

ABET
SELF-STUDY REPORT
FOR THE
FACILITIES ENGINEERING
TECHNOLOGY
AND
MARINE ENGINEERING
TECHNOLOGY
PROGRAMS
AT
CALIFORNIA MARITIME ACADEMY
VALLEJO, CALIFORNIA



July 11, 2013

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BACKGROUND INFORMATION

A. Contact Information

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B. Program History

Organization

The California Maritime Academy (CMA) began on June 3, 1929 as the California Nautical School in what is now Tiburon, California. The main purpose of this State of California institution was to train mates and engineers to operate vessels to support the merchant marine on the west coast for the United States. The first batch of students began training in March, 1931. In 1939, the name of the California Nautical School was changed to California Maritime Academy. In 1941, the current location, Morrow Cove in Vallejo, California became home to the California Maritime Academy.

CMA became a four-year college in the mid-1970s, offering two degrees, Nautical Industrial Technology (mates) and Marine Engineering Technology (engineers). The first batch of students from these four-year programs graduated in 1977, which was also the time of the first Accreditation Board for Engineering and Technology, Inc. (ABET) accreditation for Marine Engineering Technology (MET).

On July 1, 1995, CMA became the 22nd campus of the California State University (CSU) system. As part of that expansion, Facilities Engineering Technology (FET) was introduced as a degree in 1996 as major in the Engineering Technology (ET) department and the program received its first ABET accreditation in 1999.

Since their inception, both programs have been accredited by ABET. The latest accreditation was in 2006 when both programs participated in a general review by ABET. The most recent interim program reports were submitted on June 1, 2010. The ETAC Executive Committee extended the next general review from 2012 to 2013 to allow a simultaneous visit with the EAC visit.

The only major change in the programs since the last general review is the increase in the number of students enrolled. In 2005-2006 there were 163 students enrolled in ET programs. In 2012-13 there were 223. This represents almost a 37% increase in the number of students in the ET majors. The university has also grown significantly having had 723 students in 2005-2006 and in 2012-2013, having 987. This represents over a 36.5% increase

in the total number of students at the university. The current incoming Class of 2017 is similar in size to the Class of 2016, so we will see additional growth in the program in the coming year which will push us to a student body of over 1000 for the first time in our history.

Faculty

The rapid growth in our programs has forced us to declare impaction for both ET degree programs. The Class of 2018 will be the first class year to limit enrollments for ET programs in the history of CMA. Impaction is the vehicle that the CSU uses to allow more local control over the admissions process to the programs.

This growth has mandated that new tenure-track, adjunct and lecturer faculty be hired to address the increased academic teaching load.

Of the faculty on campus at the last general review in 2006, only two of the nine remain from that period. The current faculty size is 13 full-time and two part-time with searches currently underway for two additional full-time and two additional part-time. Two of the current faculty members were formerly faculty members of the Maritime Operations department which was eliminated during campus reorganization in 2012. The current faculty is made up of vastly experienced individuals with diverse skill sets from different industries and backgrounds. Most have served in leadership positions at their previous employment.

Currently there are four tenured members of the department. Three of those are Maritime Vocational Instructors and one is an Associate Professor. There are five tenure-track faculty members. Two of those are Maritime Vocational Instructors and three are Assistant Professors. There are two full time Marine Vocational Lecturers, two full time lecturers and two part time lecturers.

Since the last interim report in 2010, the Engineering Technology department has had three chairpersons due to retirements. The current, one-semester interim chairperson was elected to a two-year term in June of 2013.

Curriculum

The following curriculum changes occurred since the most recent review (these are also covered in Criterion 4):

Spring 2009: EPO 120 Marine Engineering Systems, EPO 120L Marine Engineering Systems Lab, and EPO 130 Auxiliary Machinery, were folded into EPO 125 Introduction to Marine Engineering for implementation fall 2009 for the class of 2013.

Spring 2011: ET 230 Properties of Materials and ET 332 Strengths of Materials were moved forward one semester in the sequence of the curriculum for implementation spring 2013 for the class of 2015. ET 230 was moved from fall of junior year to spring of sophomore year.

ET 230L was left in the fall semester of junior year. ET 332 moved from spring of junior year to fall of junior year. There were three reasons for this modification:

1. Students' first exposure to Materials is in the semester they take ET 230. The laboratory component, ET 230L, requires a significant background in materials and is now in the subsequent semester. Spring 2013 and Fall 2013 will be the first semesters to assess this change. Moving the lecture allows the students to be more prepared for the laboratory component of the course.
2. Moving ET 230 to the sophomore year allows students to have earlier exposure to engineering content than in the previous case. This also balances the workload more evenly across the curriculum in students' sophomore year.
3. Moving ET 332 to the earlier semester balances the work load and curriculum more evenly across students' junior year.

Spring 2012: The content of COM 220 Programming Applications for Engineering Technology Majors was absorbed into the existing COM 220L Programming Applications for Engineering Technology Majors Lab for implementation fall 2013 for class of 2016. COM 220 was then deleted from the curriculum.

Spring 2012: EPO 125L Introduction to Marine Engineering Laboratory, effective fall 2012 for the class of 2016 was added to the ET curriculum to primarily return the content of EPO 120L under an academic setting rather than being administered through the Corps of Cadets training program. It is the ET department's opinion that the preparation work accomplished in EPO 125L is valuable to the success of CRU 150 Sea Training I. Students' performance in CRU 150, across both ET and ME programs is being assessed in summer 2013.

Fall 2012: An informal CCR was submitted for catalog and curriculum sheet changes as a result of the Engineering Program Submittal to the US Coast Guard outlining our plan for compliance with STCW 1995 as amended in 2010.

Equipment and Facilities



Figure 1 – Campus of California Maritime Academy

There have been several significant capital improvements to the program since the last general review. The California Maritime Academy Campus in the foreground is shown with the Training Ship Golden Bear in the background in Figure 1 – Campus of California Maritime Academy.

Beginning in 2008 the equipment in our machine shop courses has been undergoing a refresh process. Since that time, 14 of 19 engine lathes have been replaced with identical new machines. This has significantly improved the reliability of machinery, accuracy of projects and lowered costs associated with operation and maintenance for this equipment. In 2009, a new surface grinder was added to our available equipment. In 2011, an industrial contour band saw was obtained. In 2013, an industrial CNC lathe and an industrial CNC mill were added to our equipment. Each of these assets has been successfully integrated into the academic fabric of the manufacturing process courses.

Similarly, our weld shop continues to be refreshed with new plasma cutters, new SMAW, MIG and TIG welders in association with our Miller Electric Manufacturing Company upgrade agreement. In 2013, a new CNC plasma table was added and it has been incorporated into our advanced welding course.

Aboard the Training Ship Golden Bear shown in Figure 2 – California Maritime Academy's Training Ship Golden Bear, there have been several capital improvements including:

1. 16 new laboratory work stations to support instructional activities.
2. Addition of practical equipment for dissection and reassembly including gasoline engines, diesel engines, hydraulic controls, centrifugal pumps, positive displacement pumps and heat exchangers.
3. Enhancement of existing hydraulic trainer.
4. Custom designed and constructed refrigeration trainer.
5. Construction of a shipboard electrical laboratory that includes motor controller trainers, motor trainers and instrumentation.
6. Industrial automation laboratory.
7. Creation of new diesel engine dissection laboratory including four identical diesel engines with additional spares, engine stands and all tools required for disassembly and reassembly.
8. Diesel simulator was added in spring, 2013 at a cost of \$113,000.



Figure 2 – California Maritime Academy's Training Ship Golden Bear

C. Options

There are no options for either the Marine Engineering Technology or the Facilities Engineering Technology programs.

D. Organizational Structure

The organization charts show the administrative structure supporting the Engineering Technology Programs at California Maritime Academy. The ET Department is administered by the Department Chair, and is one of five departments and one school at the Academy. Within the department, there is an individual program coordinator responsible for each of the unique programs. All Department Chairs report to the Academic Dean. The Academic Dean reports to the Provost (Figure 4 – Organizational Chart for Provost and Vice President of Academic Affairs), who reports to the President of the Academy (Figure 3 – Organizational Chart for President). As a campus of the CSU, CMA is administered by the Board of Trustees and the Chancellor of the CSU.

The President of the Academy also directly oversees Vice Presidents for the Administration and Finance, University Advancement and Student Affairs.

The California Maritime Academy Office of the President Organization Chart

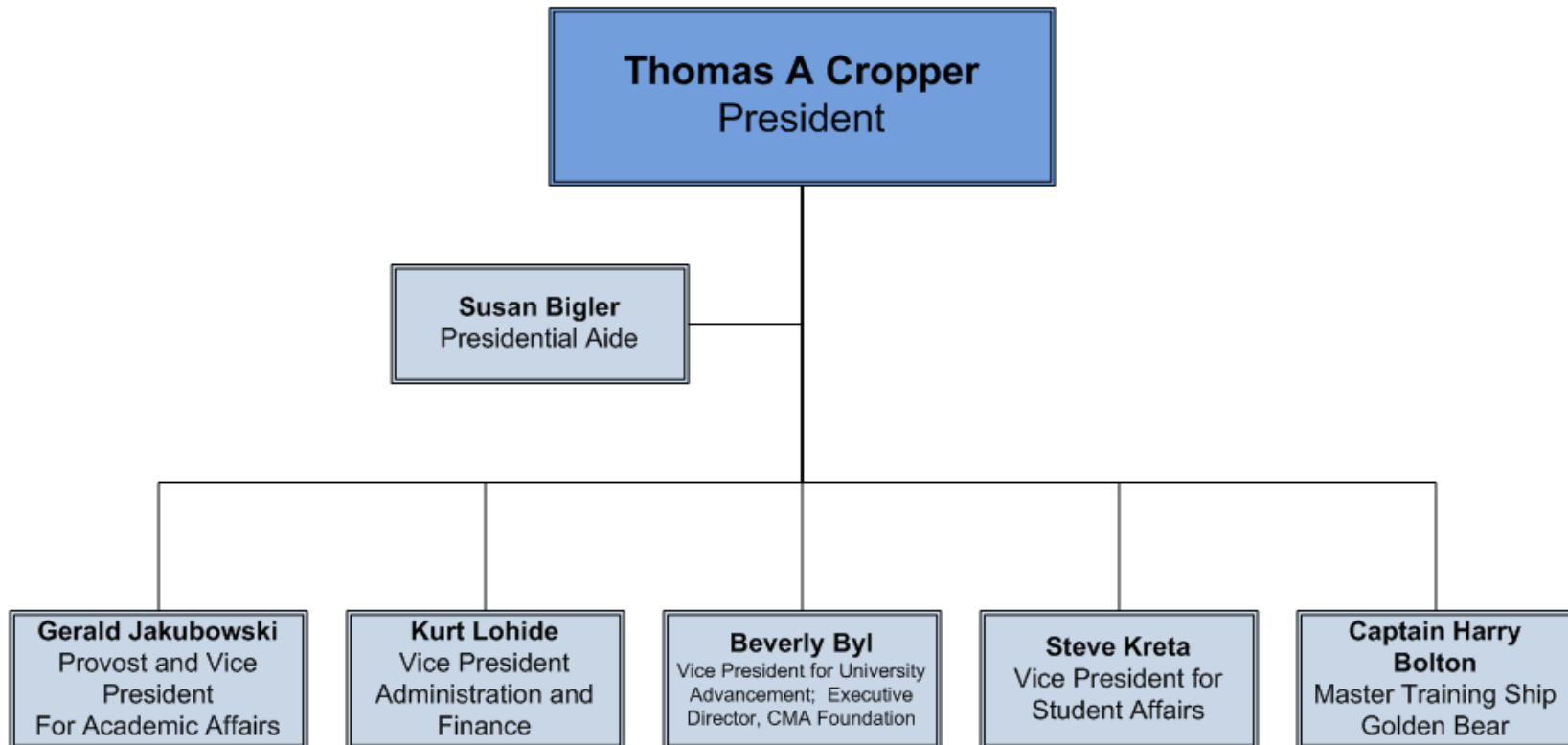


Figure 3 – Organizational Chart for President

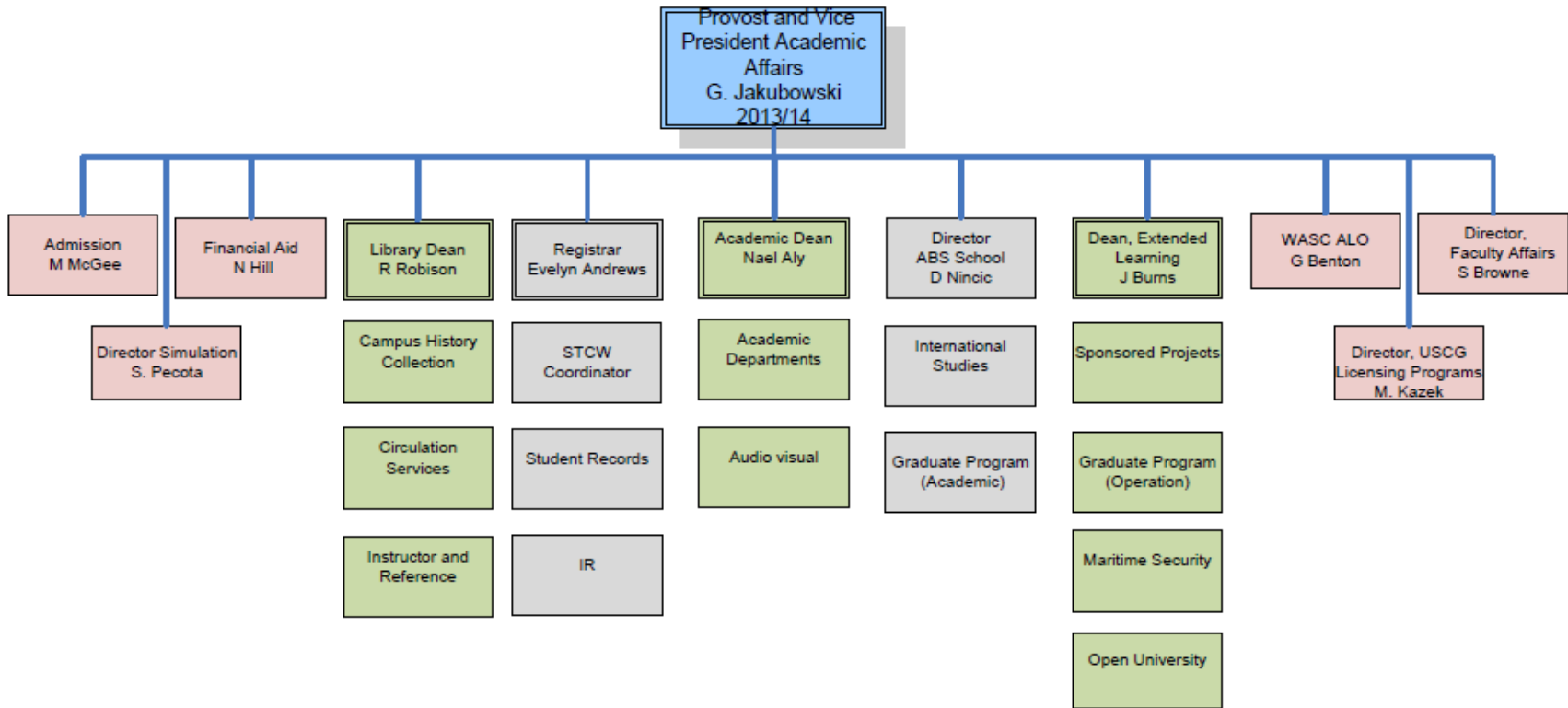


Figure 4 – Organizational Chart for Provost and Vice President of Academic Affairs

Organization Chart Administration and Finance

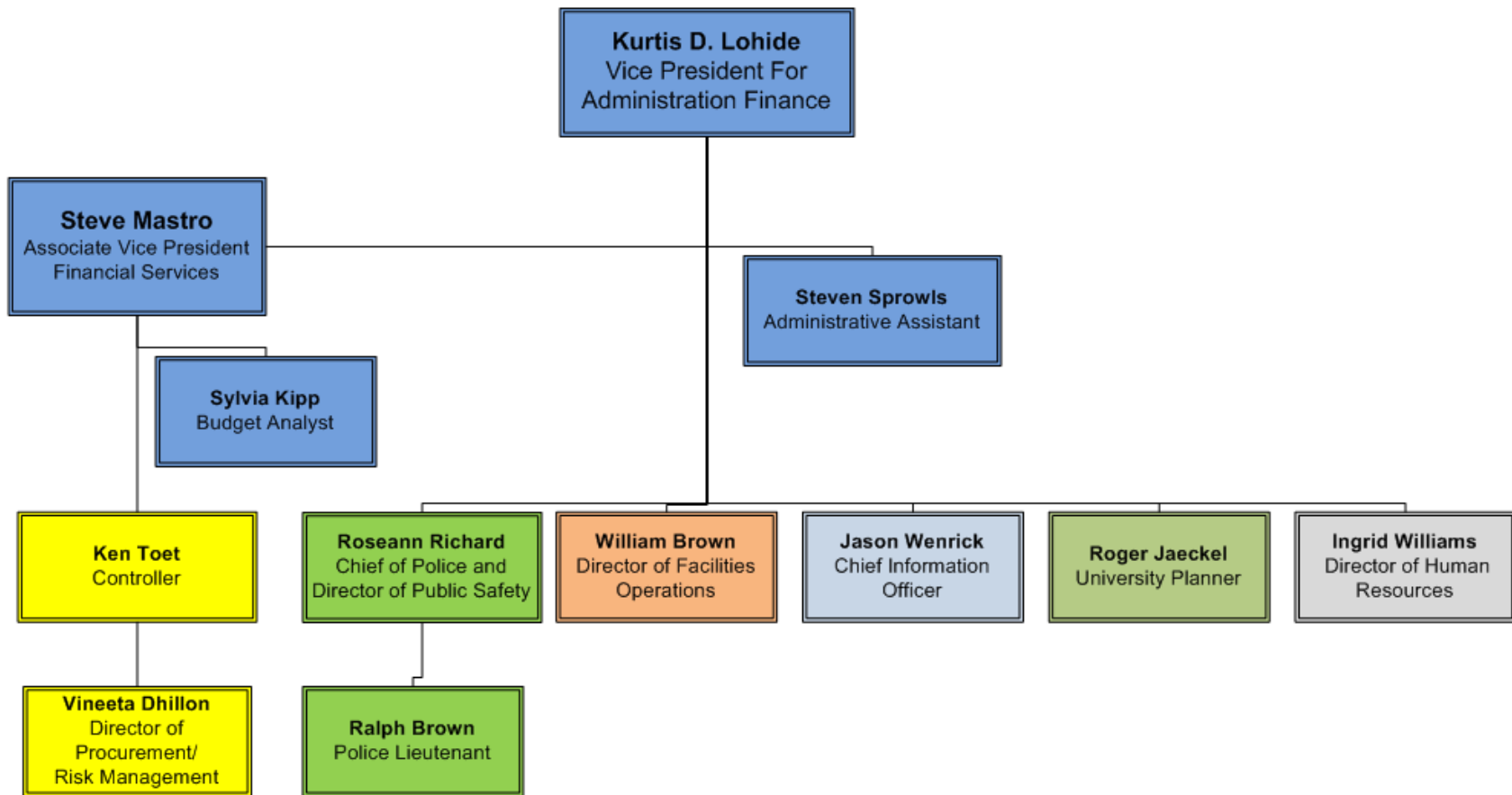


Figure 5 – Organizational Chart for Vice President for Administration & Finance

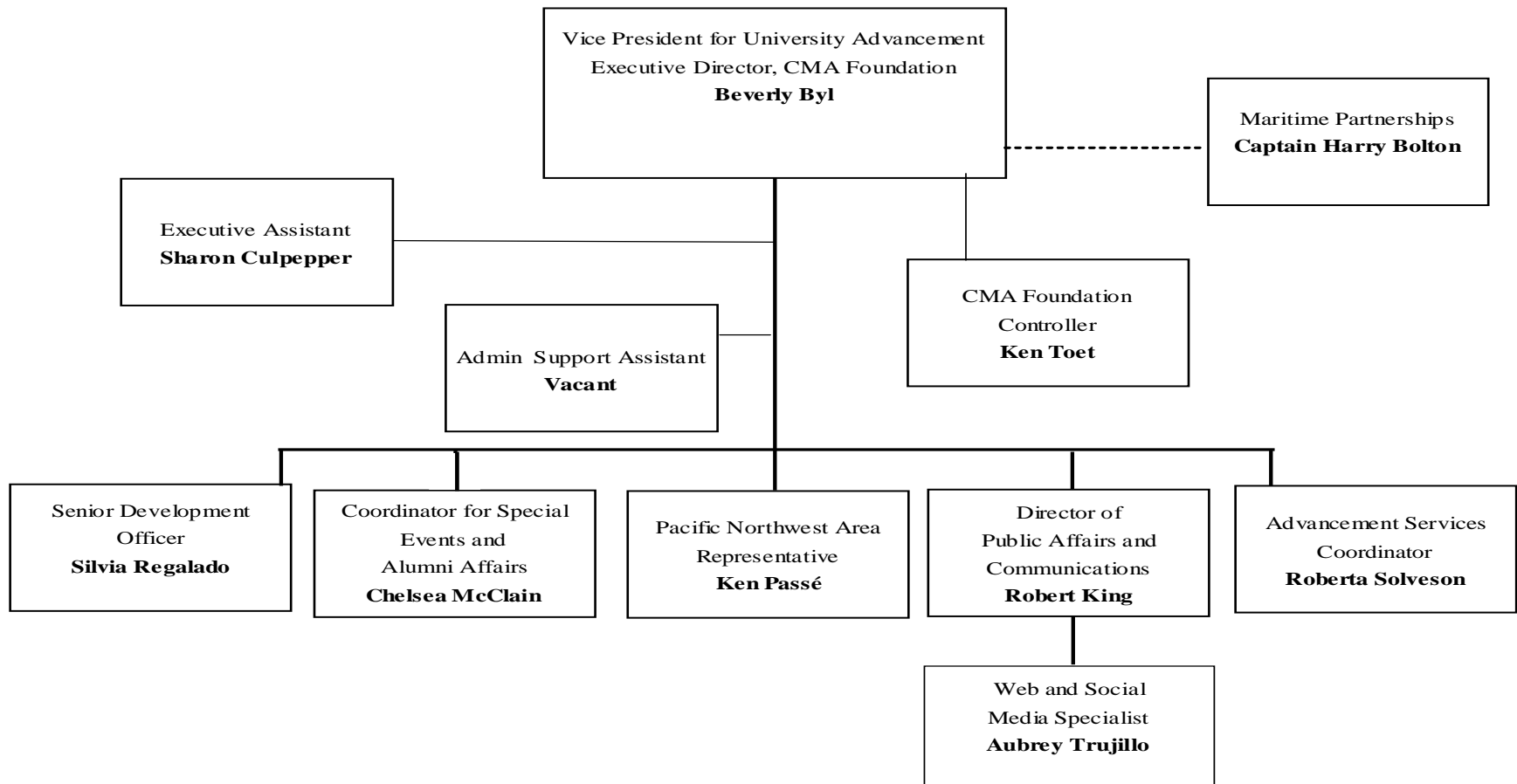


Figure 6 – Organizational Chart for Vice President for University Advancement

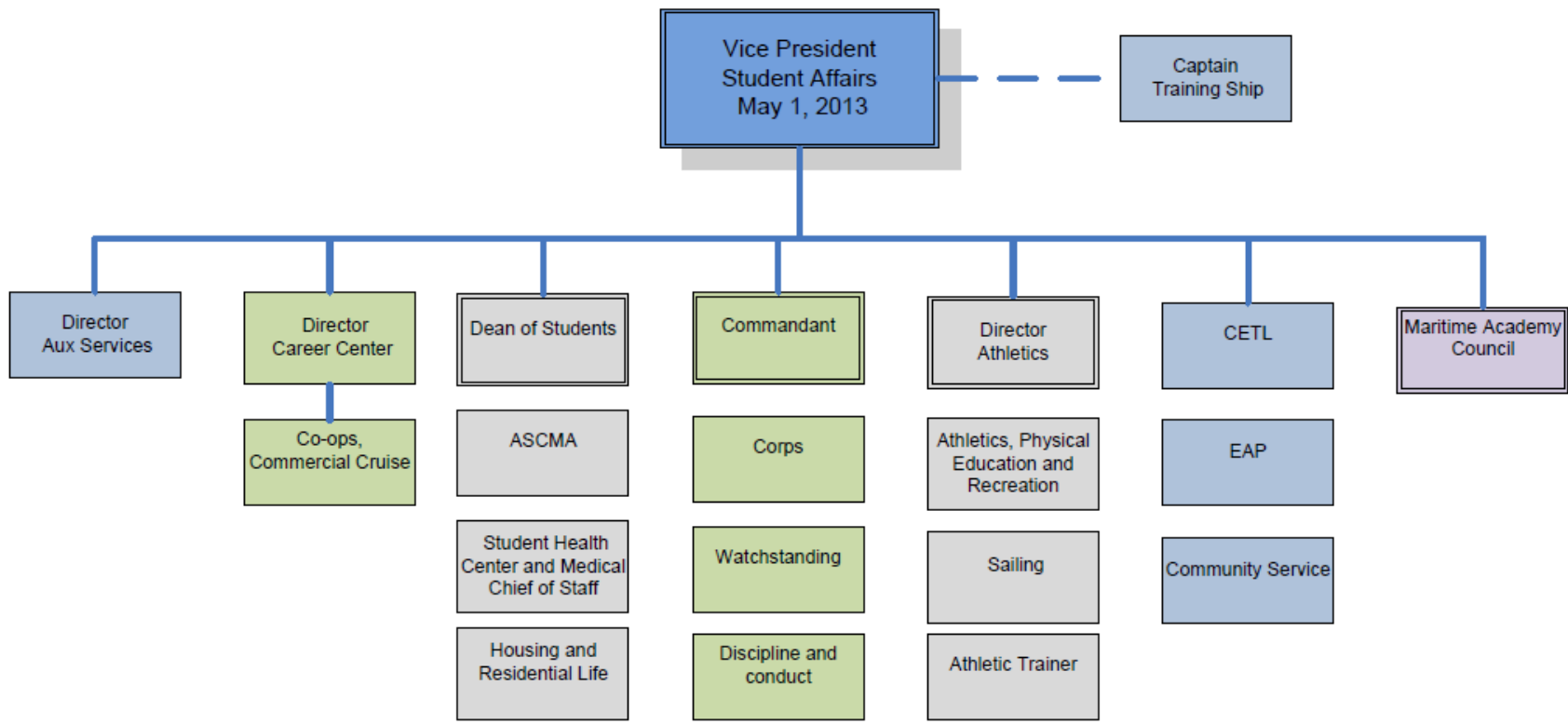


Figure 7 – Organizational Chart for Vice President of Student Affairs

E. Program Delivery Modes

During the academic year, the programs are very traditional with typical classroom and laboratory courses being delivered during the day, from Monday through Friday. There are occasional evening classes students may elect to take, but this is an exception rather than the norm. However, beginning in fall 2013, due to the increase in student population, more and more course sections are being offered in the evening hours.

