	5	***5***
Student # 7	5	5	5	5	5	5	***5***
Student # 8	5	5	5	5	5	5	***5***

ET 344: Thermodynamics {YEAR: 2018}

Reference: FINAL EXAM

Question 10: Application of First Law of Thermodynamics on Open Systems

Question 13: Analyzing Rankine Cycle

First name Surname	Question 7 [10 pts]	Question 11 [10 pts]	Total Score [20 pts]	Percentage	Percent
Student # 1	10	7	17	0.85	85
Student #2	8	5.5	13.5	0.675	67.5
Student # 3	7	7.5	14.5	0.725	72.5
Student # 4	7.5	6	13.5	0.675	67.5
Student # 5	6.5	3	9.5	0.475	47.5
Student # 6	8	6	14	0.7	70
Student # 7	5	3.5	8.5	0.425	42.5
Student # 8	10	6	16	0.8	80
Student # 9	7.5	5	12.5	0.625	62.5
Student # 10	10	7	17	0.85	85
Student # 11	3.5	2	5.5	0.275	27.5
Student # 12	6.5	5	11.5	0.575	57.5
Student # 13	8.5	4	12.5	0.625	62.5
Student # 14	6.5	6	12.5	0.625	62.5

ET 490: Power Engineering (Spring 2019)									
Team	Team Members	Introduction (20)	Discussion (20)	Conclusion (10)	Calculations (20)	References (5)	Grammar (20)	Formatting (5)	Total Percentage
1	Team # 1	14	14	7	0	5	14	4	58
2	Team # 2	12	16	8	14	4	16	4	74
3	Team # 3	20	18	8	14	5	20	5	90
4	Team # 4	16	16	8	14	5	16	4	79
5	Team # 5	16	18	8	18	4.5	16	4.5	85

SUBMISSION ATTESTING TO COMPLIANCE

Only the Dean or Dean's Delegate can electronically submit the Self-study Report.

ABET considers the on-line submission as equivalent to that of an electronic signature of compliance attesting to the fact that the program conducted an honest assessment of compliance and has provided a complete and accurate disclosure of timely information regarding compliance with ABET's *Criteria for Accrediting Engineering Programs* to include the General Criteria and any applicable Program Criteria, and the ABET *Accreditation Policy and Procedure Manual.*