Program content is delivered in standard classrooms and laboratories outfitted with appropriate equipment. Classroom courses generally have less than 40 students and laboratory courses have less than 24 students and most have maximum enrollments of 12 or less.

The vast majority of students enrolled at CMA are full-time students. First courses begin at 0700 and last classes are completed by 2150. Their experience is modeled after a typical full time engineering or technology student at a CSU campus. There are occasional, one-time certification courses that occur over weekends, but this typically amounts to less than five days throughout their CMA experience.

During the first three summers, MET students are required to spend eight weeks at sea, either sailing on the CMA training ship or on a commercial ship serving as part of the engineering watch, performing day work and completing maintenance as the ships visit various domestic and international ports. During this time the students follow the traditional engineering watch schedule typical on sea-going vessels.

During the summers following sophomore and junior years, FET students are required to spend eight weeks in industry experiencing industrial co-ops. During these co-ops, the students follow the service requirement of the host organization. A report is required at the end of each summer.

F. Program Locations

The majority of the programs' activities occur on the CMA campus. All academic work and all laboratories are taught at the campus in Vallejo, CA or on the training ship.

All ET students participate in a practical training cruise on the Training Ship Golden Bear (TSGB) during the summer between their freshmen and sophomore academic year. This activity includes 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, MET students participate on a 60-day commercial cruise on a commercial merchant marine vessel, traveling to any number of locations around the globe, and visiting both domestic and international ports. FET students participate in an eight-week co-op/internship experience at an off-campus industrial location.

During the summer between their junior and senior academic year, MET students participate as the leadership team of the 60-day practical training cruise on the TSGB as it travels to various domestic and international ports. FET students participate in a second eight week co-op/internship experience at an off-campus industrial location.

G. Deficiencies, Weaknesses or Concerns from Previous Review

The Final Statement of Accreditation to California Maritime Academy for the 2010-2011 Accreditation Cycle shows that there were no deficiencies, weaknesses, or unresolved concerns. However, weaknesses and concerns identified as a result of this study are outlined in Criterion 4.

H. Joint Accreditation

No joint accreditation is sought.

I. Acronyms Used in this Report

General

ABET – Accreditation Board for Engineering and Technology, Inc.

GPA – Grade Point Average

PEO – Program Educational Objectives

SLO – Student Learning Outcomes

STCW – Standards of Training, Certification and Watchkeeping for Seafarers

USCG – United States Coast Guard

WASC – Western Association of Schools and Colleges

University Specific

CMA – California Maritime Academy

CSU – California State University

ET – Engineering Technology

FET – Facilities Engineering Technology

IWSLO – Institution Wide Student Learning Outcome

MET – Marine Engineering Technology

TSGB – Training Ship Golden Bear

UC – University of California

CRITERION 1 – STUDENTS

A. Student Admissions

Admission criteria are consistent with policies of the 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 the required courses listed below.

The scholarship and test requirements are based on an eligibility index. The eligibility index is given 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 SAT Reasoning Test. ACT students multiply GPA by 200, then add ten times the ACT composite score to obtain the index.

- 1. $GPA \times 800 + \text{Combination of SAT Math and SAT Reading scores} = \text{SAT Index}$**
- 2. $GPA \times 200 + (\text{ACT composite} \times 10) = \text{ACT Index}$**

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.

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 1 year of U.S. History or 1 semester of U.S. History and 1 semester of Civics or American Government AND 1 year of Social Science)	2
b.	English (4 years of college preparatory English composition and literature)	4
c.	Math (4 years recommended) including Algebra I, Geometry, Algebra II, or higher mathematics (take one each year)	3
d.	Laboratory Science (including 1 biological science and 1 physical science)	2
e.	Language Other than English (2 years of the same language; American Sign Language is applicable)	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 recent entering student bodies of the ET department are represented in the tables given below. The admissions requirements have resulted in the following standardized testing distributions for the ET students entering the University for the last five years. This data is provided in Table 2 below.

Table 2 – Standards for ET Freshmen Admissions 2008-2012

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	
2008-2009	11	17.5	550	989	8	14	19	590	1009	29
2009-2010	19	19	1130	1150	3	14	18	710	956	25
2010-2011	-	-	1000	1103	4	15	21	610	1025	34
2011-2012	25	26.5	870	1034	6	16	21	730	990	33
2012-2013	23	26.5	810	1039	8	18	23	690	1050	47

The enrollment distribution for the same period is show below in Table 3 for FET majors and in Table 4 for MET majors.

Table 3 – FET Program Enrollment Trends for Past Five Academic Years

Term	Gender	Facilities Engineering Technology (FET-BS)				Facilities Engineering Technology (FET-OBS)			
		Full Time		Part Time		Full Time		Part Time	
		FTE Count	Student Term Count	FTE Count	Student Term Count	FTE Count	Student Term Count	FTE Count	Student Term Count
Fall 2008	Female (F)	3	3.367	2	1.034	1	1	0	0
Fall 2008	Male (M)	16	17.832	5	2.900	0	0	0	0
Spring 2009	Female (F)	5	7.534	1	0.267	1	1.600	0	0
Spring 2009	Male (M)	18	23.867	3	1.600	0	0	0	0
Fall 2009	Female (F)	3	3.201	1	0.400	0	0	0	0
Fall 2009	Male (M)	11	11.101	8	3.500	0	0	1	0.600
Spring 2010	Female (F)	1	1.667	0	0	0	0	0	0
Spring 2010	Male (M)	14	20.066	5	2.201	1	0.933	0	0
Fall 2010	Female (F)	2	2.567	0	0	0	0	0	0

Fall 2010	Male (M)	13	13.267	1	0.600	0	0	0	0
Spring 2011	Female (F)	2	1.934	0	0	1	2.122	0	0
Spring 2011	Male (M)	13	19.400	1	0.600	0	0	0	0
Fall 2011	Female (F)	0	0	1	0.667	0	0	0	0
Fall 2011	Male (M)	17	17.934	5	1.834	0	0	0	0
Spring 2012	Female (F)	1	0.800	0	0	0	0	0	0
Spring 2012	Male (M)	20	28.399	0	0	0	0	0	0
Fall 2012	Female (F)	1	1.167	0	0	0	0	0	0
Fall 2012	Male (M)	28	28.768	1	0.600	0	0	0	0
Spring 2013	Female (F)	2	3.200	0	0	0	0	0	0
Spring 2013	Male (M)	36	49.601	1	0.400	0	0	0	0

Table 4 – MET Program Enrollment Trends for Past Five Academic Years

Term	Gender	Marine Engineering Technology (MET-BS)				Marine Engineering Technology (MET-OBS)			
		Full Time		Part Time		Full Time		Part Time	
		FTE Count	Student Term Count	FTE Count	Student Term Count	FTE Count	Student Term Count	FTE Count	Student Term Count
Fall 2008	Female (F)	14	15.035	2	1.266	1	1.133	0	0
Fall 2008	Male (M)	104	110.672	19	11.334	2	1.967	0	0
Spring 2009	Female (F)	18	31.268	1	0.600	1	1.533	0	0
Spring 2009	Male (M)	112	173.808	7	4.068	1	1.467	0	0
Fall 2009	Female (F)	19	19.934	3	1.733	0	0	0	0
Fall 2009	Male (M)	114	121.134	17	8.834	2	1.966	0	0
Spring 2010	Female (F)	20	29.335	0	0	0	0	0	0
Spring 2010	Male (M)	120	178.800	3	1.733	2	3.200	0	0
Fall 2010	Female (F)	12	12.167	3	1.533	0	0	0	0
Fall 2010	Male (M)	114	122.772	30	16.668	2	2.200	0	0
Spring 2011	Female (F)	11	14.401	1	0.667	0	0	0	0
Spring 2011	Male (M)	126	188.400	7	4.068	2	3	0	0
Fall 2011	Female (F)	13	13.066	3	1.900	0	0	0	0
Fall 2011	Male (M)	124	132.269	21	11.932	2	1.900	0	0
Spring 2012	Female (F)	16	22.2	1	0.667			0	0
Spring 2012	Male (M)	130	189.200	7	3.333	2	2.800	0	0
Fall 2012	Female (F)	15	15.535	0	0	0	0	0	0
Fall 2012	Male (M)	164	175.535	18	11.332	2	2.200	0	0
Spring 2013	Female (F)	15	22.201	0	0	0	0	0	0
Spring 2013	Male (M)	159	235.130	10	5.532	2	2.533	0	0

Evaluating Student Performance

Once enrolled on campus, students are evaluated on a course-by-course basis. The evaluation method is based on the grading policy described in the course syllabus. The campus course syllabus and the ABET course syllabus are part of each Course Portfolio which will be presented to the ABET evaluators at the time of the visit. Course Objectives and Course Outcomes are defined on the ABET Course Syllabus and are linked to the Program Educational Objectives (PEO) and the Student Learning Outcomes (SLO). In addition, the Performance Criteria part of the syllabus show the various methods where student performance is evaluated. These methods include, but are not limited to: Homework, Quizzes, Midterm Exams, Final Exams, Midterm Reports or Projects, Final Reports, Projects or Presentations, Student Evaluations of Instructor and Course, and the Instructor Class Assessments. The last three methods are part of the SLO evaluation process as part of our overall assessment system that will be described later in the report.

The SLO evaluation process also includes tools such as Course Portfolios, U.S. Domestic Licensure exam performance, and assessment plans for MET / FET educational and student learning outcomes. The detailed process for each of these tools will be described later in the report under Criterion 4. These assessment tools are designed to measure the degree to which SLOs are achieved. A brief description of each of these tools is discussed below.

Course Portfolios include both Course and ABET Syllabi, Student Evaluations of the Instructor and Course, and Instructor Class Assessments. The syllabus shows the Course Objectives and the Student Outcomes and how they are linked to the PEOs and SLOs. In addition, samples of student works including homework, quiz, exams, reports and projects are included in the portfolios that allow examination of the content, depth, and breadth of the topics covered in the course.

Cruise and Co-op reports are required of all students participating in the Training Cruises, Commercial Cruise and Co-op activities. These activities are an integral part of the two Engineering Technology Options, Marine Engineering Technology (MET) and Facilities Engineering Technology (FET) and provide opportunities for our students to gain experiences in communication, teamwork, multidisciplinary engineering group decision-making, analysis, hands-on applications, and design skills. Students are evaluated in the acquisition of these skills by their supervisors. Samples of reports and evaluations will be made available to the visiting team.

The Registrar's Office monitors and records student performance and progress through the PeopleSoft Enterprise Student Administration software package. The software allows students to register for, add, or drop courses, and to monitor their grade point average (GPA). In addition, the software provides degree progress reports from which students and advisors can monitor students' progress through the program. 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 in the core FET and MET programs).

Students with an overall or campus cumulative GPA of less than 2.0 are placed on academic probation, in which case they are required to take a maximum of 15 units in consultation with their academic advisors to improve their GPA. In the probationary period students must:

- Repeat all specific courses in which a grade of either “D” or “F” was previously earned.
- They must complete a minimum of 12 units with no grades of “F”
- They must earn a 2.00 semester grade point average or raise their cumulative grade point averages 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 is the circumstance in which 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.

CMA will 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 repeating a course at another accredited college are expected to adhere to CMA’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 CMA 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 academic dean if they feel that there are extenuating circumstances that contributed to poor academic performance. This appeal must be made within ten days of the notification of academic disqualification. Appeals will be reviewed by the academic dean and the department chair within ten days of receipt of the appeal.

Students that are academically disqualified may 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 encouraged to notify the academic dean of any student in danger

of failing a course. 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. 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 Tau Alpha Pi (Engineering Technology Honor Society).

The description and requirements of the above programs can be found in the Cal Maritime Undergraduate catalog under Academic Regulations and Policies.

B. Transfer Students and Transfer Courses

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 enters CMA with 30 or more semester units. Because of the special nature of our program, transfer students often still require four years at CMA to graduate, particularly in the MET option. This is due to international Standards of Training, Certification and Watchkeeping (STCW) for Seafarers and United States Coast Guard (USCG) domestic licensure requirements as outlined in Title 46, Code of Federal Regulations. The number of transfer students in ET programs is given in Table 5 below.

Table 5 – Transfer Students for Past Five Academic Years

Fall Terms	Facilities Engineering Technology (FET-BS)	Facilities Engineering Technology (FET-OBS)	Marine Engineering Technology (MET-BS)	Marine Engineering Technology (MET-OBS)
	Distinct Students	Distinct Students	Distinct Students	Distinct Students
Fall 2008	1	0	11	1
Fall 2009	3	0	23	1
Fall 2010	3	0	16	0
Fall 2011	2	0	12	1
Fall 2012	3	0	17	0

C. Advising and Career Guidance

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 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 as 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.

The incoming freshman students are given the FET and MET 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, developed by the ET department, visually shows the pre-requisite framework of the program and is shared with students in ET 110 and during individual advising to help them determine critical paths for their academic goals. This roadmap is also posted near the academic advisor offices.

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.

The Career Development Center continues to be a great asset to our engineering students by assisting engineering students in finding full time jobs and summer internships. There is a dedicated shore side Assistant Director and a sea going Assistant Director which has added great value to the engineering technology programs. 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 cruise ship etiquette
- One-on-one job search counseling
- Mock, video-taped interviews

The Career Development Center at Cal Maritime assists graduating seniors in their job search. Through exit interviews, the Center also gathers statistics for use in program assessments to evaluate the competency of Academy graduates in discipline-specific, maritime-related fields. Graduate placement data is discussed in Criterion 4.

D. Work in Lieu of Courses

Cal Maritime students have very few options to receive credit in lieu of a course. The two options available are credit by examination, and challenging a particular course. Many courses that contain international STCW assessments 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 and / or USCG domestic licensure 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).

E. Graduation Requirements

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

Cal Maritime utilizes PeopleSoft which is the common management system used by the CSU 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 Requirements Report.

The student, academic advisors and academic administrators can access the academic requirements 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 CMA
3. All core FET or MET 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.

FET students are required to take an exam to obtain a Certified Plant Engineer-In Training Certificate. MET students must pass the US Coast Guard Third Assistant Engineer license exam to obtain their degree.

All ET students successfully completing ET 342 – Refrigeration and Air Conditioning are eligible to take a written exam for professional certification as an EPA Universal Technician.

Table 6 – Graduates for Past Five Academic Years

Graduation Term	Distinct Graduates-FET BS	Distinct Graduates-FET OBS	Distinct Graduates-MET BS	Distinct Graduates-MET OBS
Spring 2008	3	0	31	0

Summer 2008	0	0	0	0
Fall 2008	0	0	2	0
Spring 2009	5	0	18	1
Summer 2009	0	0	1	0
Fall 2009	1	0	3	0
Spring 2010	4	1	31	0
Summer 2010	0	0	1	0
Fall 2010	0	0	0	0
Spring 2011	1	0	17	1
Summer 2011	1	0	4	0
Fall 2011	1	0	4	0
Spring 2012	1	0	23	0
Summer 2012	0	0	5	0
Fall 2012	0	0	0	0
Spring 2013	1	0	24	1
Grand Total	18	1	164	3

F. Transcripts of Recent Graduates

The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. **These transcripts will be provided when requested separately by the team chair**

At CMA, the quality of a student's work is measured by a system of grades utilizing the traditional A–F, CR/NC grading system. CMA uses a standard 4.0 GPA calculation system. Table 6 – Grade Points Awarded for Letter Grades show grade points with the associated letter grade. Grade point averages are determined by dividing the total number of weighted grade points earned in the semester by the total number of graded units attempted in the semester. A weighted grade point is determined by multiplying the grade points earned in the course by the number of units in the course. CR/NC units are not used in GPA calculations.

Table 6 – Grade Points Awarded for Letter Grades

Grade Award	Grade Points	Grade Award	Grade Points
A, A+	4.0	C	2.0
A-	3.7	C-	1.7
B+	3.3	D+	1.3
B	3.0	D	1.0
B-	2.7	D-	0.7
C+	2.3	F	0.0

CRITERION 2 – PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Cal Maritime’s vision 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 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 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 purposes as an organization. Our educational community subscribes to the following statement of what we will do. 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.

The California Maritime Academy Compass Points

Cal Maritime uses the four compass points to symbolize the four key elements stated in the first bullet of our Mission Statement, i.e., intellectual learning, applied technology, leadership development, and global awareness.

Intellectual learning begins with the acquisition of data and culminates in analysis, synthesis, and evaluation. The initial stage is the acquisition of key facts, terms, precepts, and methodologies in a discipline. When these are synthesized, internalized, and integrated, the learner is able to construct a conceptual framework of the field, then reason about new situations. One who has mastered such a process will be able to solve problems, apply and evaluate theories, and construct new and meaningful syntheses from facts within the field. The levels of mastery involved in this process will differ according to the student’s level of

development. The beginning student learns key facts and theories. The intermediate student applies this knowledge to ever more challenging problems.

Finally, the advanced student demonstrates the ability to think critically and learn independently, enabling him or her to acquire insights and accomplishments throughout life.

Applied Technology might be described as the use of direct experiential methods, both in classes and through immersion in professional environments, with the objective of learning the skills, techniques and attitudes appropriate to a student's chosen profession, particularly those aspects of a profession that are difficult to learn through traditional academic coursework. As expressed in Cal Maritime's mission statement, our intention is that Applied Technology augment, enrich and supplement traditional classroom lecture and discussion, which we categorize as "intellectual learning". The outcome of these activities consist of graduates who have enhanced professional abilities that allow them to work in industry in a wide variety of roles.

Leadership Development has been informed by the action-oriented, real-world demands of the maritime industry, into which the majority of our graduates have been launched. The campus recognizes that the traditional formulation of leadership -- developed as it was out of the merchant marine environment -- still holds a great deal of foundational significance and value even as it evolves to encompass all our students, regardless of major. Today, Cal Maritime's leadership development program has become much more intellectually robust and complex by acknowledging the equally vital, but often paradoxical relationship between "followership" and individual agency within an organization or system. The California State University's emphasis on cultivating critical thinking skills and ethics in its graduates has provided a vital inroad to more deeply defining effective leadership practices at Cal Maritime. Only active, goal-directed, yet flexible, fluid thinking will allow the Cal Maritime graduate to maintain a competitive edge while navigating their course toward the future.

Global Awareness is based on substantive and applicable knowledge of a wide range of international issues and cultural perspectives. In the international arena, this type of understanding includes a vast array of issues that can be broken down into broad categories that include international politics and economics, environmental and cultural awareness, and global dynamics. Numerous contemporary issues face the global community; many of which are having -- or will have -- significant implications for the greater maritime and transportation industries.

Issues range from environmental crises affecting all people to critical political, economic, and social problems that affect much of the world's population. Global dynamics refers to the understanding of how the world's complex political, economic, social, and technological systems interact and operate in conjunction with one another. The interdependence of the international community, and its impact on our students and their future, requires an awareness of global dynamics. Consistent with how we approach the other three points of the mission, Global Awareness at Cal Maritime insignificantly more than academic and classroom-based awareness of the issues facing the world today and the diversity of cultures of the greater society in which we live. Rather, we are committed to an understanding and

awareness of global issues that are experienced firsthand by all of our students – to this end; all students at Cal Maritime are required to spend time abroad as part of their education. This active, participatory and experiential approach to global awareness makes Cal Maritime unique among many institutions of higher education in the United States.

B. Program Educational Objectives

Facilities Engineering Technology

FET graduates of the California 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.

Marine Engineering Technology

MET graduates of the California 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 the maritime industry.
2. Graduates will have the knowledge and ability to operate and maintain systems or processes in the maritime industry.
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.

An additional program objective criterion for Marine Engineering Technology programs specified by the lead society are met and included in the program objectives stated previously.

- a. Graduates will have strengths in their knowledge of operations, maintenance, and manufacturing as well as being well prepared for design and management in marine engineering technology. These objectives are covered in PEO 1 and 2 above.

The FET and MET educational objectives are listed in Criterion 4.

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

The PEOs for both FET and MET graduates are consistent with the mission of CMA. Each of the programs provides graduates with the experience to be a functioning member and a leader in the transportation and related industries of the Pacific Rim and beyond.

The first bullet in the mission statement and the first PEO invoke the four ‘compass points’ of the California Maritime Academy: intellectual learning, applied technology, leadership development, and global awareness.

The second PEO is also parallel to the first and second mission bullet points in that both seek to create graduates who are the highest quality licensed officers and practicing professional engineers, facility operators, managers, and leaders.

The third PEO addresses the desire for graduates to meet the second and third mission bullet points. By providing leadership training, practice and implementation the graduates learn to be effective leaders and contributing team members.

The fourth PEO addresses the need for graduates to effectively communicate in different methods. This meets the requirement of the second bullet point that graduates must be prepared and qualified leaders and can communicate in those positions.

The final PEO discusses the need for global awareness, an understanding of ethical responsibility and a commitment to safety, quality and productivity. This also invokes the four ‘compass points’ and the first bullet point which includes leadership development and global awareness.

D. Program Constituencies

The ET program identifies its significant constituencies as its students, faculty, alumni, the engineering profession and prospective employers, and its External Advisory Board.

Based upon surveys and contact between faculty and alumni, we find our ET graduates in a variety of fields. Many of the MET program graduates 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 to return to school for graduate study. FET students find a wide range of facilities employment ranging from basic building management to critical plant operation and maintenance. CMA 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, facility commissioning, facility management and operation, engineering and engineering services.

Our External Advisory Board (EAB) seeks to include this constituency in our assessment and improvement process. The EAB includes representation from industry, professional societies, and academia. The EAB meets twice a year: once in each semester. In addition, the office of career services hosts two career fair events at which employers, students, alumni and faculty can interact. Many of the EAB members attend as representatives of their respective companies, societies and organizations.

The PEOs meet the needs of our constituencies by defining qualities of successful engineers. Our constituency is divided into groups (such as students and faculty) that want our students to become successful engineers, as well as groups (such as the EAB, the engineering profession and employers) that require successful engineers to further their own aims. 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 Revision of the Program Educational Objectives

The current PEOs were presented and approved by the EAB and the administration in 2009. They were reviewed by the EAB again in 2011. Minor changes to the PEOs were reviewed by the EAB in fall 2012.

The PEOs are published in the official school catalog and on the school website. 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 EAB in various forms such as surveys.

Annually during the President's Retreat, the campus President and his staff (Vice-Presidents and Deans), faculty representation from the department chair, and the Academic Senate Executive Committee members gather to discuss and exchange views as to the direction that the Academy is going and the challenges ahead. This allows an opportunity for faculty and administrators to review the mission of the Academy, and therefore, provides an opportunity for the ET department to review its PEOs.

Alumni input regarding PEOs is solicited and documented through periodic alumni surveys. These surveys seek not only to find if our alumni believe that they are meeting our objectives, but also how important they consider each outcome has been to them, and if there

might be objectives that we did not include that we should have or that objectives need to be adjusted to address changes in the environment. The results of the alumni, co-op employers and employer surveys are included in the report under Criterion 4.

Input from the various constituencies is reviewed annually at a department retreat held prior to the beginning of the academic year. Objectives are reviewed in light of these constituent inputs and modifications are proposed if necessary. The retreat is documented by minutes. As a final step, the recommendations of the faculty for any changes to the PEOs are presented to the EAB for approval. Although approval has been the norm, any disapproval would lead to further faculty discussion. The review of PEOs by the EAB is documented in their meeting minutes.

CRITERION 3 – STUDENT OUTCOMES

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

Student outcomes are established using the mission of the institution using the metaphor used as the foundation for our institution, The Four Compass Points: Intellectual Learning, Applied Technology, Leadership Development, and Global Awareness. Additionally, the outcomes are defined to successfully reach our Program Educational Objectives, as well as from the outcomes criteria for accreditation of engineering technology programs directives.

Student outcomes are reviewed by the members of the faculty on a regular basis to assure they are, (a) continuing to meet the needs of all the stakeholders and (b) remaining in compliance with all accreditation, licensing and governmental agency requirements. Each outcome is reviewed individually by all members of the faculty and they are given an opportunity to suggest enhancements or changes. Additionally, other stakeholders, including industrial advisors and employer input are included in the process. Once an enhancement or change is formulated, both the faculty and the industrial advisory board are asked to confirm acceptance of the change. If accepted by both the faculty and the industrial advisory board, the change of the student outcome is implemented.

B. Student Outcomes

List the student outcomes for the program and describe their mapping to those in Criterion 3 and any applicable program criteria. Indicate where the student outcomes are documented.

Facilities Engineering Technology

Graduates of Facility Engineering Technology program will have:

1. a mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology
2. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology to problems associated with facilities equipment and systems
3. an ability to use proper laboratory practices, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improve processes and design
4. an ability to apply creativity in the design of systems, components or processes in the facilities environment
5. an ability to function effectively on teams
6. an ability to apply the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics and energy systems to technical problems related to facilities equipment, systems and structures
7. an ability to communicate effectively in a technical environment
8. a recognition of the need for and an ability to engage in lifelong learning including the need for updating technical knowledge and skills

9. an ability to understand and apply concepts of professional, ethical and social responsibilities
10. a respect for diversity and a knowledge of contemporary professional, societal and global issues
11. a commitment to quality, safety, timeliness and continuous improvement
12. an ability to receive the certification as Certified Plant Engineer in Training
13. an ability to engage in the operation, maintenance, analyses and management of modern facilities including power plants, HVAC and energy conservation
14. an ability to perform economic analyses and industrial operations planning including managing technical projects involving scheduling and cost analysis
15. a knowledge to manage technical projects involving manufacturing for schedules, costs and quality assurance

Marine Engineering Technology

Graduates of Marine Engineering Technology program will have:

1. a mastery of the knowledge, techniques, skills and modern tools of marine engineering technology
2. an ability to apply current knowledge and adapt to emerging application of mathematics, science, engineering and technology to problems associated with marine equipment, systems and vehicles
3. an ability to use proper laboratory practices, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improves processes and design
4. an ability to apply creatively in design of systems, components or professes in the marine environment
5. an ability to function effectively on teams
6. an ability to apply the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics and energy systems to technical problems related to marine equipment, systems and vehicles
7. an ability to communicate effectively in a technical environment
8. a recognition of the need for an and ability to engage in lifelong learning including the need for updating technical knowledge and skills
9. an ability to understand an apply concepts of professional, ethical and social responsibilities
10. a respect for diversity and a knowledge of contemporary professional, societal and global issues
11. a commitment to quality, safety, timeliness and continuous improvement
12. an ability to receive a USCG License as a Third Assistant Engineer
13. an ability to engage in the operations, maintenance, analysis and management of modern marine power plants, associated equipment and systems

Additional program outcome criteria for Marine Engineering Technology programs specified by the lead society are met and included in the student outcomes stated previously. These require that graduates of Marine Engineering Technology programs will have:

- a. a proficiency in applying the principles of college-level physics and chemistry to problems associated with marine equipment, systems and vehicles (covered in student outcome 2. above)
- b. a proficiency in applying the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics, and energy systems to marine equipment, systems and vehicles (covered in student outcome 6. above)
- c. a proficiency in the (a) use and application of instrumentation for measuring physical phenomena related to naval architecture and /or marine engineering technology, and (b) the design of experiments, data collection, analysis and formal report writing (covered in student outcome 3. above)
- d. a proficiency in the operation, maintenance, analysis and management of modern marine power plants and associated marine auxiliary equipment and systems including the use of design manuals, material/equipment specifications, and industry regulations applicable to marine engineering technology (covered in student outcome 13 above)

C. Relationship of Student Outcomes to Program Educational Objectives

The student outcomes are skills that students demonstrate through their coursework, commercial cruise and internships they participate in throughout the program. Through the application of these skills after graduation, it is expected that alumni will be able to meet our program objectives. The wording of the PEOs themselves, as well as CMA’s four compass points alludes to the student outcomes that support them as well as the concepts of “intellectual learning”, “applied technology”, “leadership development” and “global awareness”. Table 7 takes a more quantitative approach and maps the student outcomes back to the appropriate program educational objectives.

Table 7 – FET Student Learning Outcomes vs. Program Educational Objectives

Program Educational Objective	Facilities Engineering Technology Student Learning Outcomes														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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.	X	X	X	X		X						X	X	X	X

2. Graduates will have the knowledge and ability to operate and maintain systems or processes in large commercial, industrial, institutional and power generation facilities.	X	X	X	X	X	X	X		X		X	X	X	X	X
3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams					X		X		X	X			X		
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.					X		X	X	X						X
5. Graduates will demonstrate a respect for professional, ethical and social issues as well as a commitment to safety, quality and productivity.								X	X	X	X		X		

Table 8 – MET Student Learning Outcomes vs. Program Educational Objectives

Program Educational Objective	Marine Engineering Technology Student Learning Outcomes													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
1. Graduates will have the knowledge and ability to perform analysis, applications engineering, and system or process development in the maritime industry	X	X	X	X		X							X	X

2. Graduates will have the knowledge and ability to operate and maintain systems or processes in the maritime industry	X	X	X	X	X	X	X		X		X	X	X
3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams					X		X		X	X			X
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.					X		X	X	X				
5. Graduates will demonstrate a respect for professional, ethical and social issues as well as a commitment to safety, quality and productivity.								X	X	X	X		X

CRITERION 4 – CONTINUOUS IMPROVEMENT

A. Student Outcomes

The assessment of Student Learning Outcomes and how they correlate with Program Educational Objectives (PEOs) and Institutional Wide Student Learning Outcomes (IWSLO) has seen renewed emphasis over the past couple of years. The ABET, MET and CMA learning outcomes are aligned and presented in Appendix A to Criterion 4. The ABET, FET and CMA learning outcomes are aligned and presented in Appendix B to Criterion 4.

Table 9, MET Program Educational Objectives is the ET departments plan for assessing the PEOs outlined in Criteria 2. Note that while there are different assessment cycles (anywhere from one to five years) that are identified for each PEO, the PEO is evaluated in accordance with the plan set out in Table 10, MET Program Assessment Plan. For example, data is gathered annually in regards to the USCG Exit Exam, but the first educational objective is assessed in its entirety by the department on a two year cycle. The FET Program Educational Objectives are similar and are assessed as closely as possible and in conjunction with the MET plan.

Table 9 – MET Program Educational Objectives

Educational Objectives	Data Source(s)	Method(s) of Assessment	Length of Assessment Cycle (yrs)	Years of Data Collection	Target for Performance
1. Graduates will have the knowledge and ability to perform analysis, applications engineering, and system or process development in the maritime industry.	Employers and Graduates	Survey	2	2009-2013	Agreement (4.0) that SLOs are met
	Career Center	Placement	1	2009	90% Placed in MET related fields
	USCG	Exit Exam	1	2008 thru 2013	70% Pass
	USCG and MARAD	External Audit	5	2010	Program Compliance
	USCG and MARAD	Program Submittal	5	March 2013	Program Compliance
2. Graduates will have the knowledge and ability to operate and maintain systems or processes in the maritime industry.	Employers and Graduates	Survey	2	2009-2013	Agreement (4.0) that SLOs are met
	Career Center	Placement	1	2009	90% Placed in Field
	USCG and MARAD	External Audit	5	2010	Program Compliance
	USCG and MARAD	Program Submittal	5	March 2013	Program Compliance

3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams.	Employers and Graduates	Survey	2	2009-2013	Agreement (4.0) that SLOs are met
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.	Employers and Graduates	Survey	2	2009-2013	Agreement (4.0) that SLOs are met
5. Graduates will demonstrate a respect for professional, ethical, and social issues as well as a commitment to safety, quality and productivity.	Employers and Graduates	Survey	2	2009-2013	Agreement (4.0) that SLOs are met

A sample of the results from employee surveys for the first educational objective is shown in Figure 8, Employee Surveys, Educational Objective #1, Overall Average. The target average is 4 (Agree) out of a possible 5 (Strongly Agree). The department is weak in surveying alumni and has a plan to remedy this, although data will not be available for the ETAC visit. In addition, graduate placement data has not been obtained from our Career Center since 2009. This information is available and how employer surveys affect the other educational objectives will be provided for the ETAC visit in October 2013.

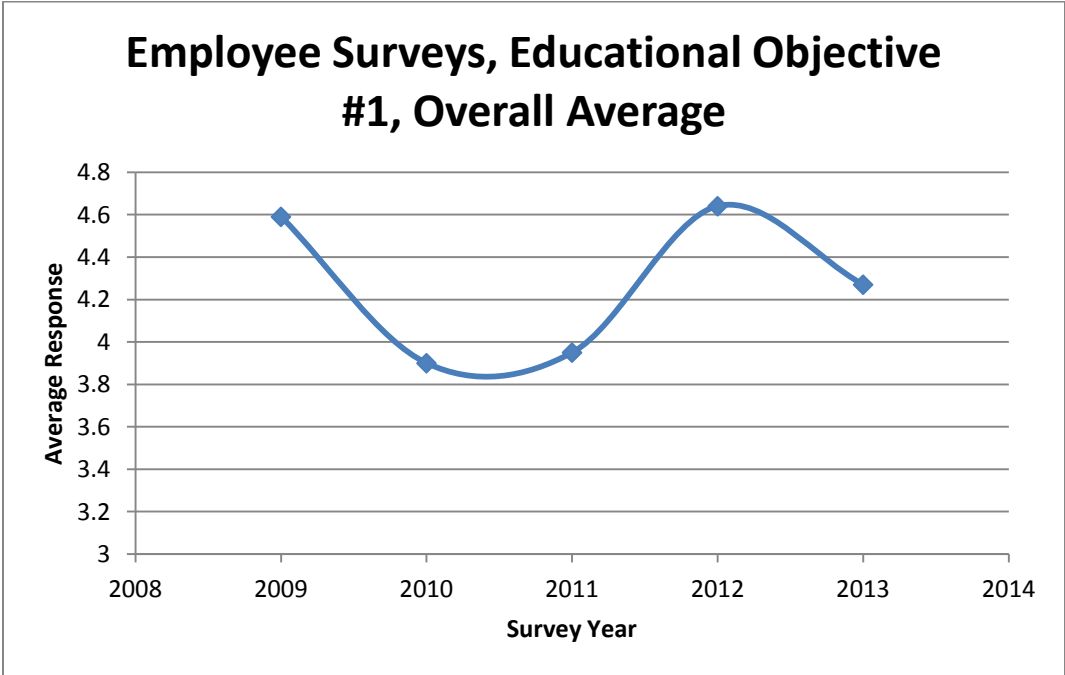


Figure 8 – Employee Surveys, Educational Objective #1, Overall Average

Figures 9-11 are examples of results of the US Coast Guard Exit Exam. The exit exam provides similar assessment measures to the Certified Plant Engineer in Training (CP-EIT) for the FET program and Fundamentals of Engineering Exam (FE) for the Mechanical Engineering program.

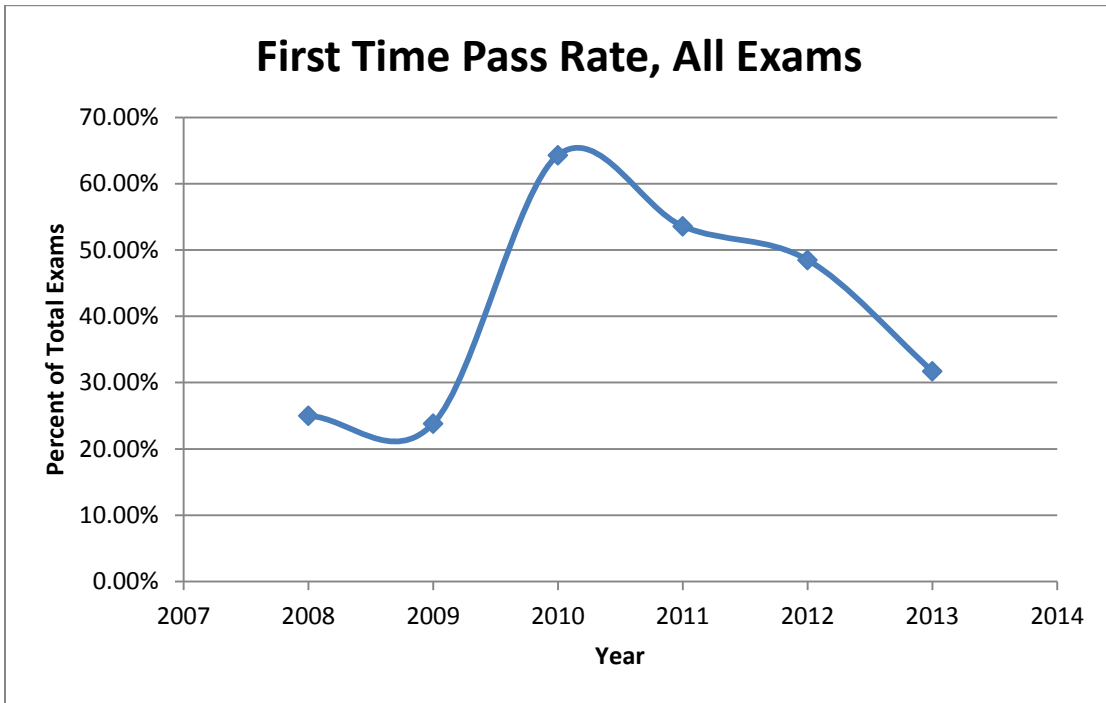


Figure 9 – USCG Exit Exam, First Time Pass Rates, All Exams

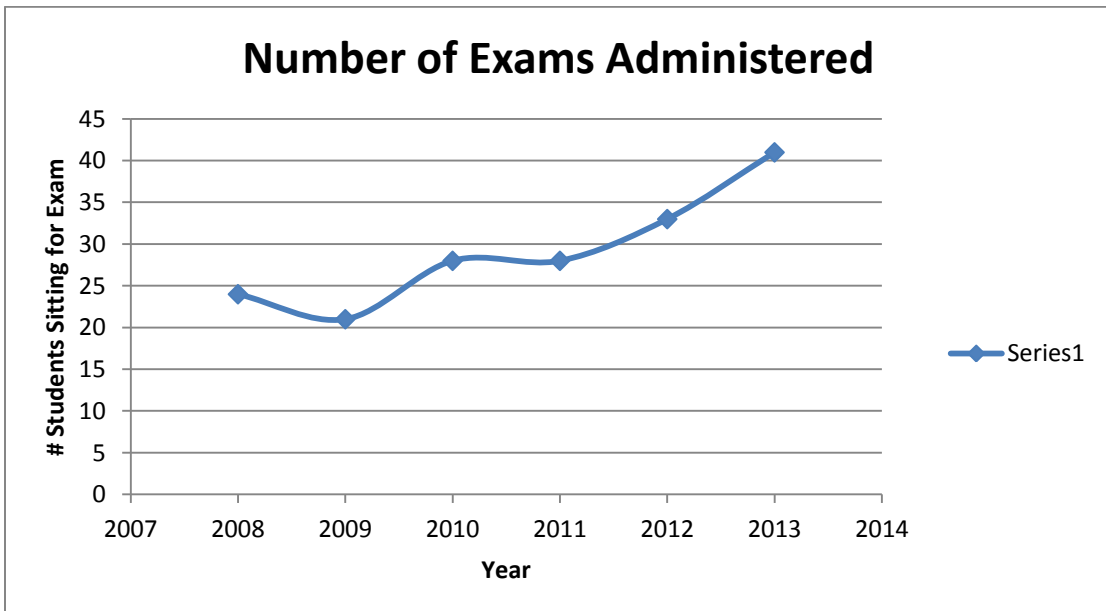


Figure 10 – USCG Exit Exam, Number of Exams Administered

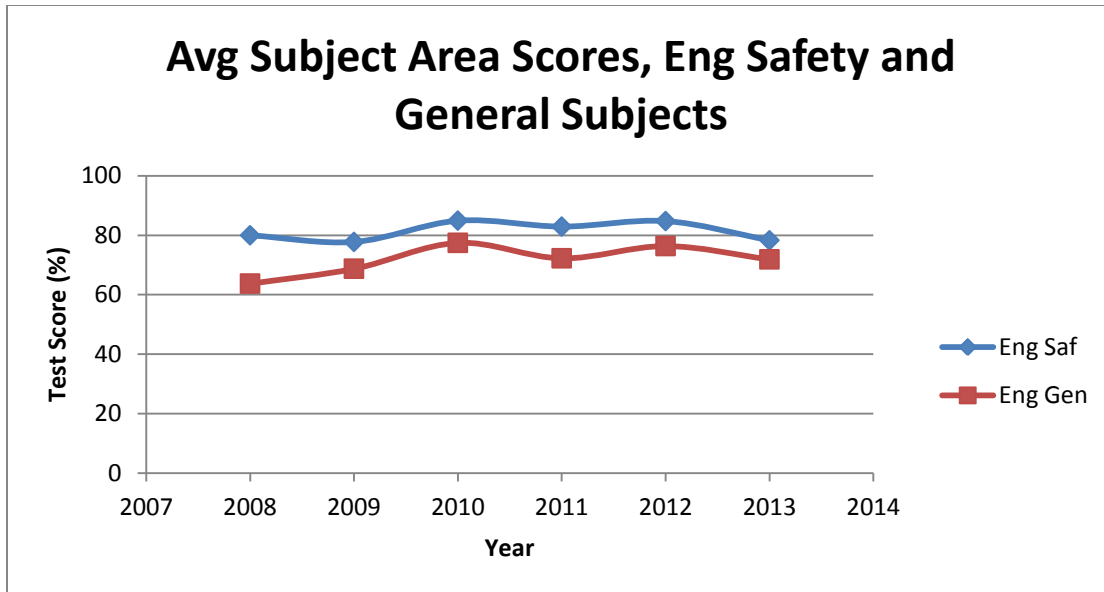


Figure 11 – Average Subject Area Scores, Engineering Safety and Engineering General Subject Areas

As outlined in Table 9, a minimum grade of 70% is required on each of the seven exams administered by the US Coast Guard. As can be seen from looking at Figure 11, this benchmark has been achieved in the two exam topics listed for the last four years. The other five subject areas all meet the minimum grade of 70% with the exception of electrical which has been at 69.3% and 69.7% for 2012 and 2013 respectively. Data tables and figures are available for the other five exams and will be included in the culture of evidence submitted for ETAC review in October.

Table 10, MET Program Assessment Plan is the ET departments plan for assessing the PEOs and SLOs outlined in Criteria 2 and Criteria 3. Since our last ETAC audit, the plan has been filled in for all SLOs and has been extended out for an additional six years until fall 2019. Three to four SLOs are assessed each semester. The FET Program Assessment Plan is similar in nature in regards to the plan for assessing SLOs, however, in the FET plan, there are two additional SLOs that are not in the MET plan, as can be seen in Appendix B to Criterion 4.

Table 10 – MET Program Assessment Plan

Educational Objectives	F-13	S-14	F-14	S-15	F-15	S-16	F-16	S-17	F-17	S-18	F-18	S-19	F-19
1. Graduates will have the knowledge and ability to perform analysis, applications engineering, and system or process development in the maritime industry.	X				X				X				X

Educational Objectives	F-13	S-14	F-14	S-15	F-15	S-16	F-16	S-17	F-17	S-18	F-18	S-19	F-19
2. Graduates will have the knowledge and ability to operate and maintain systems or processes in the maritime industry.	X				X				X				X
3. Graduates will have the knowledge and ability to function effectively as leaders on professional teams.	X				X				X				X
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.	X				X				X				X
5. Graduates will demonstrate a respect for professional, ethical, and social issues as well as a commitment to safety, quality and productivity.	X				X				X				X

Student Learning Outcomes	F-13	S-14	F-14	S-15	F-15	S-16	F-16	S-17	F-17	S-18	F-18	S-19	F-19
1. Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology		X				X				X			
2. Ability to apply current knowledge and adapt to emerging application of mathematics, science, engineering and technology to problems associated with marine equipment, systems and vehicles	X				X				X				X
3. Ability to use proper laboratory practices, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improve processes and design		X				X				X			

Student Learning Outcomes	F-13	S-14	F-14	S-15	F-15	S-16	F-16	S-17	F-17	S-18	F-18	S-19	F-19
4. Ability to apply creativity in the design of systems, components or processes in the marine environment				X				X				X	
5. Ability to function effectively on teams			X				X				X		
6. Ability to apply the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics and energy systems to technical problems related to marine equipment, systems and vehicles	X				X				X				X
7. Ability to communicate effectively in a technical environment		X				X				X			
8. Recognition of the need for and an ability to engage in lifelong learning including the need for updating technical knowledge and skills				X				X				X	
9. Ability to understand and apply concepts of professional, ethical and social responsibilities			X				X				X		
10. Respect for diversity and a knowledge of contemporary professional, societal and global issues		X				X				X			
11. Commitment to quality, safety, timeliness and continuous improvement				X				X				X	
12. Ability to receive a USCG License as a Third Assistant Engineer	X				X				X				X
13. Ability to engage in the operation, maintenance, analysis and management of modern marine power plants, associated equipment and systems			X				X				X		

Tables 11 and 12 are sample plans for showing how the ET department realizes the assessment of SLO 1 for the FET and MET programs. The assessment plans show the processes used to gather and assess the SLO, the frequency and how the results are documented and maintained. Each plan is a Microsoft Word document and a summary of progress and/or changes are included as text at the bottom of each table. The assessment coordinators have access through a

Moodle course to the learning outcomes and subsequent performance criteria. An example for SLO 3 is shown in part B of this criterion. Similar plans exist for the other SLOs and will be available for ETAC review during the October visit.

The expected goal and the extent of attainment for each SLO are weaknesses in the ET department. Reasons for these weaknesses, while not an excuse, are attributed to instructor turn-over and faculty workload as identified in Criterion 6, department chair turn-over, competing assessments (WASC and USCG) and student growth, both on campus and on cruise. Renewed emphasis and accountability to alleviate these weaknesses will be stressed to all ET faculty over the next assessment cycle.

Table 11 – FET Learning Outcome 1

FET Program Outcome 1: Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology.

Performance Criteria	Strategies	Assessment Method(s)	Source of Assessment	Time of Data Collection	Assessment Coordinator	Evaluation of Results
1. Demonstrated ability to use Technical and Operation and Maintenance manuals, material specifications and industry regulations	CEP 270 CEP 370 ENG 100 ENG 472 EPO 213 EPO 215/315 ET 230/230L EPO 319	Student and Instructor Surveys	CEP 270	Summer	M. Strange	ET License Faculty, Industrial Arts Faculty and FET Program Director
		Co-Op Employer Evaluations	CEP 270	Summer	M. Strange	
		Machining Project	EPO 315	Spring	S. Hitchcock	
2. Demonstrated ability to operate computer tools and automation systems	COM 220L ENG 100 EPQ 321 ET 370 ET 370L ET 400 ET 400L LIB 100	Quizzes, Exams and Lab Reports	ET 400L	Fall	J. Fischer	ET 321, ET 370L and ET 400L Instructors
3. Demonstrated ability to develop computer tools and automation systems	ET 370/370L ET 400/400L ET 460/460L	Project Evals	ENG 100 ET 370L ET 460L	Fall from ENG 100 Spring from ET 370L and ET 460L	J. Fischer	ENG 100 ET 370L and ET 460L Instructors

Table 12 – MET Learning Outcome 1

MET Program Outcome 1: Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology.

Performance Criteria	Strategies	Assessment Method(s)	Source of Assessment	Time of Data Collection	Assessment Coordinator	Evaluation of Results
1. Demonstrated ability to use Technical and Operation and Maintenance manuals, material specification and industry regulations	CRU 250 ENG 100 ENG 430 EPO 213 EPO 215 EPO 230L EPO 315 ET 230	Student and Instructor Surveys	CRU 250	Summer	R. Jackson	ET License Faculty and Industrial Arts Faculty
		Chief and 1-A/E Engineer Evaluations	CRU 250	Summer	R. Jackson	
		Machining Project	EPO 315	Spring	S. Hitchcock	
2. Demonstrated ability to operate computer tools and automation systems	COM 220L ENG 100 EPO 322L ET 370 ET 370L ET 400 ET 400L LIB 100	Quizzes, Exams and Lab Reports	ET 400L	Fall	J. Fischer	ET 322L , ET 370L and ET 400L Instructors
3. Demonstrated ability to develop computer tools and automation systems	CRU 350 ET 370/370L ET 460/460L	Project Eval	ENG 100 ET 370L ET 400L	Fall from ENG 100 Spring from ET 370L and ET 460L	J. Fischer	ENG 100 ET 370L and ET 460L Instructors
4. Demonstrated ability to use appropriate tools for fabrication and repair operations	STCW	CMAE 1-1A CMAE 1-1B CMAE 1-1C CMAE 1-1D CMAE 1-1E CMAE 1-1F	EPO 213	Fall & Spring	J. McCarthy	ET and Industrial Arts Faculty
		CMAE 1-6A CMAE 1-6B CMAE 1-6C CMAE 1-6D	EPO 215	Fall	S. Hitchcock	
		CMAE 3-4A	ET 250L	Fall	T. Mancilla	

B. Continuous Improvement

CMA had a Capacity and Preparatory Review (CPR) completed in 2009 and an Educational Effectiveness Review (EER) in 2011 by the Western Association of Schools and Colleges (WASC) that resulted in findings of strengths and weaknesses that were commensurate with the completion of this self-study. The portions of the CPR and EER completed by WASC that pertain to ET will be available for ETAC during the October visit. In summary, the WASC EER final report says

“The team concludes that CMA has an extensive set of programs to address its Applied Technology theme. The team further concludes that CMA needs to continue to improve on its initial efforts to measure the contribution of these programs to cadet learning, and to use those measurements for continuous improvement. (Criteria For Review 2.6, 2.7)”

In May 2012, the ET department was required to create a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis for education of the new CMA President. Some of the weaknesses addressed in this document pertain to assessment and indicate the department's self-awareness of areas that need improvement. The SWOT analysis is included as Appendix C to Criteria 4.

In addition to assessing our SLOs and how they tie-in with IWSLOs, the ET program underwent a comprehensive curriculum review culminating in a program submission to the US Coast Guard in March 2013. The comprehensive review indicated the plan necessary to assess and achieve compliance with STCW 1995 as amended in 2010. A copy of this report and applicable enclosures will be available in October for ETAC review.

The following curriculum changes occurred since the most recent review (these are also covered in Background Information):

Spring 2009: EPO 120 Marine Engineering Systems, EPO 120L Marine Engineering Systems Lab, and EPO 130 Auxiliary Machinery, were folded into EPO 125 Introduction to Marine Engineering for implementation fall 2009 for the class of 2013.

Spring 2011: ET 230 Properties of Materials and ET 332 Strengths of Materials were moved forward one semester in the sequence of the curriculum for implementation spring 2013 for the class of 2015. ET 230 was moved from fall of junior year to spring of sophomore year. ET 230L was left in the fall semester of junior year. ET 332 moved from spring of junior year to fall of junior year. There were three reasons for this modification:

1. Students' first exposure to Materials is in the semester they take ET 230. The laboratory component, ET 230L, requires a significant background in materials and is now in the subsequent semester. Spring 2013 and Fall 2013 will be the first semesters to assess this change. Moving the lecture allows the students to be more prepared for the laboratory component of the course.
2. Moving ET 230 to the sophomore year allows students to have earlier exposure to engineering content than in the previous case. This also balances the workload more evenly across the curriculum in students' sophomore year.
3. Moving ET 332 to the earlier semester balances the work load and curriculum more evenly across students' junior year.

Spring 2012: The content of COM 220 Programming Applications for Engineering Technology Majors was absorbed into the existing COM 220L Programming Applications for Engineering Technology Majors Lab for implementation fall 2013 for class of 2016. COM 220 was then deleted from the curriculum.

Spring 2012: EPO 125L Introduction to Marine Engineering Laboratory, effective fall 2012 for the class of 2016 was added to the ET curriculum to primarily return the content of EPO 120L under an academic setting rather than being administered through the Corps of Cadets training program. It is the ET department's opinion that the preparation work accomplished in EPO 125L is valuable to the success of CRU 150 Sea Training I. Students' performance in CRU 150, across both ET and ME programs is being assessed in summer 2013.

In regards to documentation of the assessment of SLOs, the following is an example showing the improvements made in ET 230L in support of SLO 3 and SLO 7.

February 26, 2009: Development of grading rubrics related to program learning outcomes was discussed. The ET Department has undertaken development of standardized grading rubrics for laboratory course work. Adoption to these rubrics will foster consistent course expectations and enable program-level assessment for Outcome 3. ET Faculty teaching laboratory courses (J. Fischer, M. Kazek, J. Massey, J. Rogers and M. Strange) will develop a grading standard for evaluating ET laboratory course work and adapt that standard to each of their courses.

September 29, 2009: ET Faculty teaching laboratory courses (J. Fischer, M. Kazek, T. Mancilla, J. Massey, J. Rogers and M. Strange) met to share sample laboratory reports, their grading rubrics, and observations from recent experiences using these assessment tools. A guide for the preparation of laboratory reports was prepared by M. Kazek and distributed to the faculty for review and comment in August 2009. The laboratory report grading rubric M. Kazek uses for evaluation of EPO 230L Properties of Materials Lab reports was included.

January 6, 2010: The ET Faculty reviewed and updated the performance criteria for FET Program Outcome 3, specified associated assessments and scheduled an evaluation of student performance for Spring Semester 2010 in conjunction with an assessment of MET Program Outcome 7.

April 1, 2010: ET Faculty teaching laboratory courses (J. Fischer, M. Kazek, T. Mader and M. Strange) met to discuss development of a system for gathering and collating data for evaluation of student matriculation throughout the sequence of engineering technology laboratory courses. Laboratory report grading rubrics were reviewed to relate the evaluation categories with the performance criteria for Program Outcomes 3 and 7. The next step is development of a computer-based record (spreadsheet) for collecting proficiency data on individual students as they progress through the laboratory course sequence.

Fall 2010: Added preparatory Moodle Quiz for each 230L lab to better prepare students for the execution of the lab. Initial assessment of this improvement indicates less time spent in lab on background and more time dedicated to conducting the lab. Not enough assessment data to indicate an improvement in understanding of the material through lab report write-ups.

September 2011: ET 230L rubric updated.

Fall 2012: New instructor (S. Hitchcock) took over instructing ET 230L. M. Kazek assisted with the first lab section of each week conducting the background portion and lab demonstration to ensure continuity of instruction throughout the other lab sections.

November 29, 2012, December 4, 2012 and December 6, 2012: Reviewed the Student Learning Outcomes (SLO) Matrix for the Marine and Facilities Engineering Technology Programs. These matrices define which courses cover each SLO and to what level taught (i.e. introduction,

reinforcement or advanced). The revised matrices were presented to the External Advisory Board (EAB) in early 2013 for comment.

June 2013: Validated information against the revised matrices reviewed in November and December 2012.

July 2, 2013: Deleted STCW assessment for performance criteria 2 based on USCG program review submittal dated March 2013.

Fall 2012: An informal CCR was submitted for catalog and curriculum sheet changes as a result of the Engineering Program Submittal to the US Coast Guard outlining our plan for compliance with STCW 1995 as amended in 2010.

Other areas for continuous improvement are identified in section A of this criterion.

C. Additional Information

Appendix A to Criterion 4, MET Learning Outcome Matrix

Appendix B to Criterion 4, FET Learning Outcome Matrix

Appendix C to Criterion 4, SWOT Analysis

Appendix A to Criterion 4, MET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Marine Engineering Technology	California Maritime Academy
a. an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline	1. Mastery of the knowledge, techniques, skills and modern tools of marine engineering technology	<u>Mastery of discipline specific skills in maritime related fields:</u> The ability to demonstrate competency in discipline specific skills
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology	2. Ability to apply current knowledge and adapt to emerging application of mathematics, science, engineering and technology to problems associated with marine equipment, systems and vehicles	<u>Critical and creative thinking:</u> The ability to comprehend, analyze and objectively evaluate new information and ideas, so as to develop informed opinions, and to explain things in a new or different way, often through synthesizing or applying intuition
c. an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes	3. Ability to use proper laboratory practices, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improve processes and design	
d. an ability to apply creativity in the design of systems, components, or processes appropriate to program educational objectives	4. Ability to apply creativity in the design of systems, components or processes in the marine environment	
e. an ability to function effectively on teams	5. Ability to function effectively on teams	
f. an ability to identify, analyze and solve technical problems	6. Ability to apply the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics and energy systems to technical problems related to marine equipment, systems and vehicles	<u>Problem solving and quantitative literacy:</u> The ability to exercise intellectual inquiry via the use of sound reasoning to identify, predict, analyze and solve problems, and to formulate, evaluate, and communicate conclusions and inferences from numerical information

Appendix A to Criterion 4, MET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Marine Engineering Technology	California Maritime Academy
g. an ability to communicate effectively	7. Ability to communicate effectively in a technical environment	<p><u>Communications</u>: The ability to coherently and persuasively share information with others via oral, written, visual and listening communication skills</p> <p><u>Information fluency and computing technology</u>: The ability to define a specific need for information, and to then locate, access, evaluate, and effectively apply the needed information to the problem at hand and to effectively use computers and computing applications in order to create, access, store, process, analyze and communicate information</p>
h. a recognition of the need for, and an ability to engage in lifelong learning	8. Recognition of the need for and an ability to engage in lifelong learning including the need for updating technical knowledge and skills	<p><u>Lifelong learning</u>: The ability to employ self-knowledge of the social and cognitive factors influencing the learning process, to engage in ongoing reflection and exploration of the purpose of personal development, and to synthesize and apply knowledge and experiences to new personal and professional applications</p>
i. an ability to understand professional ethical and social responsibilities	9. Ability to understand and apply concepts of professional, ethical and social responsibilities	<p><u>Professional conduct</u>: The ability to behave and perform in a manner that is accepted in one's profession and to move oneself continuously toward a goal or set of goals, despite personal difficulties, obstacles, and time constraints</p> <p><u>Ethical awareness</u>: The ability to apply standards of proper conduct and responsibility towards society in one's professional and personal life</p>

Appendix A to Criterion 4, MET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Marine Engineering Technology	California Maritime Academy
j. a respect for diversity and a knowledge of contemporary professional, societal and global issues	10. Respect for diversity and a knowledge of contemporary professional, societal and global issues	<p><u>Human development and the natural world:</u> The ability to demonstrate an understanding of fundamental concepts in the humanities, social, physical and life sciences</p> <p><u>Global stewardship:</u> The ability to demonstrate an awareness of diversity in global culture and environment, and an understanding of the responsibilities associated with promoting the welfare of state, country, whole of humanity, and planet</p>
k. a commitment to quality, timeliness, and continuous improvement	11. Commitment to quality, safety, timeliness and continuous improvement	
	12. Ability to receive a USCG License as a Third Assistant Engineer	
	13. Ability to engage in the operation, maintenance, analysis and management of modern marine power plants, associated equipment and systems	<p><u>Use of simulation tools:</u> Ability to use simulation tools in problem solving and analysis</p>

Appendix B to Criterion 4, FET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Facilities Engineering Technology	California Maritime Academy
a. an appropriate mastery of the knowledge, techniques, skills and modern tools of their discipline	1. Mastery of the knowledge, techniques, skills and modern tools of facilities engineering technology	<u>Mastery of discipline specific skills in maritime related fields:</u> The ability to demonstrate competency in discipline specific skills
b. an ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering, and technology	2. Ability to apply current knowledge and adapt to emerging application of mathematics, science, engineering and technology to problems associated with facilities equipment and systems	<u>Critical and creative thinking:</u> The ability to comprehend, analyze and objectively evaluate new information and ideas, so as to develop informed opinions, and to explain things in a new or different way, often through synthesizing or applying intuition
c. an ability to conduct, analyze and interpret experiments, and apply experimental results to improve processes	3. Ability to use proper laboratory practices, use instrumentation for measuring physical phenomena, analyze and interpret experiments and apply experimental results to improve processes and design	
d. an ability to apply creativity in the design of systems, components, or processes appropriate to program educational objectives	4. Ability to apply creativity in the design of systems, components or processes in the facilities environment	
e. an ability to function effectively on teams	5. Ability to function effectively on teams	
f. an ability to identify, analyze and solve technical problems	6. Ability to apply the principles of fluid mechanics, hydrostatic stability, solid mechanics, materials, dynamics and energy systems to technical problems related to facilities equipment, systems and structures	<u>Problem solving and quantitative literacy:</u> The ability to exercise intellectual inquiry via the use of sound reasoning to identify, predict, analyze and solve problems, and to formulate, evaluate, and communicate conclusions and inferences from numerical information

Appendix B to Criterion 4, FET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Facilities Engineering Technology	California Maritime Academy
g. an ability to communicate effectively	7. Ability to communicate effectively in a technical environment	<p><u>Communications:</u> The ability to coherently and persuasively share information with others via oral, written, visual and listening communication skills</p> <p><u>Information fluency and computing technology:</u> The ability to define a specific need for information, and to then locate, access, evaluate, and effectively apply the needed information to the problem at hand and to effectively use computers and computing applications in order to create, access, store, process, analyze and communicate information</p>
h. a recognition of the need for, and an ability to engage in lifelong learning	8. Recognition of the need for and an ability to engage in lifelong learning including the need for updating technical knowledge and skills	<p><u>Lifelong learning:</u> The ability to employ self-knowledge of the social and cognitive factors influencing the learning process, to engage in ongoing reflection and exploration of the purpose of personal development, and to synthesize and apply knowledge and experiences to new personal and professional applications</p>
i. an ability to understand professional ethical and social responsibilities	9. Ability to understand and apply concepts of professional, ethical and social responsibilities	<p><u>Professional conduct:</u> The ability to behave and perform in a manner that is accepted in one's profession and to move oneself continuously toward a goal or set of goals, despite personal difficulties, obstacles, and time constraints</p> <p><u>Ethical awareness:</u> The ability to apply standards of proper conduct and responsibility towards society in one's professional and personal life</p>

Appendix B to Criterion 4, FET Learning Outcome Matrix

Technology Accreditation Commission (ABET)	Facilities Engineering Technology	California Maritime Academy
j. a respect for diversity and a knowledge of contemporary professional, societal and global issues	10. Respect for diversity and a knowledge of contemporary professional, societal and global issues	<p><u>Human development and the natural world:</u> The ability to demonstrate an understanding of fundamental concepts in the humanities, social, physical and life sciences</p> <p><u>Global stewardship:</u> The ability to demonstrate an awareness of diversity in global culture and environment, and an understanding of the responsibilities associated with promoting the welfare of state, country, whole of humanity, and planet</p>
k. a commitment to quality, timeliness, and continuous improvement	11. Commitment to quality, safety, timeliness and continuous improvement	
	12. Ability to receive the certification as Certified Plant Engineer in Training	
	13. Ability to engage in the operation, maintenance, analysis and management of modern facilities including power plants, HVAC and energy conservation	
	14. The ability to perform economic analyses and industrial operations planning including managing technical projects involving scheduling and cost analysis	<p><u>Use of simulation tools:</u> Ability to use simulation tools in problem solving and analysis</p>
	15. The knowledge to manage technical projects involving manufacturing for schedules, costs and quality assurance	

Appendix C to Criterion 4, SWOT Analysis

<p>Strengths</p> <p>Diversity of instructor career backgrounds with strong tie-in to marine and shore-side industry</p> <p>STCW and domestic licensure requirements embedded in Academic and Practical Training courses – allows for the flexibility to meet ABET and WASC learning and program outcomes simultaneously</p> <p>Received funding May 12 to assess ET program for compliance with Manila Amendments and new domestic licensure requirements</p> <p>Dedicated faculty to uphold STCW and domestic licensure requirements</p> <p>Release time for a faculty member to be ET POC for ensuring STCW and domestic licensure compliance</p> <p>360 degree audit of ET curriculum, Manila Amendments and Domestic Licensure requirements</p> <p>Excellent collaboration between ET Dept and AVP, Academic Affairs / STCW Coordinator</p>	<p>Weaknesses</p> <p>STCW course outlines and syllabi need to reflect Manila Amendments, domestic licensure requirements, Educational Objectives and Student Learning Outcomes</p> <p>Consistency in how sign-offs are documented and / or completed</p> <p>Need to follow FET and MET assessment plans</p> <p>External higher education transfer credits do not cleanly meet domestic licensure or STCW sign-offs – impacts transfer students and written documentation for assessment</p> <p>Faculty not understanding that STCW are minimum requirements; faculty tend to gravitate towards requiring a higher standard at the expense of time. “when is good enough”</p> <p>In general, the understanding of the differences and links between STCW and domestic licensure requirements</p> <p>Do not have an Engineering Simulator Manager; impact is role is taken on by instructors.</p> <p>ME STCW certification program and domestic licensure is in need of review</p> <p>ME instructor by-in and understanding of STCW and domestic licensure requirements is lacking</p>
<p>Opportunities</p> <p>Creation of an MET minor for ME’s versus a license track in the ME program</p> <p>Collaboration with other Maritime Academies undergoing the same 360 degree program review</p>	<p>Threats</p> <p>External interpretation of the Manila amendments and / or domestic licensure requirements that either cause us rework or do not go in our favor</p> <p>Balance between STCW, domestic licensure, ABET and WASC audits and reviews</p>

CRITERION 5 – CURRICULUM

A. Program Curriculum

Table 13 – Facilities Engineering Technology Curriculum and Table 14 – Marine Engineering Technology Curriculum provide the course identifiers, if the course is required, elective or selected elective, what curricular area the course covers, the last time the course was taught and the average class size for each of the programs. The FET curriculum sheet showing the temporal order of the program is given in Table 15 and the MET temporal curriculum sheet is shown in Table 16.

The curriculum is ordered so that students in both programs are provided a beginning foundation of skills and practices to be successful in their studies. As they progress through the course plan, these foundational skills are reinforced and discipline specific knowledge content is received. This includes both understanding of the engineering physics (PEO 1) as well as operation, performance and maintenance experience (PEO 2). Both in the classroom and as a member of the corps of cadets, the students are members of teams, first as followers, then in leadership positions. Specific coursework has specific leadership learning objectives (PEO 3) e.g., EPO 235 – Steam Plant Watch Team Management. Several courses in the curriculum educate the student in communication in various forms. Written skills are introduced, practiced and demonstrated in several of the laboratory courses as well as in ENG 430 Naval Architecture and HUM 310 Engineering Ethics. Verbal and listening skills are a constant component of all operational courses. Students are instructed in the skill of verbally communicating thoughts, instructions and orders in a concise and well organized fashion. Several laboratory courses have an ‘open-ended project’ component that requires each student to do a presentation in front of the class. These skills provide sufficient development for our graduates to meet PEO 4. Finally, from their first engineering course, ET 110 Introduction to Engineering Technology to their final capstone course, ET 490/ET 490L Power Engineering Technology/Laboratory, as well as formal instruction in HUM 310 Engineering Ethics, the students are thoroughly instructed in professional, ethical, social and societal issues associated with engineering technology (PEO 5).

Table 13 – Facilities Engineering Technology Curriculum

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 & Basic Sciences	Discipline Specific Topics	General Education	Other		
FALL 2012:							
CHE 100 – Chemistry I	R	3				F2012 S2013	36
CHE 100L - Chemistry I Lab	R	1				F2012 S2013	22
ELEC 8 – American Institutions Elective	SE			3		F2012 S2013	42
ELEC 21 – Humanities Elective (Lower Division)	SE			3		F2011 F2012	19
ENG 100 - Engineering Graphics	R				2	F2011 F2012	15
ET 110 – Introduction to Engineering Technology	R		1			F2011 F2012	44
MTH 100 - College Algebra and Trigonometry	R	4				F2011 F2012	22
PE 100 – Beginning/Intermediate Swimming	R				(.5) ³	F2011 F2012	148

SPRING 2013:							
DL 105 – Marine Survival	R				1	F2012 S2013	29
DL 105L – Marine Survival Lab	R				1	F2012 S2013	10
DL 105X – USCG Lifeboatman’s Exam	R				(0) ³	F2012 S2013	116
EGL 100 – English Composition	R			3		F2012 S2013	22
EPO 110 - Plant Operations I	R				1	F2012 S2013	16
EPO 125 – Introduction to Marine Engineering	R		3			F2012 S2013	37
EPO 125L – Introduction to Marine Engineering Lab	R		1			F2012 S2013	21
EPO 213 – Welding Lab	R				1	F2012 S2013	19
LIB 100 – Information Fluency in the Digital World	R				2	F2012 S2013	19
MTH 210 – Calculus I	R	4				F2012 S2013	25
SPRING CRUISE 2013:							
CRU 150 – Sea Training I	R				8	S2012 S2013	114
EPO 220 – Diesel Engineering I	R		2			S2012 S2013	113
FALL 2013:							
COM 220L – Programming Applications for ET Majors Lab	R		1			F2011 F2012	23
ELEC 20 – Critical Thinking Elective	SE			3		F2012 S2013	25

EPO 210 - Plant Operations II	R				1	F2011 F2012	14
EPO 214 – Boilers	R		3			F2012 S2013	44
EPO 215 – Manufacturing Processes I	R				1	F2012 S2013	13
EPO 230 – Steam Plant System Operations	R		1			F2012 S2013	6
MTH 211 – Calculus II	R	4				F2012 S2013	25
PHY 200 – Engineering Physics I	R	3				F2012 S2013	24
PHY 200L – Engineering Physics I Lab	R	1				F2012 S2013	13
SPRING 2014:							
CHE 205 – Chemistry of Plant Processes	R		3			S2010 S2012	14
EGL 110 – Speech Communication	R			3		F2012 S2013	21
EPO 235 – Steam Plant Watch Team Management	R		1			F2012 S2013	6
EPO 312 - Turbines	R		3			F2012 S2013	40
ET 230 – Properties of Materials	R		2			F2012 S2013	31
ET 232 - Statics	R		3			S2012 S2013	45
PHY 205 – Engineering Physics II	R		4			F2012 S2013	22
SPRING CO-OP 2014:							
CEP 270 – FET Co-Op I	R				3	S2012 S2013	9

FALL 2014:							
ELEC 22 – Humanities Elective (Upper Division)	SE			3		F2012 S2013	46
EPO 319 – Facilities Engineering Diagnostics Lab	R		1			F2011 F2012	11
ET 230L – Properties of Materials Lab	R		1			F2011 F2012	11
ET 250 – Electrical Circuits	R		3			F2011 F2012	40
ET 250L – Electrical Circuits Lab	R		1			F2011 F2012	8
ET 330 – Dynamics	R		3			F2011 F2012	44
ET 332 – Strength of Materials	R		3			S2012 S2013	43
ET 344 – Thermodynamics	R		3			F2011 F2012	34
SPRING 2015:							
EGL 300 – Advanced Writing	R			(3) ³		F2012 S2013	24
EPO 310 - Plant Operations III	R				1	S2012 S2013	9
EPO 315 – Manufacturing Processes II	R				1	S2012 S2013	11
EPO 321 – Introduction to Power Generation Plants	R		1			S2012 S2013	5
ET 340 – Fluid Mechanics	R		3			S2012 S2013	45
ET 340L – Fluid Mechanics Lab	R		1			S2012 S2013	11
ET 342 – Refrigeration and Air Conditioning	R		2			S2012 S2013	41

ET 342L – Refrigeration and Air Conditioning Lab	R		1			S2012 S2013	10
ET 370 – Electronics	R		3			S2012 S2013	37
ET 370L – Electronics Lab	R		1			S2012 S2013	9
SPRING CO-OP 2015:							
CEP 370 – FET Co-Op II	R				3	S2012 S2013	6
FALL 2015:							
ELEC 9 – American Institutions Elective	SE				3	F2012 S2013	36
ENG 470 – Engineering Management	R		3			F2011 F2012	22
ET 350 – Electrical Machinery	R		3			F2011 F2012	29
ET 350L – Electrical Machinery Lab	R		1			F2011 F2012	8
ET 400 – Instrumentation and Measurement	R		3			F2011 F2012	33
ET 400L – Instrumentation and Measurement Lab	R		1			F2011 F2012	11
ET 442 – Heating, Ventilation and A/C	R		2			F2011 F2012	3
ET 442L – Heating, Ventilation and A/C Lab	R		1			F2011 F2012	3
SPRING 2016:							
ELEC 32 – Social Science Elective (Upper Division)	SE			3		S2012 S2013	41

ENG 472 – Facilities Management	R		3			S2011 S2012	2
ET 460 – Automation	R		3			S2012 S2013	30
ET 460L – Automation Lab	R		1			S2012 S2013	10
ET 490 – Power Engineering Technology	R		3			S2012 S2013	31
ET 490L – Power Engineering Technology Lab	R		1			S2012 S2013	10
HUM 310 – Engineering Ethics	R			3		S2012 S2013	30
TOTALS		20	80	24	29		
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE							153
PERCENT OF TOTAL		13.1%	52.3%	15.7%	19.0%	100%	

1. Average enrollment over all sections.
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.
3. (x) indicates courses required due to licensure or other agencies.

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

Table 14 – Marine Engineering Technology Curriculum

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 & Basic Sciences
		Math & Basic Sciences	Discipline Specific Topics	General Education	Other		
FALL 2012:							
CHE 100 – Chemistry I	R	3				F2012 S2013	36
CHE 100L - Chemistry I Lab	R	1				F2012 S2013	22
ELEC 8 – American Institutions Elective	SE			3		F2012 S2013	42
ELEC 21 – Humanities Elective (Lower Division)	SE			3		F2011 F2012	19
ENG 100 - Engineering Graphics	R				2	F2011 F2012	15
ET 110 – Introduction to Engineering Technology	R		1			F2011 F2012	44
MTH 100 - College Algebra and Trigonometry	R	4				F2011 F2012	22
PE 100 – Beginning/Intermediate Swimming	R				(.5) ³	F2011 F2012	148

SPRING 2013:							
DL 105 – Marine Survival	R				1	F2012 S2013	29
DL 105L – Marine Survival Lab	R				1	F2012 S2013	10
DL 105X – USCG Lifeboatman’s Exam	R				(0) ³	F2012 S2013	116
EGL 100 – English Composition	R			3		F2012 S2013	22
EPO 110 - Plant Operations I	R				1	F2012 S2013	16
EPO 125 – Introduction to Marine Engineering	R		3			F2012 S2013	37
EPO 125L – Introduction to Marine Engineering Lab	R		1			F2012 S2013	21
EPO 213 – Welding Lab	R				1	F2012 S2013	19
LIB 100 – Information Fluency in the Digital World	R				2	F2012 S2013	19
MTH 210 – Calculus I	R	4				F2012 S2013	25
SPRING CRUISE 2013:							
CRU 150 – Sea Training I	R				8	S2012 S2013	114
EPO 220 – Diesel Engineering I	R		2			S2012 S2013	113
FALL 2013:							
COM 220L – Programming Applications for ET Majors Lab	R		1			F2011 F2012	23
ELEC 20 – Critical Thinking Elective	SE			3		F2012 S2013	25

EPO 210 - Plant Operations II	R				1	F2011 F2012	14
EPO 214 – Boilers	R		3			F2012 S2013	44
EPO 215 – Manufacturing Processes I	R				1	F2012 S2013	13
EPO 230 – Steam Plant System Operations	R		1			F2012 S2013	6
MTH 211 – Calculus II	R	4				F2012 S2013	25
PHY 200 – Engineering Physics I	R	3				F2012 S2013	24
PHY 200L – Engineering Physics I Lab	R	1				F2012 S2013	13
SPRING 2014:							
EGL 110 – Speech Communication	R			3		F2012 S2013	21
EPO 235 – Steam Plant Watch Team Management	R		1			F2012 S2013	6
EPO 312 - Turbines	R		3			F2012 S2013	40
ET 230 – Properties of Materials	R		2			F2012 S2013	31
ET 232 - Statics	R		3			S2012 S2013	45
NSC 100 – Naval Science for the MMO	R				3	F2012 S2013	37
PHY 205 – Engineering Physics II	R		4			F2012 S2013	22
SPRING CO-OP 2014:							
CRU 250 – Sea Training II	R				8	S2012 S2013	40

FALL 2014:							
ELEC 22 – Humanities Elective (Upper Division)	SE			3		F2012 S2013	46
ET 230L – Properties of Materials Lab	R		1			F2011 F2012	11
ET 250 – Electrical Circuits	R		3			F2011 F2012	40
ET 250L – Electrical Circuits Lab	R		1			F2011 F2012	8
ET 330 – Dynamics	R		3			F2011 F2012	44
ET 332 – Strength of Materials	R		3			S2012 S2013	43
ET 344 – Thermodynamics	R		3			F2011 F2012	34
FF 200 – Basic/Advanced Marine Firefighting	R				(0) ³	F2012 S2013	74
SPRING 2015:							
EGL 300 – Advanced Writing	R			(3) ³		F2012 S2013	24
EPO 310 - Plant Operations III	R				1	S2012 S2013	9
EPO 315 – Manufacturing Processes II	R				1	S2012 S2013	11
EPO 322 – Diesel engineering II / Simulator	R		1			F2012 S2013	35
EPO 322L – Diesel Engineering II / Simulator Lab	R		1			F2012 S2013	8
ET 340 – Fluid Mechanics	R		3			S2012 S2013	45
ET 340L – Fluid Mechanics Lab	R		1			S2012 S2013	11

ET 342 – Refrigeration and Air Conditioning	R		2			S2012 S2013	41
ET 342L – Refrigeration and Air Conditioning Lab	R		1			S2012 S2013	10
ET 370 – Electronics	R		3			S2012 S2013	37
ET 370L – Electronics Lab	R		1			S2012 S2013	9
SPRING CO-OP 2015:							
CRU 350 – Sea Training III	R				8	S2012 S2013	51
FALL 2015:							
ELEC 9 – American Institutions Elective	SE				3	F2012 S2013	36
ENG 430 – Naval Architecture	R		3			F2011 F2012	24
ENG 470 – Engineering Management	R		3			F2011 F2012	22
ET 350 – Electrical Machinery	R		3			F2011 F2012	29
ET 350L – Electrical Machinery Lab	R		1			F2011 F2012	8
ET 400 – Instrumentation and Measurement	R		3			F2011 F2012	33
ET 400L – Instrumentation and Measurement Lab	R		1			F2011 F2012	11
SPRING 2016:							
ELEC 32 – Social Science Elective (Upper Division)	SE			3		S2012 S2013	41
EPO 217 – Shipboard Medical	R				1	F2012 S2013	15

ET 460 – Automation	R		3			S2012 S2013	30
ET 460L – Automation Lab	R		1			S2012 S2013	10
ET 490 – Power Engineering Technology	R		3			S2012 S2013	31
ET 490L – Power Engineering Technology Lab	R		1			S2012 S2013	10
HUM 310 – Engineering Ethics	R			3		S2012 S2013	30
TOTALS		20	74	24	43		
OVERALL TOTAL CREDIT HOURS FOR THE DEGREE						161	
PERCENT OF TOTAL		12.4%	46.0%	14.9%	26.7%	100%	

1. Average enrollment over all sections.
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.
3. (x) indicates courses required due to licensure or other agencies.

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

Table 15 – Facilities Engineering Technology Curriculum Sheet

**CLASS OF 2016
FACILITIES ENGINEERING TECHNOLOGY MAJOR
DIVISIONS 1&2
CURRICULUM**

REVISED 11/2/12
Subject to Change

Total Units: 153

Certified Plant Engineer-In Training Certificate Required for Graduation

Writing Proficiency Requirement: All Junior students must demonstrate upper division writing competency as a graduation requirement. This may be fulfilled by passing either the Graduation Writing Exam or EGL 300 Advanced Writing.

FALL 2012

CHE 100	Chemistry I	3.0
CHE 100L	Chemistry I Lab	1.0
ELEC 8	American Institutions Elective	3.0
ELEC 21	Humanities Elective (Lower Division)	3.0
ENG 100	Engineering Graphics	2.0
ET 110	Introduction to Engineering Technology*	1.0
MTH 100	College Algebra and Trigonometry	4.0
PE 100	Beginning/Intermediate Swimming	(.5)
Total		17.0

SPRING 2013

DL 105	Marine Survival	1.0
DL 105L	Marine Survival Lab	1.0
DL 105X	USCG Lifeboatman's Exam	0.0
EGL 100	English Composition	3.0
EPO 110	Plant Operations I	1.0
EPO 125	Introduction to Marine Engineering*	3.0
EPO 125L	Introduction to Marine Engineering Lab*	1.0
EPO 213	Welding Lab	1.0
LIB 100	Information Fluency in the Digital World	2.0
MTH 210	Calculus I	4.0
Total		17.0

SPRING CRUISE 2013

CRU150	Sea Training I	8.0
EPO 220	Diesel Engineering I*	2.0
Total		10.0

FALL 2013

COM 220L	Programming Applications for Engr. Tech Majors Lab*	1.0
ELEC 20	Critical Thinking Elective	3.0
EPO 210	Plant Operations II	1.0
EPO 214	Boilers*	3.0
EPO 215	Manufacturing Processes I	1.0
EPO 230	Steam Plant System Operations*	1.0
MTH 211	Calculus II	4.0
PHY 200	Engineering Physics I	3.0
PHY 200L	Engineering Physics I Lab	1.0
Total		18.0

SPRING 2014

CHE 205	Chemistry of Plant Processes*	3.0
EGL 110	Speech Communication	3.0
EPO 235	Steam Plant Watch Team Management*	1.0
EPO 312	Turbines*	3.0
ET 230	Properties of Materials*	2.0
ET 232	Statics*	3.0
PHY 205	Engineering Physics II	4.0
Total		19.0

SPRING CO-OP 2014

CEP 270	FET Co-Op I	3.0
Total		3.0

FALL 2014

ELEC 22	Humanities Elective (Upper Division)	3.0
EPO 319	Facilities Engineering Diagnostics Lab*	1.0
ET 230L	Properties of Materials Lab*	1.0
ET 250	Electrical Circuits*	3.0
ET 250L	Electrical Circuits Lab*	1.0
ET 330	Dynamics*	3.0
ET 332	Strength of Materials*	3.0
ET 344	Thermodynamics*	3.0
Total		18.0

SPRING 2015

EGL 300	Advanced Writing	(3.0)
EPO 310	Plant Operations III	1.0
EPO 315	Manufacturing Processes II	1.0
EPO 321	Introduction to Power Generation Plants*	1.0
ET 340	Fluid Mechanics*	3.0
ET 340L	Fluid Mechanics Lab*	1.0
ET 342	Refrigeration and Air Conditioning*	2.0
ET 342L	Refrigeration and Air Conditioning Lab*	1.0
ET 370	Electronics*	3.0
ET 370L	Electronics Lab*	1.0
Total		14.0

SPRING CO-OP 2015

CEP 370	FET Co-Op II	3.0
Total		3.0

FALL 2015

ELEC 9	American Institutions Elective	3.0
ENG 470	Engineering Management*	3.0
ET 350	Electrical Machinery*	3.0
ET 350L	Electrical Machinery Lab*	1.0
ET 400	Instrumentation and Measurement*	3.0
ET 400L	Instrumentation and Measurement Lab*	1.0
ET 442	Heating, Ventilation, and A/C*	2.0
ET 442L	Heating, Ventilation, and A/C Lab*	1.0
Total		17.0

SPRING 2016

ELEC 32	Social Science Elective (Upper Division)	3.0
ENG 472	Facilities Management*	3.0
ET 460	Automation*	3.0
ET 460L	Automation Lab*	1.0
ET 490	Power Engineering Technology*	3.0
ET 490L	Power Engineering Technology Lab*	1.0
HUM 310	Engineering Ethics	3.0
Total		17.0

* Courses in Major
(CGPA = 2.0 is required)

Table 16 – Marine Engineering Technology Curriculum Sheet

**CLASS OF 2016
MARINE ENGINEERING TECHNOLOGY MAJOR
DIVISIONS 1&2
CURRICULUM**

REVISED 5/14/13
Subject to Change

Total Units: 161

Third Assistant Engineer's/OICEW License Required For Graduation

Writing Proficiency Requirement: All Junior students must demonstrate upper division writing competency as a graduation requirement.
This may be fulfilled by passing either the Graduation Writing Exam or EGL 300 Advanced Writing.

FALL 2012

CHE 100	Chemistry I	3.0
CHE 100L	Chemistry I Lab	1.0
ELEC 8	American Institutions Elective	3.0
ELEC 21	Humanities Elective (Lower Division)	3.0
ENG 100	Engineering Graphics▶	2.0
ET 110	Introduction to Engineering Technology*	1.0
MTH 100	College Algebra and Trigonometry	4.0
PE 100	Beginning/Intermediate Swimming	(.5)

Total 17.0

SPRING 2013

DL 105	Marine Survival▶	1.0
DL 105L	Marine Survival Lab▶	1.0
DL 105X	USCG Lifeboatman's Exam	0.0
EGL 100	English Composition	3.0
EPO 110	Plant Operations I▶	1.0
EPO 125	Introduction to Marine Engineering*	3.0
EPO 125L	Introduction to Marine Engineering Lab*	1.0
EPO 213	Welding Lab▶	1.0
LIB 100	Information Fluency in the Digital World	2.0
MTH 210	Calculus I	4.0

Total 17.0

SPRING CRUISE 2013

CRU 150	Sea Training I▶	8.0
EPO 220	Diesel Engineering I*	2.0

Total 10.0

FALL 2013

COM 220L	Programming Applications for Engr. Tech Majors Lab	1.0
ELEC 20	Critical Thinking Elective	3.0
EPO 210	Plant Operations II▶	1.0
EPO 214	Boilers▶*	3.0
EPO 215	Manufacturing Processes I▶	1.0
EPO 230	Steam Plant System Operations▶*	1.0
MTH 211	Calculus II	4.0
PHY 200	Engineering Physics I	3.0
PHY 200L	Engineering Physics I Lab	1.0

Total 18.0

SPRING 2014

EGL 110	Speech Communication	3.0
EPO 235	Steam Plant Watch Team Management▶*	1.0
EPO 312	Turbines▶*	3.0
ET 230	Properties of Materials*	2.0
ET 232	Statics*	3.0
NSC 100	Naval Science for the MMO	3.0
PHY 205	Engineering Physics II	4.0

Total 19.0

SPRING CRUISE 2014

CRU 250	Sea Training II	8.0
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Total 8.0

FALL 2014

ELEC 22	Humanities Elective (Upper Division)	3.0
ET 230L	Properties of Materials Lab*	1.0
ET 250	Electrical Circuits*	3.0
ET 250L	Electrical Circuits Lab▶*	1.0
ET 330	Dynamics*	3.0
ET 332	Strength of Materials*	3.0
ET 344	Thermodynamics*	3.0
FF 200	Basic/Advanced Marine Firefighting▶	0.0

Total 17.0

SPRING 2015

EGL 300	Advanced Writing	(3.0)
EPO 310	Plant Operations III▶	1.0
EPO 315	Manufacturing Processes II	1.0
EPO 322	Diesel Engineering II/Simulator*	1.0
EPO 322L	Diesel Engineering II/Simulator Lab▶*	1.0
ET 340	Fluid Mechanics*	3.0
ET 340L	Fluid Mechanics Lab*	1.0
ET 342	Refrigeration and Air Conditioning*	2.0
ET 342L	Refrigeration and Air Conditioning Lab▶*	1.0
ET 370	Electronics▶*	3.0
ET 370L	Electronics Lab*	1.0

Total 15.0

SPRING CRUISE 2015

CRU 350	Sea Training III▶	8.0
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Total 8.0

FALL 2015

ELEC 9	American Institutions Elective	3.0
ENG 430	Naval Architecture▶*	3.0
ENG 470	Engineering Management*	3.0
ET 350	Electrical Machinery*	3.0
ET 350L	Electrical Machinery Lab▶*	1.0
ET 400	Instrumentation and Measurement*	3.0
ET 400L	Instrumentation and Measurement Lab*	1.0

Total 17.0

SPRING 2016

ELEC 32	Social Science Elective (Upper Division)	3.0
EPO 217	Shipboard Medical▶	1.0
ET 460	Automation▶*	3.0
ET 460L	Automation Lab*	1.0
ET 490	Power Engineering Technology*	3.0
ET 490L	Power Engineering Technology Lab*	1.0
HUM 310	Engineering Ethics	3.0

Total 15.0

▶ STCW Courses (Must receive a "C-" or higher, or "CR")
* Courses in Major (CGPA = 2.0 is required)

The prerequisite structure supports student success in reaching the student outcomes in the programs. Each prerequisite provides the necessary knowledge and practice required for success in the following course. Figure 12 – Engineering Technology Academic Program Flowchart, shows the prerequisite requirements for each course in the academic portion of the program. Additionally, Figure 13 – Engineering Technology Practical Training Flowchart, shows the prerequisite requirements for each course in the practical training component of the program.

FET students receive 20 hours of mathematics and basic science instruction which amounts to 13.1% of their total degree hours. They receive 80 hours of discipline specific instruction (52.3%), 24 hours of general education subjects (15.7%) and 29 hours of other subjects (19.0%). Other subjects include required co-ops, cruise and other discipline required work. In excess of 70% of their university experience is directly associated with preparing for or in courses dealing directly with the major.

MET students receive 20 hours of mathematics and basic science instruction which amounts to 12,4% of their total degree hours. They receive 74 hours of discipline specific instruction (46.0%), 24 hours of general education subjects (14.9%) and 43 hours of other subjects (26.7%). Other subjects include required cruises and other discipline required work. In excess of 70% of their university experience is directly associated with preparing for or in courses dealing directly with the major.

Both programs have the capstone course of ET 490/ET 490L Power Engineering Technology/Laboratory. From the description of the courses:

ET 490 is a study of combustion processes, combustion by-products and emission abatement and electrical distribution and transmission systems commonly found in modern marine engineering propulsion plants and the power industry.

Upon successful completion of this course, the student:

Learning Outcome 1: Will be able to apply the principles of fluid mechanics and thermodynamics in power plant performance analyses.

Learning Outcome 2: Will be able to apply the principles of electrical machinery to in the analysis of electrical power generation, transmission and distribution.

Learning Outcome 3: Will learn how to develop strategies for analyzing power generating system performance.

Learning Outcome 4: Will develop an appreciation for the harmful emissions associated with fossil fuel power plants and have a basic understanding of the technologies for controlling them.

Learning Outcome 5: Will have a basic understanding of alternative energy solutions.

The ET 490/ET 490L course provides the student with the opportunity to bring together much of the coursework previously completed at CMA. Multi-disciplinary physics

(materials, statics, dynamics, electrical, thermodynamics, fluid mechanics and system engineering) coursework must be combined, assimilated and synthesized in complex power generation and distribution systems which meet the expectations of experience and practice of PEO 1 and 2. Additionally, the instruction provides the students with the requirement of attending professional events associated with power technology. They experience communication on a professional level that includes power industry professionals and leaders. This supports their development of becoming effective leaders (PEO 3) as well as experience with different leadership methods and styles (PEO 4). Finally, LO4 and LO5 above provide the student with experience and practice of being globally aware and help them understand the complex and interrelated nature of engineering technology (PEO 5).

All students from both programs have three summer experiences. All freshmen of both programs sail for a 60 day cruise on the Training Ship Golden Bear during the summer between their freshman 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 systems, from main propulsion to the production of and handling of water for ships use. The students also have specific instruction and coursework associated with the systems of the ship. They are instructed by members of the Engineering Technology faculty for this work as well as ship specialists.

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 a bi-weekly report to the course instructor as well as a cumulative document that provides details on the entire experience, weekly journal reports, reviews from industrial supervisors and performance criteria evaluation. The minimum time for this experience is eight weeks of full time service at the company. Many students work the entire summer at these positions, gaining valuable additional experience. Many of the students are hired by their co-op company prior to, or immediately after graduation.

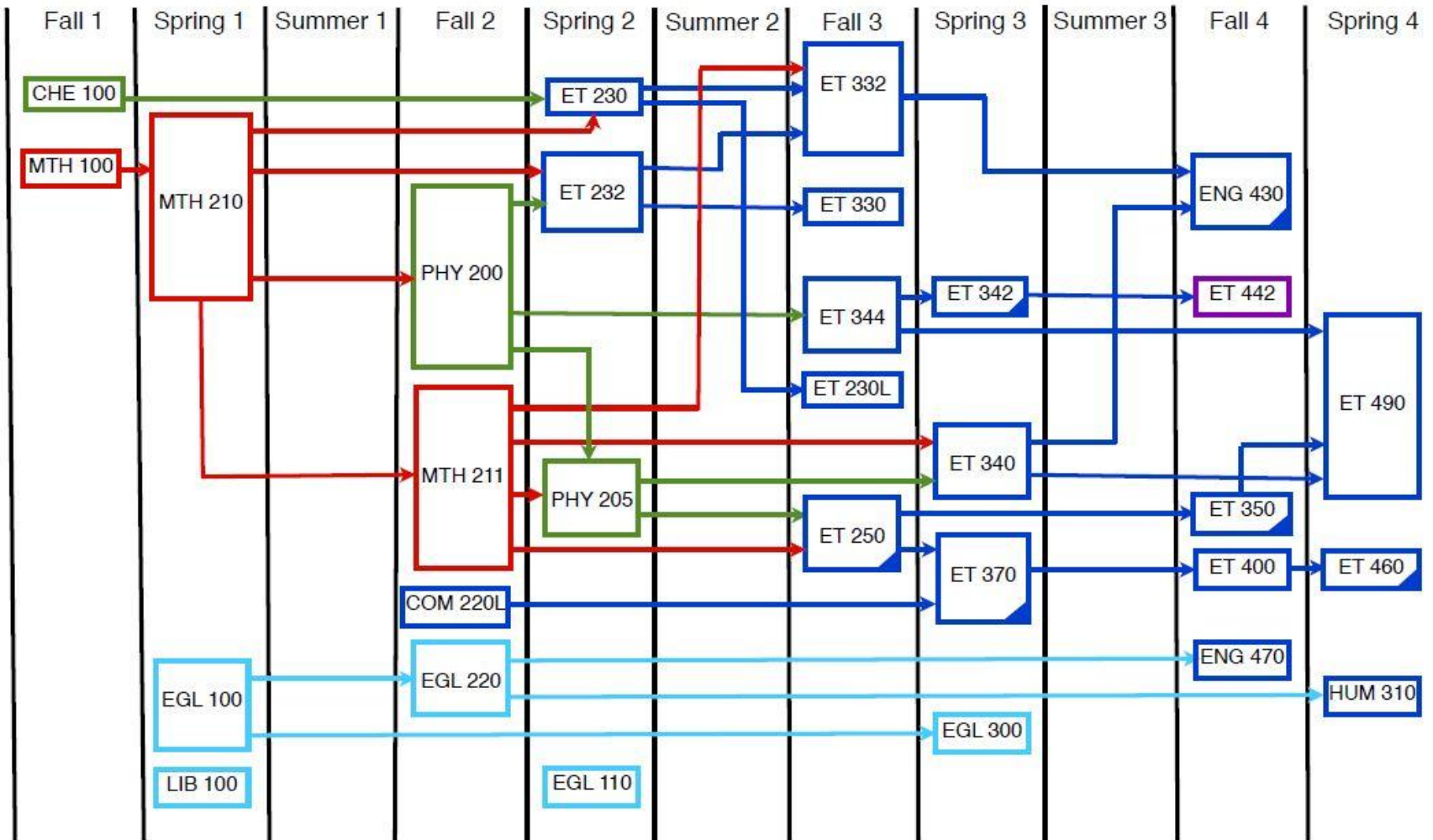
MET students have a commercial cruise experience between their sophomore and junior year. The students are placed with a commercial or governmental maritime sea-going organization. They sail for a minimum of 60 days as a member of the company's engineering department. This provides them with experience in various types of vessels. Similar to the FET industrial co-op experience, they provide bi-weekly reports to the associated course instructor as well as a final cumulative document describing their entire co-op experience.

Between junior and senior year, MET students sail as a member of the leadership team aboard the TSGB. They are responsible for the operation, maintenance, scheduling, administration and safety of all systems in the engineering department. They receive additional training coursework provided by the faculty of the engineering technology department for higher level operational skills. Additionally, the cruise faculty oversee the licensure and STCW components of the activities the students successfully complete during

the 60 day voyage. This cruise also acts as a culmination experience for MET students as all proficiencies, knowledge, maturity and decision making skills are practiced in a very real environment with significant consequences.

The evaluation team visiting campus will be able to see portfolios of all course work, evaluate all textbooks, tour all facilities and see individual courses being taught. Documents will be provided to the visit team that show how each SLO is mapped into the individual course curriculum and how specific student outcomes are evaluated as well as the data and the evaluation of SLO data.

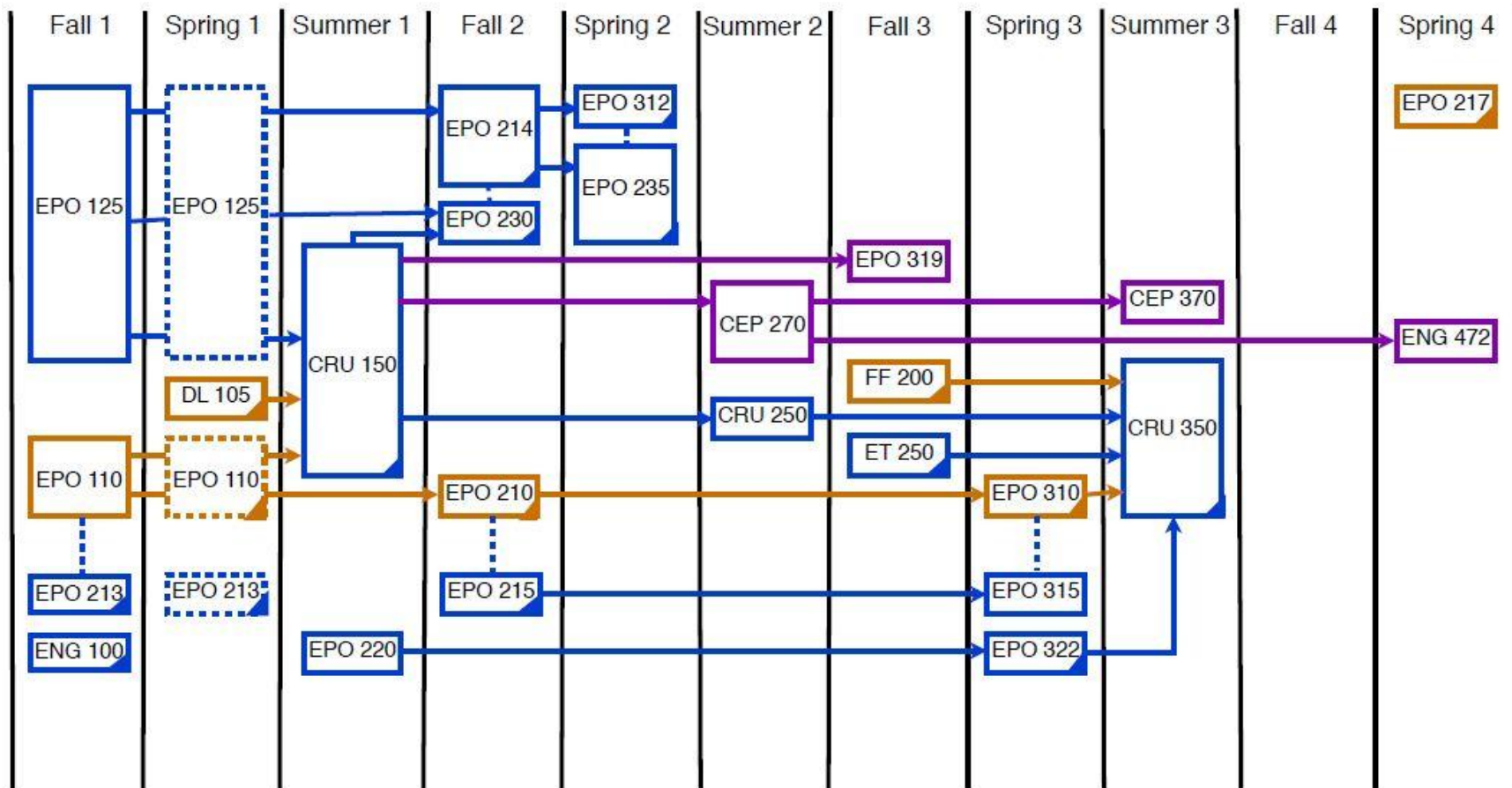
Academic Program Engineering Technology (Revised 8.28.12)



Note: ▲ = STCW Course

Figure 12 – Engineering Technology Academic Program Flowchart

Practical Training
Engineering Technology (Revised 8.28.12)



Notes:

▲ = STCW Course

Divisions 3 and 4 freshmen enroll in EPO 110, 125 and 213 and live aboard Training Ship during Fall Semester

Divisions 1 and 2 freshmen enroll in EPO 110, 125 and 213 and live aboard Training Ship during Spring Semester

Figure 13 – Engineering Technology Practical Training Flowchart

B. Course Syllabi

Appendix A includes a syllabus for each course used to satisfy the mathematics, science, and discipline-specific requirements required by Criterion 5 for both FET and MET programs.

The Accessible Technology Initiative (ATI) reflects the CSU ongoing commitment to provide access to information resources and technologies to individuals with disabilities. By executive order of the chancellor of the CSU, ATI formatted syllabi are required for all courses. ATI formatted syllabi are provided to students and examples are present in all course portfolios available for review.

C. Advisory Committee

The EAB is made up of members that represent all majors at CMA. Within the EAB, there are six members that provide input and feedback to the ET department. As of May 3rd, 2013, the six members are:

Mr. Larry Asera
Chairman and CEO
Asera, LLC

Mr. Amit Pal
Government Relations
Pacific Gas & Electric Company

Mr. Jerry Biron, Director
Vice President, Region IV
Association for Facilities Engineering
City Electric Supply

Mr. Bob Rogers, PE
Lake County Resources Initiative
Mechanical Engineer

Mr. Steven Brady
Performance & Reliability Manager
Chevron Shipping Company LLC

Mr. Miguel Suarez
Manufacturing Operations
Genentech, Inc.

These members all serve in lead roles within their companies who provide product and services to the industries and organizations for which our graduates are trained. Additional industry program feedback is also sought from maritime organizations, companies, operators, unions and regulators. Regular interaction with these constituents through commercial cruise co-ops for MET students and industrial co-ops for FET students provide valuable feedback to our programs.

The EAB is consulted on a regular basis during the review of the PEOs and SLO's. They also provide additional feedback as our industrial representatives. They are scheduled to meet with the ET leadership during their regular meeting university-wide advisory meeting that occurs once each semester.

The advisory committee work and interactions with the programs are documented in Criterion 4 previously in section B titled Continuous Improvement. Examples of review of curriculum changes and validation for PEOs are contained within.

CRITERION 6 – FACULTY

A. Faculty Qualifications

The faculty of the Engineering Technology (ET) program is composed of four tenured instructors, five tenure-track faculty, and four full-time and two part-time non tenure-track faculty. Three of the tenured track faculty are Maritime Vocational Instructors and one is an Associate Professor. Of the five tenure-track faculty members, two are Maritime Vocational Instructors and three are Assistant Professors. There are two full time Marine Vocational Lecturers, two full time lecturers and two part time lecturers. Academic faculty members minimally hold a graduate degree in an engineering discipline. Marine Engineering courses are taught by seven licensed faculty members, all of whom have either a B.S. in Marine Engineering, a USCG Chief Engineer's License, or significant years of industrial experience in the maritime field. Lab courses are taught primarily by licensed faculty.

Tenure-track faculty members are under probationary status and reviewed every other year starting in the second year of their employment. Tenured faculty members are reviewed every five years. Non tenure-track faculty members are reviewed annually. These regular reviews assess the competency of faculty members in their areas of responsibility. Additionally, starting in the 2012-13 academic year, all courses are evaluated by the students. Prior to this period, a minimum of one course per semester for each instructor was evaluated by students. These student surveys are used in each instructor's performance evaluation. These reviews are dictated by the collective bargaining agreements between the CSU and California Faculty Association (CFA). The CFA is a union representing all faculty in the CSU system.

B. Faculty Workload

All licensed faculty members are required to spend two months each summer aboard the Training Ship Golden Bear (TSGB). This includes teaching and/or standing engine room watch during the summer cruise for ALL engineering students assigned (CMA, Texas A&M, Massachusetts Maritime Academy and other visiting maritime students). Therefore, for licensed faculty the academic year is normally ten months in duration.

Note: In summer 2012, the TSGB only completed one two-month training cruise versus two. The work required by licensed faculty in preparation for one cruise versus two summer cruises was the opposite of what you would expect. This was due primarily to the increase in the number of students on cruise requiring programmatic changes to the rotation schedule between instruction, practical training, watchstanding, and special projects; and a significant redesign and expansion of an engineering laboratory on the 4th deck of the ship. From cruise 2011 to 2012, the number of sophomores on cruise went from 59 to 97 and the number of seniors went from 30 to 45 for a total increase of 89 to 142. For cruise 2013, there are 164 engineering students on cruise.

For summer 2013, a diesel simulator lab was constructed in one of the classrooms on the 3rd deck. Additional information about both of these projects is further outlined in Criterion 7.

Table 17, Faculty Workload Table shows the workload assignments for fall 2013. Additional workload tables are available for previous years. As shown, the average load per semester for each ET faculty member falls in the 9-12 unit range. Additional work of advising, committees and other University business make up the remainder of the nominal work assignment of 15 total units. With twelve full-time faculty members, the student-to-instructor ratio varies. A lecture class may have as many as 45 students while simulator lab classes such as Steam Plant Operations and Watch Team Management courses are capped at six students per instructor. Some lab classes require a capacity limit of 24 students; some accommodate less, depending on available lab and/or computer resources.

Table 17 – Faculty Workload Table, Fall 2013

Instructor	Sum of Sections	Sum of WTUs
Academic 1	6	9
COM 220 L	4	6
ET 230 L	1	1.5
ET 400 L	1	1.5
Andrews	9	15
Departmental Responsibilities	1	3
EPO 110	4	6
EPO 210	4	6
A-Staff	2	4
ME 220	2	4
Cook	9	15
Departmental Responsibilities	1	3
EPO 125 L	2	3
EPO 210	6	9
Fischer	7	15
Departmental Responsibilities	1	3
ET 400	2	6
ET 400 L	4	6
Green	7	15
Departmental Responsibilities	1	3
EPO 214	2	6
EPO 235	4	6
Hitchcock	9	15
EPO 215	6	9
ET 230 L	2	3
Shop Maintenance & Logistics	1	3

Instructor	Sum of Sections	Sum of WTUs
Jackson	7	15
Departmental Responsibilities	1	2
EPO 322	1	1
EPO 322 L	4	6
ET Chair	1	6
Jefferson	3	8
ENG 470	2	6
ET 442	1	2
Kazek	8	15
Departmental Responsibilities	1	3
ENG 430	2	6
ET 110	2	2
ET 230 L	2	3
STCW Coordinator	1	1
Mancilla	5	15
Departmental Responsibilities	1	3
ET 250	2	6
ET 350	2	6
McCarthy	6	12
Departmental Responsibilities	1	3
EPO 213	4	6
Shop Maintenance & Logistics	1	3
Morris	9	15
Departmental Responsibilities	1	3
EPO 321	1	1.5
ET 250 L	7	10.5
M-Staff	2	4
EPO 395, HSP	1	3
EPO 395, IWTM	1	1
MVI-1	10	14.5
EPO 230	9	13.5
EPO 319	1	1
MVL-1	6	10
CRU 250	2	4
EPO 110	2	3
EPO 235	2	3
MVL-2	8	12
EPO 215	3	4.5
ET 350 L	4	6
ET 442 L	1	1.5
O'Brien	1	1
EPO 217	1	1

Instructor	Sum of Sections	Sum of WTUs
Pinisetty	5	15
ET 330	2	6
ET 332	1	3
ET 344	2	6
Rigg	7	15
Departmental Responsibilities	1	3
EPO 125	2	6
EPO 230	4	6
Rodgers	6	15
Departmental Responsibilities	1	3
ENG 100	3	6
EPO 312	1	3
Power Lab Maintenance	1	3
Strange	8	16
ABET Coordinator	1	1
CEP 270	1	0.5
CEP 370	1	0.5
Departmental Responsibilities	1	3
ET 332	1	3
FET Coordinator	1	2
ME 230	2	6
Grand Total	140	270.5

Engineering Technology faculty teach the curricula of both the Marine Engineering Technology and Facilities Engineering Technology programs. Additionally, Engineering Technology faculty are also responsible for instructing 19 semester courses (48 credit hours) in the Mechanical Engineering License Track curricula, 13 semester courses (27 credit hours) in the Mechanical Engineering ME-option Power Generation Minor curricula, and six semester courses (16 credit hours) in the Mechanical Engineer ME-option curricula. (e.g., all Mechanical Engineering students take EPO 110, EPO 125, and EPO 213 as freshmen, as well as many others throughout the remainder of their curricula). All these courses are taught by Engineering Technology faculty. Table 18 – Student Cohorts Taught by Engineering Technology Faculty shows the relative sizes of the cohorts that the Engineering Technology faculty taught in the Fall of 2012. The Mechanical Engineering program’s successes are realized in large part due to the efforts of the Engineering Technology faculty.

Table 18 – Student Cohorts Taught by Engineering Technology Faculty

Total Student Cohorts Taught by Engineering Technology Faculty, Fall 2012	
Facilities Engineering Technology	29
Marine Engineering Technology	199
Mechanical Engineering License Track	155
Mechanical Engineering Non-License Track	31

Currently the Engineering Technology Department is seeking to hire three new licensed instructors and one academic instructor for the fall 2013 semester. The addition of these new faculty members will maintain the current student-to-instructor ratios even with an increase in the number of freshmen entering the ET program. In addition to keeping regular office hours, each full-time instructor is assigned a number of advisees. These faculty members are assigned advisees at the start of their second year of employment. Normally each instructor will be given eight to ten additional student advisees each academic year. Students are required to seek their advisor's assistance and signature prior to registering for each semester. The registration process is performed online through PeopleSoft software. All students are on "hold" until meeting with their advisor. After class schedules and other academic matters are reviewed with the advisee, the hold is removed by the advisor.

Engineering Technology faculty members also frequently speak with ET and ME students on career goals and objectives. This is useful for the majority of students because their contact with the maritime industry prior to attending Cal Maritime is usually limited.

Additionally, the Corps of Cadets at Cal Maritime is divided into four engineering divisions. Each division encompasses engineers from all majors. Currently, only ET faculty members serve as divisional advisors and mentors and meet with student officers throughout the year. ET faculty lend technical support and advice on topics such as TSGB systems, watchstander training, and co-curricular leadership programs.

The size of our institution requires that faculty wear many hats. Two significant events in the past cycle that have required considerable faculty efforts were associated with various accreditation visits outside of ABET.

All Maritime Engineering Technology and over 80% of Mechanical Engineering students receive a USCG 3rd Assistant Engineer's License (upon passing a USCG domestic licensure exam) in parallel to completing their academic programs at CMA. An announced onsite audit of CMA by the USCG and the U. S. Maritime Administration was conducted on March 9-10, 2010. Beginning in January 2012, ET department faculty began an 11-month review process of the MET program to develop a plan for compliance with STCW 1995 as amended in 2010 for implementation fall 2013.

CMAs program approval for STCW 1995 expires in the summer 2013. The renewal of our program compliance with STCW 1995 and CMAs plan for program compliance under the Manila Amendments of 2010 were submitted for approval by the USCG on March 31, 2013. This accreditation required a significant level of effort to ensure program compliance.

The second event was participating and providing a culture of evidence for compliance with institutional wide SLO's F (Discipline Specific Knowledge) and G (Information Fluency) for the Western Association of Schools and Colleges Educational Effectiveness Review held back in March 2011. In Spring 2013, ET department faculty provided evidence for support of institutional wide SLO I (Ethical Awareness).

C. Faculty Size

With 13 full-time and two part-time faculty members, the Engineering Technology faculty is adequately staffed to meet the needs of each of the courses in the program. However, there is an anticipated increased need for engineering simulation classes (steam and diesel simulator courses) and other lab classes starting in the fall 2013, due to the increase in freshmen entering the ET program. To meet this need and to maintain current student-to-instructor ratios, the department is currently soliciting four additional full-time instructors for the fall 2013 semester.

Professional Organizations with participation by faculty and students:

- ISA – International Society of Automation
- San Francisco Society of Port Engineers
- SNAME – Society of Naval Architects and Marine Engineers
- ASEE – American Society for Engineering Education
- AFE – Association of Facility Engineers
- Project Lead the Way – host local high school students on campus tours
- Tau Alpha Pi – Engineering Technology Honors Society
- Historic Ship Society

D. Professional Development

There are a number of sources for faculty development funding:

1. Sabbaticals are available to tenured faculty members who have been teaching at Cal Maritime for a minimum of six years. The sabbatical pays for one semester at full pay or two semesters at half pay. Typically the campus awards two sabbaticals per year.
2. The CSU Chancellor's Office provides about \$12,500 each year to the campus to award research, scholarship and creative activities (RSCA) grants. Grants usually consist of summer salary for one to two months or toward release time during the academic year.
3. The campus President awards Mission Achievement Grants. Grants consist of supplemental salary and expenses up to a maximum of \$3,500 each. Usually one or two grants are awarded each year.
4. The Provost/Vice President for Academic Affairs provides awards of up to \$500 for domestic travel and \$1,000 for international travel to conferences and symposia from the Provost's Presentation Fund. These grants are awarded to presenters only.
5. For 2012-13 the President committed \$50,000 for general faculty development. This fund is available to cover remaining presentation expenses, and also fund additional activities such as attendance at workshops and continuing education courses.

6. Faculty development activities are available on campus at no cost. These workshops generally consist of brown bag lunches for exchanging pedagogical ideas and approaches as well as introduction of innovative teaching tools, software and techniques.

To secure funds listed above, faculty members apply to the Faculty Development Committee of the Academic Senate as a first step. This committee consists of the chairs of each academic department plus two faculty members at-large.

Typically, the administration funds all proposals that have been recommended by the committee.

Fall 2012 and Spring 2013 ET Faculty Development Activities

Jonathan Fischer attended ASEE- CIEC Conference, Mesa, AZ

Stan Hitchcock attended HAASTEC Machine Tool Conference in Oxnard, CA

Robert Jackson attended Kongsberg Conference in St. Johns, Newfoundland, Canada

Michael Kazek attended the Maritime Advisory Council Conference in Boston, MA

James McCarthy attended AWS and SEMA Shows in Las Vegas, NV

Douglas Rigg attended ABET Workshop in San Diego, CA

John Rodgers attended SNAME Annual Conference in Providence, RI.

Mike Strange attended ABET Workshop in San Diego, CA

Mike Strange attended ASEE- CIEC Conference, Mesa, AZ

E. Authority and Responsibility of Faculty

The Engineering Technology department faculty are responsible for the program quality, assessment, evaluation, and improvement of the program. As part of this responsibility the ET faculty takes primary responsibility of 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.

Program objectives and student outcomes are reviewed by all department faculty members. This is done on a regular basis by all members of the ET faculty. Course outcomes and objectives are summarized, and are mapped to program outcomes and student objectives to assess how well they are being met. The faculty will then discuss what areas need improvement, and what action is recommended. The faculty will also review the outcomes and objectives to see whether modifications are recommended. If a situation arises where a change is required in the interim, the entire ET faculty meets and follows the above procedure to determine recommended actions.

The process described above leads to faculty initiated recommendations. In addition, the department periodically reviews recommendations made by employers, students and alumni through surveys and meetings of the external advisory board. These recommendations may also result in recommended actions.

The department will inform the dean of proposed action items, and will present them to the next meeting of the external advisory board. Any proposed actions involving significant

modification to the curriculum or program will then go through a formal approval process by the curriculum committee.

The process to modify an existing course or create a new course or program is through the Curriculum Committee (CC) of the Academic Senate of the California Maritime Academy. The Curriculum Committee, with representatives from each department, serves three primary functions:

- 1) It functions as the official archives for the curriculum of the institution. The master-documents of the committee constitute the state-of-the curriculum for the institution.
- 2) It functions as the institutionally designated vehicle-of-change for all modifications to the curriculum.
- 3) It functions as an academic policy-making organ of the institution.

With respect to the responsibility for modification of the curriculum, the following policies apply:

- All requests for changes in the curriculum, including new programs or courses, or significant modification of existing programs or courses, are evaluated by the Curriculum Committee (CC).
- Proposals for program or course changes can be initiated by a faculty member, an academic administrator, or a student.
- An official Curriculum Change Request is required to start the process. The form, which includes assessment and evaluation methods, along with all the appropriate documents, is submitted to the appropriate department chair(s). The chairs of all affected departments conduct an internal review of the request. A vote of the proposed change is conducted within each affected department. The form and the results of the tally of the department along with a Department Chair Questionnaire are forwarded to the Academic Dean.
- The Academic Dean reviews the proposal and all related documents. The Dean may choose to provide additional written commentary and forwards all the documents to the Chair of the Curriculum Committee.
- The CC Chair will call for an open meeting to consider the proposal and vote on it. The CC recommendation will then be forwarded to the appropriate academic administrator for final approval and implementation of the curriculum change.
- A curriculum change is implemented after the approval by the department, the CC, and the appropriate administrator.

CRITERION 7 – FACILITIES

A. Offices, Classrooms and Laboratories

There are several facilities that make up the physical plant for the performance of engineering instruction at CMA.

Training Ship Golden Bear

First and foremost is the Training Ship Golden Bear (TSGB). The Training Ship is a 500-foot vessel that the Academy uses for shipboard training of cadets, both in-port and at-sea. The vessel makes two sea-going voyages each year, with the exception of 2012 and 2013 due to State of California budgetary issues. We anticipate return to two cruises in the future. Each voyage is a minimum of 60 days 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. Since summer 2012, TSGB has only made a one two-month training cruise.

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 oily 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.

In addition to the student operation of the main systems of the ship outlined above, they also have complete responsibility of the operation and maintenance of all the hotel systems for the ship, which must provide for 350+ residents during the training cruise. Systems include the all water handling from production with seawater evaporators to final treatment of gray and black water sewage, HVAC, fire protection and electrical power.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use and program computer-based automation

- Demonstrated ability to operate a marine power plant
- Demonstrated understanding of issues in working on a team
- Demonstrated ability to function as a member of a small team
- Demonstrated ability to lead a team
- Demonstrated ability to use electrical/electronic knowledge to marine engineering systems
- Demonstrated ability to analyze energy systems for efficiency and performance
- Demonstrated understanding of ethical issues in engineering
- Demonstrated understanding of social responsibilities
- Demonstrated understanding of issues of pollution from ships
- Demonstrated understanding of safety as it relates to the marine industry

Training Ship Upgrading and Maintenance

- The Maintenance and Upgrading of the Training ship is under the direction of the Vessels Master and Chief Engineer.
- Day to day maintenance is directed by the Training Ship's First Assistant Engineer. Much of the daily work is accomplished by ship's permanent crew. In addition, CMA MET student's have STCW obligations. These require a direct participation in engine room operation and maintenance. Students participate in many of the ship's engineering crew tasks.
- Continuing improvements are done annually through federally funded (MARAD) Dry Dock and Voyage Repair / Upgrade projects.
- Each year large scale projects such as Main Engine disassembly, and refurbishing ships structure / machinery are done in fall and spring periods. In many projects, CMA engineering students participate in Engine repairs and refurbishments.
- Upgrades to ship board classrooms include New Classroom Computer, Projectors, new screens and white boards, Chair/ Table replacements, New Carpets, and Flooring. In 2012 and scheduled 2014 there have been and will be major HVAC upgrades.
- Complete engineering laboratory refurbishment accomplished in spring of 2012.
- New Diesel Simulator Training Lab (computer / monitors / control consuls installed spring 2013.
- In 2013 all computers in the computer laboratories were replaced including new monitors.

Machine Shop

The Machine Shop has 19 engine lathes of various capacities, one "conventional" milling machine, four knee-type milling machines with digital readouts, three drill presses, two band saws, 10 bench grinders and a surface grinder. New to the Machine Shop are a three-axis CNC milling machine and a two-axis CNC lathe.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use technical/operational/maintenance manuals, material specifications and industry regulations
- Demonstrated ability to use instruments for measuring

- Demonstrated understanding of the measures of quality and timeliness and how these measures are applied
- Demonstrated understanding of safety as it relates to the marine industry

Weld Shop

Cal Maritime's Weld Shop 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 shop also has a metal shear, a sheet metal brake, a hydraulic press and a bench grinder. New to the Weld Shop is a two-axis CNC plasma cutter. One classroom is shared between the Weld Shop and the Machine Shop.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use technical/operational/maintenance manuals, material specifications and industry regulations
- Demonstrated understanding of the measures of quality and timeliness and how these measures are applied
- Demonstrated understanding of safety as it relates to the marine industry

Power Lab (Dwyer Hall)

The Power lab in Dwyer hall is stocked with many components. The primary component is a working Cogeneration plant which utilizes a gas turbine. The hot exhaust from the turbine is then used to generate steam. There is also a working 150KW diesel generator set. A 12-cylinder locomotive diesel engine affords students the opportunity to observe the workings of its valves and crankcase. In the middle of the room is an eight-stage steam turbine with its case separated to demonstrate each stage of the steam path through the turbine and out through the condenser. The turbine is attached to a reduction gear set, with its herringbone gear train displayed through an acrylic window. There is a classroom area set up for small diesel repair, with various small four-cylinder diesels about the classroom area in various stages of teardown. There is a refrigeration trainer used to show the various valve line-ups of a typical shipboard refrigeration system. There are various small cutaways and parts of pumps, valves and turbines available as training aids. There are four classrooms available on the second floor of the lab.

Performance criteria this facility helps attain:

- Demonstrated ability to analyze energy systems for efficiency and performance

Diesel Simulator

CMA's Diesel Simulator 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 in on this room also. 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 instructor can provide instructions or act in other typical shipboard roles over the phone or loud speaker system similarly to typical communications on a vessel. The simulator also has environmental sound to provide a more realistic simulation experience to the students.

Student learning outcomes and performance criteria this facility helps attain:

- 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 analyze energy systems for efficiency and performance
- Demonstrated ability to analyze the performance of power plants

Steam Simulator

This facility has a mockup of two marine boilers with two burners each, plus a full mockup of a typical marine boiler with cutaways to allow visual access to its internal components. There is a separate room with a typical marine steam engine room operating system console. There are other consoles for monitoring ship's service steam generators and a ship's service diesel generator. Above and behind the console sits a separate room with an instructor's station inside. The instructor can monitor operations through a one-way mirrored window. The instructor can provide instructions or act in other typical shipboard roles over the phone or loud speaker system similarly to typical communications on a vessel. The simulator also has environmental sound to provide a more realistic simulation experience to the students. There is yet another ante-room that contains a small working boiler, steam valve cutaways and various steam turbine parts.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated understanding of the design requirements of complex marine systems
- Demonstrated ability to analyze energy systems for efficiency and performance
- Demonstrated ability to analyze the performance of power plants
- Demonstrated understanding of issues of pollution from ships
- Demonstrated understanding of safety as it relates to the marine industry
- Demonstrated ability to analyze the performance of power plants
- Demonstrated ability to operate a marine power plant

Materials Lab

The Materials Lab has workstations for 12 students. There are three mobile computer workstations and two fixed, dedicated workstations. The lab has a Charpy pendulum/hammer testing machine, a tensile test machine with dedicated computer data collection workstation, a Creep test machine complete with weights, a Universal tester, which doubles as a manual stress/strain tester and as a Brinell hardness tester. There is also a

Rockwell hardness tester. There is an abrasive saw for the precision cutting of metallurgical samples, a specimen mounting press and a variable speed grinder-polisher for preparing steel samples for microscopy. There is a 20x-50x-100x microscope with built-in camera for metallurgical microscopy. There are two 1000-degree centigrade ovens for heating metal samples. There is a fixture and hoses for performing Jominy end quench tests.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use computer tools
- Demonstrated ability to use technical/operational/maintenance manuals, material specifications and industry regulations
- Demonstrated ability to apply mathematical tools for solving marine engineering problems
- Demonstrated ability to develop lab procedures given the desired results
- Demonstrated ability to use instruments for measuring
- Demonstrated ability to write a technical report
- Demonstrated ability to analyze and interpret results of experiments
- Demonstrated ability to function as a member of a small team

Fluids Lab

The Fluids lab boasts a wind tunnel capable of 0-4440 feet per minute, a working gas turbine model, an engine test platform for measuring intake and exhaust air, torque and RPM, a flow analyzer, a conduction heat transfer demonstrator, and a heat exchanger demonstrator. There are five fixed, and two mobile workstations.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use computer tools
- Demonstrated ability to use technical/operational/maintenance manuals, material specifications and industry regulations
- Demonstrated ability to apply mathematical tools for solving marine engineering problems
- Demonstrated ability to develop lab procedures given the desired results
- Demonstrated ability to use instruments for measuring
- Demonstrated ability to write a technical report
- Demonstrated ability to analyze and interpret results of experiments
- Demonstrated ability to function as a member of a small team

Instrumentation and Controls Lab

This lab has one instructor's and six student computer workstations and six lab workstations. There are six PLC training consoles, one servo trainer and one ball and beam trainer, along with several printed circuit trainers.

Student learning outcomes and performance criteria this facility helps attain:

- Demonstrated ability to use computer tools

- Demonstrated ability to use technical/operational/maintenance manuals, material specifications and industry regulations
- Demonstrated ability to apply mathematical tools for solving marine engineering problems
- Demonstrated ability to develop lab procedures given the desired results
- Demonstrated ability to use instruments for measuring
- Demonstrated ability to write a technical report
- Demonstrated ability to analyze and interpret results of experiments
- Demonstrated ability to function as a member of a small team

Classrooms

All classrooms and labs on the campus have internet access, permanent projection capabilities and document cameras for the instructor, whiteboards, window treatments, tables, chairs and paint. Wi-Fi internet and fiber-optic cable exist throughout the entire campus, including residential facilities and the Training Ship. In many of the lecture classrooms, each student's desk has ports for power and data access. Four of the classrooms are equipped with networked Smart Board interactive technology display systems.

The Classroom Building has six classrooms plus a computer center with 24-stations which is open for all students 24 hours each day of the academic year.

The Technology Building has eight classrooms for lectures, an electrical/electronic laboratory and an HVAC laboratory.

The Laboratory Building contains a computer classroom with 24 work stations and several specialized labs. These labs include individual fluids, materials, mechanics, design, instrumentation a control, chemistry and physics laboratories. Several of these laboratories themselves may also be used as classrooms. The campus tutoring center is in this building as well. It contains computer workstations and an instructor station as well as administrative space for the tutoring programs. Additionally there is a small teaching lounge area in the tutoring center.

The campus Auditorium is occasionally partitioned to provide three additional classrooms. It is also used for large events associated with the various cohorts on campus (e.g., all ET majors meeting).

The Training Ship has four traditional classrooms and several specialized areas for diagnostics, computer training and discipline specific training. There is also a computer lab and technical library that are used throughout the academic year and while the vessel is on summer training cruises.

B. Computing Resources

Cal Maritime has a full redundant network infrastructure that has 10GB backbones and 1GB connectivity in both computer labs. The 1GB redundant Internet connection provides high speed connectivity to external locations. Cal Maritime has two computer labs, each with 24 students, one instructor PC and a projection unit. The computers in the labs are current

workstations with “Intel i5” processors running at 3.2 GHz, with 4 GB of RAM, and 500GB hard drives. The computers have onboard Intel HD graphics which allow them to run most applications. High end Dell 22” monitors are on all lab desk and the PC’s are running Windows 7 for the operating systems.

Additionally, all engineering laboratories are outfitted with computers as required by the activities that occur in them. An example of this would be our Material Science laboratory that is outfitted with three workstations that are used for data acquisition and data processing associated with the materials laboratory courses. These systems are current with the requirements of the courses they support.

Students have computers available in the library, at the student services facility, the tutoring center, on the ship and in the residence halls. All facilities, outside of the ship, have Wi-Fi accessibility. The ship provides Ethernet due to the constraints of wireless transmission in a steel vessel. Many of the classrooms, in addition to Wi-Fi, have both utility and Ethernet support available for students’ computers.

CMA has a distributed printing system that allows faculty and staff to print at almost any location on campus. Near faculty offices and classrooms there are several high volume, networked, printer/copier/scanner systems available for use. In specific laboratories, there are color printers available to support the laboratory activities.

Students have a point card system that is available to them that is part of their campus credentials. This allows them to make prints and copies at several locations on campus for a fee.

Cal Maritime has the following software installed on each computer in the labs:

- Microsoft Office
- Internet Explorer
- Media Player
- QuickTime
- VLC media player
- Firefox
- ARCGIS
- Matlab
- SolidWorks
- NI Labview
- Smart Tec
- PTC Creo
- ANSYS
- Adobe Suite
- MiniTab
- Mathmatica

The hardware and software, as well as the instructional support for faculty and technical support for the computing facilities, are meeting the needs of the ET program and its students.

Hardware and software are regularly updated. Most recently, in the summer of 2012, all computers in both student laboratories were completely replaced. Additionally, most of the faculty workstations were also replaced with new equipment at that time. As software updates become available they are typically installed between semesters to allow sufficient time for compatibility issues to be resolved.

The campus uses Kaspersky Endpoint Security for Windows on every campus computer to insure a minimum amount of disruption from external threats and attacks.

C. Guidance

The ET programs are based in the operations and maintenance of vessels and facilities that require significant training in the safe use of systems, specialized equipment, computers and tools. Students are instructed by experienced trained experts in their field in the use of specific tools associated with the completion of their tasks. Instruction begins with simple tools (each student is required to carry a knife and flashlight in many laboratory and operational courses), such as hand tools. As their abilities improve, they learn to safely operate sophisticated tools such as refrigeration evacuation and exchange systems. Ultimately, once they complete the program, they are qualified to safely operate and maintain all the systems associated with either a complex building plant or the complete engineering plant of an ocean-going ship, including all auxiliary systems.

Introductory computer training is provided early in the students' experience so they all have a common basis from which more sophisticated computer tools can be taught. Students are taught basic skills such as Microsoft Office Suite. They have instruction from the library faculty on techniques of finding, vetting and reporting information. In more advanced computer instruction they use design, analysis and data acquisition tools such as SolidWorks and LabView. Additionally, they are thoroughly instructed in the use and application of engineering calculators.

Safety is foremost in our curriculum. Every one of our laboratory and operations based courses begins with specific instruction about safety. Safety concepts are reinforced continually throughout the courses and specific training is provided when appropriate (e.g., use of SCBA). Students must wear appropriate safety equipment when the situation arises. They are required to possess their own safety shoes, hearing protection, safety glasses at all times when required. Safety training is first in foremost in our curriculum. They receive specialized training in multiple areas such as the requirements of working in confined space or with hazardous materials.

Typical Course Safety Strategy Example:

On the first day of the course EPO 215 and 315 (Manufacturing Processes I and II, respectfully), students are given a briefing on safe working practices and the safe operation of each type of machine tool in the shop. They are then given a safety quiz on what they learned. Students must achieve a grade of 85% or higher on the quiz before they can work in the shop. There is also a section in each course syllabus that addresses shop safety. A copy of the course syllabus, safety briefing and safety quiz are available in the EPO 215 and EPO 315 course booklets and on the associated course's learning management system. Additionally, during the course, students are questioned about safety behavior and their situational awareness by the instructional staff. If students' responses are found to be deficient they are instructed in the proper technique or behavior for the specific situation.

In the machine shop, each machining evolution that students are required to perform is demonstrated before the students attempt them. The instructor is always present on the shop floor when students are performing their work, moving from machine to machine, ensuring safe and proper work. Often there is a teacher's assistant present as an extra set of eyes, also circulating in the machine shop while students work.

To address the issue of safe and well maintained equipment, an assistant works in the Machine Shop to ensure all machines are maintained in safe and proper working order. For any building facility needs, the Facilities technicians are a phone call or an email away. They're good about responding quickly to any needs that may arise.

D. Maintenance and Upgrading of Facilities

California Maritime Academy has a facilities and maintenance crew on staff that handles the majority of the work required to keep the campus functioning well and orderly. The crew is overseen by a director of operations. A facility is maintained at a remote location on campus for offices, shops and stores. Both regular maintenance and repair are handled through a work order system with jobs given priority and assigned to the appropriate service unit, be it specialty trades or general services. Many of the small to medium repairs and upgrades to facilities are completed with the local staff. Upgrades requiring special skilled contractors are managed by the director of facilities or their designate.

Major upgrades are typically open for bid through a process dictated by the CSU. Once the project is determined, bids are received and reviewed by local campus planners and engineers as well as the CSU main office. Once a contractor is chosen, the planning department and the director of operations work closely to monitor the progress of the repair or upgrades.

Facilities are refreshed, including upgrades to infrastructure as required or on a scheduled basis. The upgrades typically include new furnishings, enhanced utilities as well as significant improvement of the installed technology. Currently one to two classrooms per year are receiving a complete floor to ceiling refreshes. Additional upgrades and enhancements, such as improved projection systems or the addition of smart technologies are also being completed.

Grounds are maintained and enhanced by local employees.

E. Library Services

The Academy library is located in the center of the campus. The Library supports the learning and research needs of the California Maritime Academy's Engineering Technology students and faculty by offering a wide array of services and resources.

The Library's general collection consists of over 50,000 items as well as many engineering journal titles in print, and a substantial collection of instructional and informational videos. Beyond the physical collection, the Library provides electronic access to many engineering related databases with full-text access to thousands of scholarly and trade journal articles. Parts of these research collections are located on the Training Ship during the summer to support the cruise program.

The library's web site is the portal for locating its information resources. Over 12,000 current periodicals are available online. In addition, books and other materials can be located and delivered within two weeks from virtually any U.S. library via the library's online service. Books and materials from other CSU campuses or area universities can be located and delivered within a few days.

Library instructors are provided through several courses to achieve a level of information competence and to ensure that all students are fluent in navigating the increasingly vast amount of information available to improve their studies and professional training. The instructors and resources are also available for faculty in conducting research.

For books and articles not directly available, the Library's interlibrary loan (ILL) program consists of two services, LINK+ and OCLC. LINK+ provides easy discovery and rapid access to over 11 million physical items from over 50 regional academic and public libraries. Journal articles or books not available through LINK+ can be requested through OCLC, a national network of libraries.

For engineering students, the Library offers engineering-specific, in-class research workshops integrated across the curriculum. In addition, librarians offer in-depth, one-on-one research assistance and online research guides that direct students to key proprietary engineering databases and web resources. Students also may get direct assistance through email or QuestionPoint, a one-on-one, 24/7 chat research service provided by a national cooperative of academic libraries. Other popular Library services include: access to course reserve materials, study and collaboration space, computers, and equipment, such as eReaders, scientific calculators, and headphones.

For engineering faculty, the Library assigns one librarian to be a liaison with the Mechanical Engineering and Engineering Technology departments. This librarian offers instructional support, research assistance, assistance obtaining materials, and consults with the faculty on acquiring key resources. Faculty may opt to receive current awareness emails from YBP Library Services to review and recommend book titles for acquisition.

Off-campus programs, including online and hybrid classes, have access to all of the Library's online resources, including databases, research guides, email and phone help, and QuestionPoint, the 24/7 chat reference service.

The following Engineering journals, databases, and learning resources available through the Library:

Engineering Journals (print)

- ASHRAE Journal
- Diesel Progress
- Electrical Apparatus
- Engineered Systems (ES)
- Facilities Engineering
- Hydro International
- Intech (International Society of Automation)
- Journal of Applied Mechanics
- Journal of Computing and Information Science in Engineering
- Journal of Dynamic Systems, Measurement and Control
- Journal of Energy Resources Technology
- Journal of Engineering Education
- Journal of Engineering for Gas Turbines and Power
- Journal of Fluids Engineering
- Journal of Fuel Cell Science and Technology
- Journal of Heat Transfer
- Journal of Marine Engineering and Technology
- Journal of Mechanical Design
- Journal of Turbomachinery
- Machine Design
- Maintenance Technology
- Materials Performance
- Mechanical Engineering (ASME)
- Naval Engineering
- Plant Engineering
- Plant Services
- Pollution Engineering (PE)
- Power
- Power Engineering
- Progressive Railroading
- Sea Technology
- Turbomachinery International

CRITERION 8 – INSTITUTIONAL SUPPORT

A. Leadership

Leadership and management of the engineering technology program are provided primarily through the department chair. The department chair is elected to a three-year term by the members of the department, with subsequent approval by the president. It is a year-round position, but is part-time. A department chair receives 40% release time from normal teaching duties to serve as chair. A portion of this release time may be given to other department members who have been delegated with some significant duties outside of teaching by the chair. The department chair reports to the academic dean, and is expected to collaborate with department members in an atmosphere of shared governance.

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

1. Providing information and advice on the budget to the academic dean
2. Managing the department budget
3. Approving expenditures by the department
4. Working to ensure that faculty receive the support needed to teach effectively
5. Providing reviews of faculty performance and recommendations for retention, promotion and tenure (as one part of a larger process)
6. Facilitating the assessment process and its use to improve curriculum
7. Scheduling classes and faculty assignments
8. Serving as the department representative on various committees
9. Serving as the liaison between the department and its constituencies (industry, students, etc.)

The engineering technology department is responsible for the program quality, assessment, evaluation, and improvement. As part of this responsibility, ET faculty take primary responsibility of the courses they teach. This includes creating course portfolios to assess and evaluate course objectives and outcomes.

B. Program Budget and Financial Support

The Provost and Vice-President of Academic Affairs, with input from the Academic Dean, allocates the funding for the Academic Program. There is a certain amount funded annually for operations of the entire academic program. This amount is funded separately from the faculty and staffing allocation of the programs, which is considered as a recurring Position Control fund to cover the department basic faculty and staff cost including release time activities as determined by each department chair in consultation with the Dean. If extra sections are needed to accommodate increase of students and there is a need to hire more part time lecturers, the department chair, with the support of the Dean, submit a request with justifications to the Provost and VP of Academic Affairs for his approval for extra one time funds.

The 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 Mechanical Engineering (and Engineering Technology) 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 faculty computers, furniture, copying, paper, and other office supplies.

The Academic Dean also handles the equipment purchases funded through the California State Lottery program. This fund has been used for computer upgrades, faculty computers, software and lab upgrades and new equipment acquisitions. The engineering technology department has access to this fund and has encouragement and support from the Academic Dean that this fund is available for equipment to support and maintain the Engineering Technology labs and programs.

CMA does not have graders or teaching assistants at the Academy.

Teaching workshops are usually organized by the Center of Engagement, Teaching and Learning (CETL). The CETL supports faculty in developing teaching and learning innovations to enhance student learning and to improve the overall classroom experience. It provides opportunities and space for faculty to collaborate and to learn more about pedagogy and technology. Teaching workshops offered by the Center, which is budgeted at \$12,000 annually, are available to all full and part-time Cal Maritime faculty at all stages of their academic careers. Teaching workshops are offered in many formats such as:

Brown Bag Luncheons – Opportunities for faculty to share classroom innovations and other scholarship of teaching and learning techniques.

Workshops – Special speakers for pedagogy and/or technology training to enhance teaching and learning.

Retreats and Faculty Learning Communities – Events designed for faculty to work together on topics of special interest to the campus community.

Classroom Assessment – Private or small group consultation to develop classroom or program assessment strategies.

Support Faculty – Provide assistance for attendance at conferences in the field of Teaching and Learning when funds are available.

During the 2012-13 AY, fourteen teaching workshops were offered by the CETL covering a wide range of topics such as:

1. Geographic Information System (GIS)

2. Giving Students Ownership of their Learning
3. Extending Moodle; Advanced Features of Moodle
4. Authentic Learning FLC
5. Teaching Naked: Technology and E-Communication Webinar.

The sources of financial support needed to maintain, and upgrade the infrastructures, facilities and equipment used in the Engineering Technology Department as well as other departments are as follows:

The California State University General Fund

This is funding from the Cal State System based on enrollment and base requirements of the campus. The funding is distributed to Academic Affairs and from the Provost and VP of Academic Affairs through the Academic Dean to the individual Departments. The General Fund provides funding for faculty salaries and benefits as well as day-to-day operating expenses of the department.

After few tough years of budget cuts and uncertainties across all CSU campuses, the budget picture seems to be finally improving and stabilizing. In his budget which was approved in June 14, 2013, California Governor proposed a multi-year stable funding plan for higher education. It prioritizes higher education by providing new funds to begin reinvesting in California's public universities, with the expectation that the universities will improve the quality, performance and cost effectiveness of the educational systems. According to the Governor's budget, California State University System will receive up to a 20-percent increase in General Fund appropriation (about \$511 million) over a four-year period (2013-14 through 2016-17), representing about a 10-percent increase in total operating funds including tuition and fee revenues.

California State University Bond Funds for Capital Improvements

This funding is available for new construction and building equipment for the campus. New construction for the campus is based on a priority determined by the campus master plan. The last three buildings built on the campus have been academic lab buildings, each of which supported the Mechanical Engineering department in various ways.

California State University distribution of the State Lottery Fund

Cal Maritime typically receives about \$100,000 for equipment purchases each year through the lottery funds. The Academic Dean, working with the department Chairs determines the use of this funding, most of which supports computer infrastructure, programs and lab and equipment upgrades and replacements. In the past two academic years, almost \$100,000 of lottery funds was distributed to supply the ME and ET departments with new CNC Mill and CNC Lathe as well as their tooling hardware to be used in the student machine shop. In

addition, the ET department received over \$13,000 during the 2012-13 AY to replace its copy machine.

Institutional Reserve Equipment Pool Funding

Every year, departments are asked to submit proposal to purchase capital equipment items (a stand-alone item costing \$5,000 or greater that has a service life of greater than two years) from the “Institutional Reserve; Equipment Pool.” Department requests are prioritized at the divisional level and all requests are evaluated by the Budget Advisory Committee. In 2012-2013 AY, \$400,000 was available in the equipment pool funds for allocation of approved requests. The ET department received \$65,000 from the equipment pool to support the funding needed to develop a Kongsberg Diesel Simulation Lab on the Training Ship that would allow an instructor to create scenarios for students at three workstations. The remaining \$50,000 needed funds for this simulation lab was covered by the Academic Dean (\$25,000 from Lottery funds,) and the AVPAA (\$25,000 from Simulation.)

Campus Wholeness Funds

Starting in 2012-2013 AY, the President and the Provost and Vice President of Academic Affairs made available to all academic departments the amount of \$50,000 to be used to assist faculty in doing their jobs in teaching and research. The ET department received \$16,205.00 for Digital readout package for a milling machine and a lathe, repair the damaged platen on Satec Tensile Testing Machine in Materials Laboratory, and Drafting tools.

The Engineering Technology Program is one of only six degree programs at the California Maritime Academy, and typically includes about 25% of the entire student body. As such, the program is an integral component of the Academy mission, and receives all 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, and the Academic 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, the Provost and Vice-President of Academic Affairs, and the Academic Dean all 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.

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 appropriate level to its needs when compared to the overall resources of the Academy as a whole. Evidence of this support can be seen in the recent ET faculty hires, faculty salaries, recent laboratory upgrading and equipment purchases.

C. Staffing

Due to the relatively small size of the Cal Maritime community, most support personnel/staff for the Engineering Technology programs are shared by the entire campus community. This would include the following areas: Information Technology and Audiovisual Support, Assessment, Career Development, Registration & Records, Admissions, Simulation, clerical and Lab Technicians.

The support for the programs in the above areas, as relating to the programs' objectives, has been mainly sufficient. It is the responsibility of the Human Resources office to retain and train staff and in general has done a decent job in offering and supporting the needed training workshops and seminars to keep staff motivated and update their skills.

Career Development

The Career Center continues to be a great asset to our engineering students. The Career Center continues to assist engineering students in finding full time jobs and summer internships. There is a dedicated shore side Assistant Director which has added great value to the engineering program. The Career Center holds workshops, trainings, and other engineering focused Career related meetings to prepare engineering graduates for employment. With the Career Center's assistance in Career Fair's and on-campus employment our engineering graduates are obtaining nearly 100% employment each year within four months of graduation.

D. Faculty Hiring and Retention

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 academic dean for a new hire. The justifications for the new position are considered, as well as the budgetary considerations. This is followed by an official request for hiring, which requires approval by the Academic Dean and provost and Vice President of Academic Affairs.

Once the request has been approved, the human resources department will create an advertisement for the position. A search committee will be formed, and a chair of the committee chosen. The committee will review applications and choose a list of candidates to be interviewed. Candidates are brought to campus, and are interviewed by the committee, dean and provost. Candidates are also typically required to provide a teaching demonstration, and to meet with students and faculty from the department. Feedback from all sources are gathered by the search committee, which then reviews all information, makes a recommendation for hire and checks references. Following additional background checks, an offer of employment is then made by the Academic Dean after consultation with the Provost and Vice President of Academic Affairs.

The engineering technology department faculty has been relatively stable. 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 Cal Maritime. 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 encouraged to pursue development of their teaching skills. They are also provided feedback through periodic evaluations.

E. Support of Faculty Professional Development

During the fall semester 2012, academic departments received \$500/full-time faculty for professional development. This money was used or at least earmarked during the fall semester. The chairs of each department had the authority to approve the use of these funds for faculty members of his or her department. Any funds not used or earmarked by departments during the fall are forwarded to the Academic Senate’s Faculty Development Committee who then field professional development proposals from the entire faculty and distributes professional development funds for the remainder of the academic year.

The ET Department had 13 full-time faculty members, including full-time lecturers during fall 2012 semester and received \$6,500 for professional development. Three members of the department used or had earmarked \$3,890 for professional development.

Faculty	Activity	Amount Spent or Earmarked
Mike Strange	Attended ABET Accreditation Training Workshops, 2011-2012	\$650
Doug Rigg	Attended ABET Accreditation Training Workshop, San Diego Oct. 2012	\$640
Mike Strange	Attended ABET Accreditation Training Workshop, San Diego Oct. 2012	\$1,200
Jonathan Fischer	Attended ASEE CIEC Conf in Phoenix, Feb. 2013	\$1,400

Scholarship of Teaching and Learning (SoTL) Grant

In 2011, the Scholarship of Teaching and Learning (SoTL) Grant (\$25,000) was created for faculty who engage in the improvement of teaching and learning. This fund is designated for those who are interested performing classroom assessment or other assessment techniques designed to document improvements in teaching resulting in measurable increase in student learning outcomes.

In the fall 2012, Jonathan Fischer, Assistant Professor in the ET Department, applied for a SoTL Grant and he received \$1,500 for his project: *Online Learning Tools and Assessment for COM 220L Programming Applications for Engineers*. Jonathan proposed to develop an archive of online supplements and assessments, implement these supplements, study and give a presentation on their benefits to student learning. Jonathan began his project in the spring semester 2013 and will continue his work on the project in the fall 2013.

Academy-Wide Faculty Professional Development Fund

In 2012-2013, \$14,946 was available to faculty to attend and participate in professional conferences, workshops, classes, and other events.

Three ET faculty, Stan Hitchcock, Mike Strange, and Bob Smith applied for and received \$600, \$300, \$300, respectively, from the Academy-Wide Faculty Professional Development Fund to attend the HassTech 2013 Training Event in Oxnard, CA during April 2013.

San Francisco Port of Engineers Fund

The San Francisco Port of Engineers Fund, through the CMA Foundation, provides funds to engineering faculty (Engineering Technology and Mechanical Engineering) to further their professional development. At the beginning of the 2012-13 AY, \$9,646 was available in this fund.

No ET faculty for this 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 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 awarded for each grant is \$3,500/academic year.

No applications for this grant were submitted by any faculty member (all academic departments) in 2012-13 AY.

Chancellor's Office Research, Scholarship and Creative Activity Mini-Grants (RSCA Funds)

The RSCA Funds are provided by the Office of the Chancellor of the CSU. The funds are distributed to each CSU campuses 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. In the past, Cal Maritime has received approximately \$10,000 in RSCA Funds, but in 2012-13 AY and for the past two academic years, the Chancellor's Office has not provided resources to campuses for this fund.

Provost's Presentation Fund (PPF)

An important element of scholarship is the effective presentation of one's research. Additionally, presentation of scholarly activity at a meeting of a scholarly association increases the visibility of Cal Maritime. To promote faculty presenting at association conferences, the Provost/VPAA has established a PPF to assist in costs associated at attending such conferences. Faculty can receive up to \$500/conference where they will be presenting their research.

No applications for the PPF were submitted by faculty in the ET department in 2012-13 AY

Sabbatical Leaves

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 s/he 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.

No faculty from the ET department was on sabbatical leave during the 2012-2013 AY.

APPENDIX A – COURSE SYLLABI

Course Number and Name:

CHE 100: Chemistry I

Credits and Contact Hours:

3 Credits

Appointment by e-mail

Instructor's or Course Coordinator's Name:

Steven Runyon

Textbook, Title, Author and Year:

Introductory Chemistry: A Foundation, Hybrid; Zumdahl/DeCoste, 7th ed. ONLINE WEB LEARNING (OWL) ACCESS (ISBN: 9780538757089)

Specific Course Information:

This course is an intensive survey of the fundamental principles of inorganic chemistry. Primary emphasis is on atomic and molecular structure, atomic orbital theory, chemical reactions, stoichiometry, bonding theory, molecular geometry, thermochemistry, and the states of matter.

Specific Goals for the Course:

At the completion of this course, the successful student will be able to:

Solve quantitative chemistry problems and demonstrate reasoning clearly and completely. Integrate multiple ideas in the problem solving process.

Describe, explain and model chemical and physical processes at the molecular level in order to explain macroscopic properties and trends.

Classify matter by its state and bonding behavior using the Periodic Table as a reference.

Apply important theories such as the Kinetic Molecular Theory of Gases or the Quantum Mechanical Theory of the Atom to the solution of general chemistry problems.

Brief List of Topics to be Covered:

Atomic and Molecular structure; Atomic orbital theory; Chemical reactions; Stoichiometry; Bonding Theory; Molecular geometry; Thermo-chemistry; States of Matter.

Course Number and Name:

CHE 100L: Chemistry I Laboratory

Credits and Contact Hours:

1 Credit

Appointment by e-mail

Instructor's or Course Coordinator's Name:

Steven Runyon

Textbook, Title, Author and Year:

Lab notebook with duplicate sheets

Specific Course Information:

As a co-requisite, this course is designed to expand upon as well as reinforce chemical concepts introduced in Chemistry 100 and introduce students to processes, hardware, instruments and techniques employed in a chemistry laboratory environment. Topics addressed during experiments include metric measurement, properties of chemicals, chemical reactions, reaction stoichiometry, the ideal gas law, thermochemistry, and solutions.

Specific Goals for the Course:

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

- a. Apply basic experimental techniques to verify scientific principles introduced in the lecture (CHEM 100).
- b. Navigate safely and effectively around the chemistry lab.
- c. Perform chemistry experiments independently or in small groups.
- d. Discuss scientific results both in written and oral forms.
- e. Learn independently and present topics to audiences with greater facility.

Brief List of Topics to be Covered:

Metric measurement; Properties of chemicals; Chemical reactions; Reaction stoichiometry; Ideal gas law; Thermo-chemistry; Solutions.

Course Number and Name:

COM 220L: Programming Applications for ET Majors Lab

Credits and Contact Hours:

1 Credit

Section 1: Tue: 14:30-16:20

Section 2: Th: 14:30-16:20

Instructor's or Course Coordinator's Name:

Mr. Jon Fischer

Textbook, Title, Author and Year:

Excel for Engineers and Scientists; S.C. Bloch 2nd Ed.

a. All materials available on the CMA Moodle page for COM 220.

Specific Course Information:

a. (Specific skills students are expected to learn in this course)

In 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.

In Mathematica

4. Solve simultaneous equations of any order.
5. Apply the solve function to physics problems.

In Matlab

6. Import data from files into matrices.
7. Perform basic matrix manipulation and algebra.
8. Perform basic statistical analysis within matrix data (max, min, mean, etc)

In LabView

9. Build basic programs that generate results based on user inputs.
10. Build a block diagram that simulates an industrial process.

TI-89:

11. To give students the ability to effectively use their calculators to perform engineering calculations.

Specific Goals for the Course:

a. (General description of what a student should expect to DO in the course)

1. To use computers to effectively graph and analyze engineering data.
2. To develop and write basic computer programs to solve measurement and engineering problems.
3. To use computers to solve basic algebraic, trigonometric, and calculus based
4. To gain basic competency in the following computer applications: Mathematica, Matlab, LabView

5. To gain advanced competency in Microsoft Excel.

Brief List of Topics to be Covered:

Basic competency in using Excel, Mathematica, Matlab, Lab View and the TI-89 programmable calculator.

Course Number and Name:

CRU 150: Sea Training I (Engine)

Credits and Contact Hours:

8 Credits

60 Day Training Cruise

Instructor's Name:

Engineering Technology Faculty

Textbook, Title, Author and Year:

Electricity, Fluid Power, and Mechanical Systems for Industrial Maintenance; **Thomas Kissell**; Prentice Hall; USBN: 0-13-896473-4

Modern Marine Engineers Manual; Volume 1; Hunt

- a. Other Supplemental Materials: Soldering Kit; A100

Specific Course Information:

This course is the first at-sea experience on the training ship for the students. 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.

All knowledge and practical STCW assessments must be satisfactorily completed to attain a passing grade. A grade of C- (70 %) or better must be earned to certify attainment of minimum competency. A Cruise Completion Book will be issued to each 3/C cadet enrolled in CRU 150 for the purpose of documenting completion of STCW requirements.

NOTE: Students who pass EPO 125 Introduction to Marine Engineering with a grade of C- (70 %) or better will be granted credit for those STCW competencies that are based upon PT Examination. However, all students are required to take all written exams and pass all practical training.

Pre-Requisites: DL 105, DL 105L, EPO 110, EPO 125

Specific Goals for the Course:

1. Demonstrate proficiency in watchstanding, day work, and in practical skills grounded in modern marine engineering principles.
2. 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.
3. Gain competency in engineering skills useful to future course work at CMA and to a successful career in marine engineering.

Brief List of Topics to be Covered:

The course is conducted in sixteen training rotations. Students will be assigned to watch, day work, 4th segment training, or practical training by division. The 4th segment training is broken up into four categories:

a) AMEOD/CC; b) Wiper; c) Special Projects; d) STCW Competencies/System Training Watch Officers, and day work supervisors will assign either a satisfactory or unsatisfactory evaluation at the end of each rotation. If a student's performance is deemed to be unsatisfactory, the grade with written comments must be recorded on the department approved "Engineering Evaluation Form". Under normal circumstances, the student should be given a written copy of the grade at the end of the work day in which the unsatisfactory performance occurred. Students will be required to go through a remediation process for any unsatisfactory performance evaluation. A panel of at least two licensed engineering officers will review the student's progress and make a determination for remediation. This panel has the authority to reduce a student's overall cruise grade and/or send the student to the commandant's office for disciplinary action in response to a serious deficiency/infraction.

Written examinations and computer-based training reports will be used to assess certain STCW competencies during practical training rotations. A minimum score of 70% is required to certify STCW competencies included in the written examinations. If a student fails any STCW assessment, a makeup examination will be administered to afford the student an opportunity for remediation and follow-on demonstration of STCW competency. If a student fails the makeup examination in any area, a panel of at least two engineering officers will review the student's progress and make a determination for remediation and satisfactory completion of cruise or cruise failure.

Practical STCW competencies are to be completed on watch or by special arrangement with a licensed engineer. If a student does not successfully complete a practical STCW competency the first time, he or she must go to the same engineering officer for their second assessment. If a student fails the second assessment, a board of at least two engineering officers will review the student's progress and make a determination for additional assessment or failure of the cruise.

Course Number and Name:

CRU 250: Sea Training II (Engine)

Credits and Contact Hours:

8 Credits

60 Day Training Cruise

Instructor's Name:

Engineering Technology Faculty

Textbook, Title, Author and Year:

Modern Marine Engineer's Manual-Volume I, Third Edition, by E. Hunt, Cornell Maritime Press, ISBN 0 87033-496-4

Modern Marine Engineer's Manual-Volume II, Third Edition, by E. Hunt, Cornell Maritime Press, ISBN 0 87033-537-5

Specific Course Information:

This course is a sixty (60) day sea training experience aboard a commercial or government vessel for students pursuing a USCG Third Assistant Engineer's License. Students are given the opportunity to work as a member of the vessel crew in performing vessel maintenance, standing engineering watches, and participating in regulatory mandated safety training. A Commercial Cruise Project including a journal of operational and maintenance experiences, technical descriptions and drawings of shipboard engineering systems, and a summary of measures to implement environmental and SOLAS regulation is required as part of the course.

Pre-Requisites: CRU 150, EPO 110, EPO 125, EPO 210, EPO 213, EPO 215, and EPO 220

Specific Goals for the Course:

This instruction contains the requirements for your commercial Cruise project report. Deadline: Your Cruise Project Binder must be submitted to the CMA Career Development Center within two weeks of your being discharged from the vessel. The binder can be delivered in person or by mail. If sent by mail the postmark documenting when the package was sent shall not exceed two weeks from time of discharge. One easy option is to place the completed binder into a USPS Priority Mail Medium #2 Flat Rate Box. The box is free from any United States Post Office, and the shipping cost is approximately thirteen dollars.

You must have 60 days of documented sea time to successfully complete CRU 250. A grade of incomplete will be recorded until the required sea time has been documented. It is highly recommended that the cadet copy all important papers to carry on their person when departing the vessel. Likewise you should also save a copy of all the Cruise Report Document electronic files to a flash drive and carry this with you. Baggage can sometimes be lost when traveling and it would be unfortunate if you had to repeat CRU 250 because your sea project was misplaced.

F. During the summer semester the cadet must be ready to meet their assigned commercial vessel whenever directed to do so. Do Not Make Any Plans That Would Limit Your Availability and then expect the Career Center to accommodate your schedule. Any cadet who fails to meet their assigned vessel will be immediately dropped from the CRU 250 Sea Training II course.

Brief List of Topics to be Covered:

Maintaining a daily journal and as described in the CRU 250 Instructions – provide information and drawings on main propulsion, auxiliary systems, electrical power plant, safety of life at sea (SOLAS) and miscellaneous topics.

Course Number and Name:

CRU 350: Sea Training III (Engine)

Credits and Contact Hours:

8 Credits

60 Day Training Cruise

Instructor's Name:

Engineering Technology Faculty

Textbook, Title, Author and Year:

Electricity, Fluid Power, and Mechanical Systems for Industrial Maintenance; Thomas Kissell; Prentice Hall; USBN: 0-13-896473-4

Instrumentation; 5th addition; Kirk, Weedon, & Kirk; American Technical Publishers; ISBN: 978-0-8269-3430-7

Specific Course Information:

During the cruise, the student will assume the responsibility for the proper performance of assigned duties and supervision of first cruise students in engineering tasks. Responsibilities include: 1) watch engineer, directly responsible to the licensed engineer for the operation of all equipment, ensuring all data is properly taken and recorded and all duties are properly performed; 2) accomplishment of engineering system maintenance and component repair; and 3) carrying out the duties of a Third Assistant Engineer under the supervision of the Chief Engineer.

Pre-requisites: CRU 250, EPO 310 and FF 200

Specific Goals for the Course:

1. By the end of cruise, the student will have demonstrated required STCW competencies to stand watch as a Third Assistant Engineer.
2. Student will demonstrate their ability to perform the watch duties of a 3rd Assistant Engineer.
3. Student will demonstrate their ability to competently manage a watch utilizing "Engineering Watch Team Management" techniques.
4. Student will demonstrate their knowledge of the training vessel engineering systems.
5. Student will demonstrate their ability to perform engineering repairs in a safe and responsible manner.
6. Student will demonstrate their ability to operate, troubleshoot, and maintain shipboard electrical equipment and instrumentation.

Brief List of Topics to be Covered:

Watchteam Management and Leadership
Industrial Safety
Industrial Electricity
Industrial Automation
Purifier Operation and Troubleshooting

Hydraulic and Electronic Speed Governors
Machinery Alignment
Diesel Engine Diagnostics
Hydraulics

Course Number and Name:

ENG 100: Engineering Graphics

Credits and Contact Hours:

2 Credits

Tuesday: 12:30-14:20

Instructor's Name:

Stan Hitchcock

Textbook, Title, Author and Year:

Instructional Workbook for Drafting, 4th Edition; by Paul Wallach and Dan Hearihy

Beginner's Guide to Solid Works 2012 – Level I; by Alejandro Reyes

Other Equipment/Material Requirements

Drafting Tools: 30/60- and 45-degree triangles, No. 2 pencil, ball-point pen or technical pen, circle template, compass, soft rubber eraser, pencil sharpener, flexible curve, white-out bottle.

Specific Course Information:

a. MOODLE

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Moodle, which is the course management software used for Cal Maritime courses. You are responsible for regularly checking Moodle for course updates. To access Moodle, go the CMA homepage and sign in with your CMA user ID (all lowercase) and password. Click on the Moodle icon and you will see this course along with the other courses you are presently enrolled.

b. Course Description

An introduction to engineering graphics, the primary media for developing and communicating engineering system design information. Preparation of technical drawings using drafting instruments and CAD software is based on ANSI standards and includes orthographic projections, dimensioning, and tolerances.

Work will be evaluated based on:

- Drawing details: Conventional orthographic views, proper descriptive views, sections scales, lines, LETTERING, etc.
- Design information: Proper tolerances specified, conventional notes and symbols, parts labeled or parts listed.
- Bills of Material.
- Dimensioning practices: Proper arrowheads, position of dimensioning, completeness of dimensions, dimensions illustrated on best views, etc.
- Draftsmanship: Thickness of lines, lettering, neatness, reproduction quality, etc.
- Title Block: Assignment title, student's name, course and section number, date and sheet number included.

Specific Goals for the Course:

a. Student Learning Objectives:

During this course, students will demonstrate their ability to:

Understand drawing symbols and tools for sketching, drafting and CAD

Develop a manual machine drawing

Develop a computer-aided machine drawing

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

SLO1 Demonstrate a familiarity with blueprint reading

SLO2 Demonstrate knowledge of sketching and manual drafting techniques

SLO3 Demonstrate Knowledge of CAD software tools and techniques

Brief List of Topics to be Covered:

Drawing details, design information, bill of materials, dimensioning practices, draftsmanship and title blocks.

Course Number and Name:

ENG 430: Naval Architecture, Sections 1-2

Credits and Contact Hours:

3 Credits

Mon, Wed and Fri: 1000-1050 (1), 1230-1320 (2)

Instructor's Name:

Michael Kazek

Textbook, Title, Author and Year:

Ship Stability for Masters and Mates; Barrass, C. B., and D. R. Derrett. 6th Ed. Burlington, MA: Elsevier Ltd., 2006. Print. ISBN: 978-0-7506-6784-5

a. Other Supplemental Materials:

Handouts will be posted to Moodle at least a week in advance and will also be **available during class**.

Baker III, Elijah. *Introduction to Steel Shipbuilding*. 2nd ed. New York: McGraw-Hill, 1953. Bound.

George, William. *Stability and Trim for the Ship's Officer*. 3rd ed. Maryland: Cornell Maritime Press, 1983. Print. ISBN: 0-87033-297-X

Gilmer, Thomas. *Modern Ship Design*. 2nd ed. Annapolis, MD: Naval Institute Press, 1981. Print. ISBN: 0-87021-388-1

Lewis, Edward V. *Principles of Naval Architecture, Volume 1, Stability and Strength*. 2nd ed. Jersey City, NJ: The Society of Naval Architects and Marine Engineers, 1988. Print. ISBN: 0-939773-00-7

Lewis, Edward V. *Principles of Naval Architecture, Volume 2, Resistance, Propulsion, and Vibration*. 2nd ed. Jersey City, NJ: The Society of Naval Architects and Marine Engineers, 1988. Print. ISBN: 0-939773-01-5

Rawson, K. J., and E. C. Tupper. *Basic Ship Theory, Volume 1*. 5th ed. Burlington, MA: Elsevier Ltd., 2001. Print. ISBN: 978-0-7506-5396-7

Rawson, K. J., and E. C. Tupper. *Basic Ship Theory, Volume 2*. 5th ed. Woburn, MA: Butterworth-Heinemann, 2001. Print. ISBN: 0-7506-5397-3

Tupper, Eric C. *Introduction to Naval Architecture*. 4th ed. Burlington, MA: Elsevier Ltd., 2004. Print. ISBN: 0-7506-6554-8

Specific Course Information:

a. This is a naval architecture survey course intended to introduce the student to ship nomenclature, intact and damaged stability theory and calculations, hull structural design considerations, ship resistance and propulsive power predictions, propeller selection concepts, and ship motions.

b. Pre-requisites:

ETs - ET 332, Strength of Materials; ET 340, Fluid Mechanics

MEs – ME 332, Mechanics of Materials; ME 340, Engineering Fluid Mechanics

ENG 430 fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of “C-minus” is required in the course to certify STCW competency.

Specific Goals for the Course:

Students will gain the knowledge and application of stability, trim and stress tables, and diagrams. Students will be able to calculate ship drafts, list and stability conditions following changes in weight, dry-docking or damage to the ship. Students will learn fundamental actions to be taken in the event of a partial loss of intact buoyancy.

Students will gain a general knowledge of the principal structural members of a ship and the proper names for various parts. Students will then learn how to calculate gross structural hull loads and estimate hull stresses under various loading conditions.

Students will also gain an understanding of selecting appropriate propellers for a ship and how to predict power requirements from towed model test data.

Learning Outcomes (LO)

- i. LO1: Exposure to the knowledge, techniques, skills and modern tools used in the field of naval architecture.
- ii. LO2: The ability to apply current knowledge and emerging applications of mathematics, science, engineering and technology to problems associated with naval architecture.
- iii. LO3: The ability to apply creativity in the design of systems, components or processes in the marine environment.
- iv. LO4: The ability to function effectively and lead teams.
- v. LO5: The ability to apply the principles of fluid mechanics, hydrostatic stability, materials, and dynamics to technical problems related to ships, marine equipment, and systems.
- vi. LO6: The ability to communicate effectively in a technical environment.

Brief List of Topics to be Covered:

Ship nomenclature, intact and damaged stability theory and calculations, hull structural design considerations, ship resistance and propulsive power predictions, propeller selection concepts, and ship motions.

Course Number and Name:

ENG 470: Engineering Management

Credits and Contact Hours:

3 Units

Tue and Thu: 12:30-1:45

Instructor's Name:

Dr. John Massey, Ph.D.

Textbook, Title, Author and Year:

Managing Engineering and Technology, Daniel Babcock and Lucy Morse, Prentice Hall International, Upper Saddle River, NJ
ISBN – 0-13-199421-2 (2007).

Specific Course Information:

This is a course in the fundamentals of engineering management. The course will cover the transition from engineering to management and provide a basis in areas of engineering management.

- a. Pre-requisite: Junior Standing

Specific Goals for the Course:

An understanding of general Engineering Management
An understanding of Engineering Economics and ability to solve problems
An understanding of the basics of Engineering Ethics
Familiarity with how Engineers must apply the basics of Project Planning, Scheduling, and Management.
Understand overall Planning and Forecasting, Decision Making and Controlling.
Awareness of Corporate and Project Organizations.
Comprehension of Quality Assurance and Control.
Familiarity with Managing Research, Design, and Production.
Familiarity with marketing Engineering Products and Services.

Brief List of Topics to be Covered:

Engineering Ethics
Project Organization and Management
Engineering Economics and Financial Evaluation
Maintenance Management and Supervision
Planning and Forecasting
Decision Making
Organizing
Leadership
Managing Research, Design and Operations
Marketing

Course Number and Name:

EPO 110: Plant Operations 1

Credits and Contact Hours:

1 Credit

Mon, Wed and Fri - AM class 0800-1040 - PM class 1330-1610

Instructor's Name:

Mike Andrews

Textbook, Title, Author and Year:

No textbooks are assigned students. All information research is available via The Ship's Technical Library.

The Training Ship's Technical library contains all operation, repair data for machinery installed aboard the ship and facility. In addition to repair and operation manuals, a ship's logistics computer is available for spare parts and machinery manual acquisition.

Students will be assigned outside projects to research the operation and maintenance of plant machinery. Information gathered will be from internet based company web sites.

a. Supplemental Study Materials

Students shall have access to a computer capable of access to the internet and an ability to print out assignments. In addition, students should have access to a digital camera for photo research of various projects.

- Technical manuals (company and manufacture web site via internet access)
- Drawings and piping network plans

b. Moodle

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Moodle. This is the course management software used for Cal Maritime courses. Supplemental Course Information placed on this site is provided by the courses instructor.

Students are responsible for regularly checking Moodle for course updates.

To access Moodle, go the CMA homepage and sign in with your CMA user ID (all lowercase) and password. Click on the Moodle icon and you will see this course along with the other courses you are presently enrolled.

c. Research Note Book

Students will be required to keep an updated note book for information and research conducted in class.

Specific Course Information:

This course is an introductory lab that will introduce the student into a marine and industrial power plant environment.

Ship and Engine room Plant familiarization Initially students will be given basic introductions to their “lab” space - the training ship Golden Bear.

Plant and workshop safety Students will learn the basics of shop safety practices, and personal safety requirements. The training ship’s engine room and various shop spaces are the practical engineering facilities. Students will learn skills through some lectures and participating in various skill training labs. Depending on the project and its relationship with course material, there will be direct involvement working alongside or observing the ship’s engineers. During the course of instruction, students will work under the direction of the training ship engineers and participate in various industrial maintenance tasks. Students will begin to use and demonstrate learned skills while participating in actual inspection, maintenance and repair of shipboard systems and equipment. This course intends to enhance student comprehension of engineering concepts taught in the classroom by applying theory of operation to actual observed and direct participation of marine / industrial system operation.

Specific Goals for the Course:

- a. **To introduce students to the skills needed in the practical maintenance and repair of industrial machinery, electric motors, and large diesel engines.**

Basic skills in research and critical thought /diagnosis are also a course objective. Engineering skills are emphasized to include the safe use of tools and equipment, maintenance procedures, and necessary cleaning and repair of equipment. Students will be expected to carry out all instructions and assignments with diligence and personal responsibility. Students will demonstrate satisfactory STCW competencies. During the entire course, established safety work practices and shipboard safety will be impressed upon each student.

- b. **Student Learning Outcomes (SLO)**

In addition to basic skills needed in a Marine or Industrial Facility students will be required to complete and pass a number of STCW skill tasks.

Brief List of Topics to be Covered:

Shipboard and Industrial Safety
Crane, winch and hoist signals
Safe use of electrical equipment
Causes of electrical shock
Paint, lubrication and repair procedures
Surface preparation techniques
Shipboard waste management and disposal
Routine preventative maintenance and repair actions
Application and maintenance of tools
Marine pollution prevention actions and regulations
Marine pollution disposal methods and use of anti-pollution equipment
Electrical and equipment lock out / tag out procedures

Course Number and Name:

EPO 125: Introduction to Marine Engineering

Credits and Contact Hours:

3 Credits

Tue and Thu: 0800-0915 for Section 1

Tue and Thu: 1430-1545 for Section 2

Instructor's Name:

Douglas Rigg

Textbook, Title, Author and Year:

1. *Engineering Cruise Notebook*, by Al MacLemor. Great description of our TSGB Systems
2. *Principals of Naval Engineering*, NAVPERS 10788-B.
3. *Machinist's Mate 3&2 (Surface)*, NAVEDTRA 12146
4. *Engineman 3*, NAVEDTRA 14331
5. *Basic Machines*, NAVEDTRA 14037

Other Supplemental Materials:

Various hand outs will be passed out in class and or posted on Moodle
You are responsible for regularly checking Moodle for updates.

Specific Course Information:

- a. An introductory course in marine engineering that develops a basic understanding of common shipboard systems, their functions, arrangement, major components and principals of operation. Hands on studies of the engineering systems aboard the *Training Ship Golden Bear* (TSGB) to reinforce the system concepts discussed in class.

Specific Goals for the Course:

- a. To develop competency in both theory and practice that will permit the student to:
 1. Understand basic marine engineering systems, their functions, arrangement, major components, and principals of operation.
 2. Develop the body of knowledge which can be described as "Marine Engineering Principals."
 3. Gain familiarization with the engineering systems aboard the TSGB.
 4. Become acclimated to the standards of watchkeeping.
 5. Gain basic preparation for professional or license exams.

b. Learning Outcomes:

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

1. Stand a competent watch as a Cadet during the summer cruise.
2. Be academically prepared for CRU 150 and Diesels 220.

Brief List of Topics to be Covered:

Shipboard Compartment Numbering, Main SW cooling System, Types of heat exchangers, Maintenance of heat exchangers
Aux SW system. Pipe fittings. Types and construction of valves
Tubing and Tubing connections. Pipe schedules
Filters and Strainers
Central Fresh Water system, Turbocharger intercoolers
Centrifugal Pumps
Positive Displacement Pumps, Lube Oil Systems
Diesel Engines, Air Start System, Bearings
Drive Train
Clutch, Reduction Gear, Brake
Stern Tube, Propellers
Steering Gear Systems
Steam Cycle, Types of Steam Traps
Aux. Boilers, Forced Circulation Boilers
Ships Service Generators
Electrical Generation

Course Number and Name:

EPO 125L: Introduction to Marine Engineering Lab

Credits and Contact Hours:

1 Credit

Tue and Thu: 1230-1420

Instructor's Name:

Lyle Cook

Textbook, Title, Author and Year:

TSGB Engineering Cruise Notebook Electronic copy will be posted on Moodle

a. Other Supplemental Materials

Principles of Naval Engineering Naval Education and Training Command Electronic copy will be posted on Moodle

Engineering graph paper from Campus Bookstore

Specific Course Information:

An introductory laboratory 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 the *Training Ship Golden Bear* (TSGB) reinforce engineering system concepts discussed in class.

Moodle

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Moodle, which is the course management software used for Cal Maritime courses. You are responsible for regularly checking Moodle for course updates.

Failure to turn in drawings will result in failing EPO-125L. Late drawings will not be accepted.

Specific Goals for the Course:

- a. To develop competency in both theory and practice that will permit the student to:
1. Understand basic marine engineering systems, their functions, arrangement, major components, and principles of operation.
 2. Understand the basic methods of system monitoring, instrumentation and principles of operation.
 3. Develop the body of knowledge, which can be described as "Marine Engineering Principles."
 4. Gain familiarization with engineering systems aboard the TSGB.
 5. Trace systems and complete required drawings.
 6. Become acclimated to the standards of watch keeping.

7. Basic preparation for professional or license examinations.
- b. During this course, students will demonstrate their ability to:
 1. Relate theory of operation to practical application through examination
 2. Produce system drawings from their observations (tracing)
 3. Stand a competent watch on the training ship

Brief List of Topics to be Covered:

Independent tracing of propulsion plant systems and drawings to include.

- TSGB general plant arrangement
- Central fresh water cooling
- Main engine jacket water
- Fuel oil service
- Main engine lubricating oil
- Start Air

Course Number and Name:

EPO 210: Ship Operations II

Credits and Contact Hours:

1 Credit

Appointment by e-mail

Instructor's Name:

Lyle Cook

Textbook, Title, Author and Year:

Ship's equipment technical manuals

a. Other Supplemental Materials:

All students participating in Plant Operations lab will have the following items:

- Hardhat (issued)
- Flashlight
- Gloves (two types, leather and knit cotton)
- Hearing protection
- Eye protection (safety glasses or safety goggles)

Specific Course Information:

This course is a practical engineering laboratory in which students will learn specific skills through direct involvement in the inspection, maintenance and repair of the shipboard systems and equipment. It is also intended to enhance student comprehension of engineering concepts taught in the classroom by applying theory of operation to actual system of operation.

Each student will be required to complete the STCW sign-off sheet as part of their assignments. Control sheets and study guides for the sign-offs will be provided.

EPO 210, Ship Operations II fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of "C-minus" is required in the course to certify STCW competency in the following areas:

a. Satisfactory Course Completion:

1. Attendance of each scheduled session
2. Satisfactory work performance determined by:
 - a. Attitude / Enthusiasm / Attentiveness
 - b. Engineering Ability / Quality of Work
 - c. Ingenuity / Resourcefulness
 - d. Leadership
 - e. Safety

3. Satisfactory completion of Lab reports/homework/assignments

Specific Goals for the Course:

To instruct students in the practical maintenance and repair routine required of engineering personnel while preparing the ship for annual training cruise. Basic engineering skills are emphasized including safe use of tools and equipment, maintenance procedures, and necessary cleaning and repair of equipment. Students will be expected to carry out all instructions and assignments with diligence and personal responsibility. Students will demonstrate satisfactory STCW competencies. Sound safety work practices and shipboard safety orientation will be major objectives to be impressed upon each student.

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

During this course, students will demonstrate their ability to:

- Properly select and safely use tools during the performance of maintenance
- Complete maintenance tasks assigned, including part replacement and proper documentation
- Use the ship's technical library to locate and properly utilize the available equipment technical manual
- Carry out assigned tasks with attention to required personal protective equipment
- Pass the required STCW proficiencies listed in the STCW section of this syllabus

Brief List of Topics to be Covered:

Using gaskets, sealants and packing materials
Maintenance and repair of electrical equipment
Detection of grounds in the electrical system
Pumps, piping and control systems
Reciprocating and gear pump maintenance
Valve maintenance

Course Number and Name:

EPO 213: Welding Lab

Credits and Contact Hours:

1 Credit

Mon/Wed/Fri: 11:00-12:00

Instructor's Name:

James McCarthy

Textbook, Title, Author and Year:

Welding Skills, by Joseph W. Giachino, William Weeks

Basic Welding Skills on CD available in library.

Specific Course Information:

This course provides experience in electrical welding, oxyacetylene welding, brazing and burning techniques sufficient to effect emergency repairs.

Arc Welding

1. Flat Position: a. Lap Joint, b. Tee Joint, c. Butt Joint
2. Vertical Position

Gas Welding

1. Fusion Welding
2. Mild Steel Filler Rod: a. Butt Joint, b. Lap Joint, c. Corner Joint, d. Tee Joint
3. Brass Filler Rod: a. Butt Joint, b. Lap Joint, c. Tee Joint
4. Oxyacetylene Cutting and Burning
5. Silver Braze

STCW: EPO 213 fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of "C-minus" is required in the course to certify STCW competency in various welding areas.

Specific Goals for the Course:

1. Each student will demonstrate the ability to weld using electric arc by satisfactorily welding various types of welds on three different joints using mild steel electrode.
2. Each student will demonstrate a thorough knowledge of good safety practices by satisfactorily applying them in the welding lab.
3. Each student will demonstrate the ability to weld using oxyacetylene torch by satisfactorily welding two sheet metal plates on three different joints using mild steel and brass filler rod.
4. Each student will plan, prepare, and safely cut a 3" circular hole in the plate using oxyacetylene process.
5. Each student will plan, prepare, and safely form two steel plates with a T-joint in a horizontal position using an electric arc welding process.
6. Each student will plan, prepare, and safely make a sweat joint forming the copper tube and coupling or fitting.

7. Each student will plan, prepare, and safely form a 90 bend on the copper tube using a tube bender.
8. Each student will plan, prepare, and safely conduct a visual inspection of a welded joint. Upon completion of the visual inspection the student will conduct a bend test in accordance with AWS standards.
9. Each student will plan, prepare, and safely conduct a non-destructive test of a welded joint. This test can be either a dye-penetrant test or a magnetic particle test. The student will conduct the non-destructive test in accordance with AWS standards.

Brief List of Topics to be Covered:

Arc and gas welding

Course Number and Name:

EPO 214: Boilers

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 12:30 – 13:20

Instructor's Name:

Scott Green

Textbook, Title, Author and Year:

Steam Plant Operations, 7th, 8th or 9th Edition, Everett B. Woodruff, et al, ISBN 0-07-036150-9 OR

Modern Marine Engineering Manual (Volume 1), 3rd Edition, Everett C. Hunt

a. Other Supplemental Materials:

"The Quick 'n' Dirty Guide to Running a Plant", 3rd Edition, S. Green (available online)

Specific Course Information:

BOILERS (EPO 214) is a study of the construction, operating principles, and maintenance of fossil fuel steam generation systems. We will introduce the various thermodynamic cycles and the plants in which such steam generators are used. The course will explore the systems associated with their operation. Although propulsion boiler systems will frequently serve as the platform for discussions, their relationship to similar shore side installations – including other forms of auxiliary steam generators - will also be discussed. Students will be introduced to key principles of marine engineering operations with regard to these systems and support machinery, as well as to emissions control, automation and common casualties inherent with such installations.

Special note: All provisions herein shall apply to all students enrolled in this course, regardless of whether or not you are in a licensing program, and regardless of major course of study. This is in the interest of fairness and collegiality with those for whom this course is mandatory for graduation. While this course does not have specific STCW competencies assigned to it, it is very much a requirement for licensure within current laws set forth by the United States Coast Guard. As such, all material contained herein is intrinsic to the knowledge and operation of any steam generator.

a. Pre-requisites: All: EPO 125 and EPO 125L

b. Co-requisites: All: EPO 230

Much of the course reference material - such as the syllabus, major assignments, handouts, etc. - may be found on my faculty web page accessible through clicking the link on the Academy's intranet Moodle Learning Management System ("LMS").

Specific Goals for the Course:

Students will gain the knowledge and application of essential engine plant operation principles of modern propulsion, power generation, process and auxiliary boilers. The fundamentals of basic steam cycles and relevant thermodynamics will provide the

framework for discussion of the construction and operation of a variety boilers and steam generators – including associated automation systems. Although the focus will be upon marine propulsion steam plants, salient points as they relate to shore-side steam facilities will also be discussed.

- a. LO1: learned 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.

LO2: familiarity with the arrangement and operation of steam propulsion plant systems, including typical periodic maintenance and inspection activities.

LO3: learned 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.

LO4: The ability to relate the principles of fluid mechanics, thermodynamics and physics to the operation of a large propulsion plant.

LO5: been introduced to the principles of casualty response in steam generator plant operation under common demanding circumstances.

LO6: begun preparation for the Steam Vessels sections of the U.S. Coast Guard examination for licensure as a Third Assistant Engineer Unlimited Horsepower

Brief List of Topics to be Covered:

The construction, operating principles, and maintenance of fossil fuel steam generation systems.

Steam propulsion plant and boiler controls

Course Number and Name:

EPO 215: Manufacturing Processes I

Credits and Contact Hours:

1 Credit

Mon/Wed/Fri: 11:00-12:00

Instructor's Name:

Stan Hitchcock

Textbook, Title, Author and Year:

No Textbook Required

a. Other Supplemental Materials:

Safety is paramount in the shop. For each and every class, you are required to provide your own safety glasses or goggles. Safety glasses or goggles must have clear lenses and must meet or exceed ANSI Z87.1-2003 safety specifications. Please come prepared with a notebook, a notepad and writing equipment.

Specific Course Information:

An introduction to machine shop practices utilizing engine lathes, precision measuring instruments and hand tools. Assigned projects include execution of designs developed by students in prior graphics design courses.

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on Moodle, which is the course management software used for Cal Maritime courses. You are responsible for regularly checking Moodle for course updates.

EPO 215 fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of "C-minus" is required to certify STCW competency.

Specific Goals for the Course:

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

- SLO1 Proper and safe use of hand tools for metalworking
- SLO2 Proper and safe use of bench grinder for grinding tool bits
- SLO3 Proper and accurate use of precision measurement instruments
- SLO4 Proper and safe use of lathes in manufacturing a part from a drawing

During this course, students will demonstrate the ability to:

- Interpret a drawing or sketch and devise a manufacturing process
- Select from different tools and tooling for manufacturing a part
- Use safe work practices with various machine tools in the shop

Brief List of Topics to be Covered:

Precision Measurement

Manufacturing Drawing and Process – Pump Shaft

Tool Grinding; Manufacturing Process – Heavy Hex Nut

Course Number and Name:

EPO 217: Shipboard Medical

Credits and Contact Hours:

1 Credit

Appointment by e-mail

Instructor's Name:

Douglas O'Brien, PAC

Textbook, Title, Author and Year:

International Medical Guide for Ships. 3rd edition

Specific Course Information:

Practical application and the principles of First Aid and Medical Care on board ship to meet STCW requirements. Topics include body structure and function, resuscitation techniques, bleeding control, shock management, burns, lacerations, muscle/skeletal injuries, spinal injuries, toxicological hazards, pharmacology, sterile, technique and radio medical advice.

Assessment Methodologies and Criteria:

Written examinations to assess the students understanding of the knowledge-based portion STCW guidelines. The instructor will demonstrate the clinical skills the Students will then be required to practice these skills and then be required to demonstrate competency.

EPO 217 fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of "C-minus" is required in the course to certify STCW competency.

Specific Goals for the Course:

This course meets the knowledge-based and clinical skills proficiency requirements of STCW Table A-VI/4-1 Assessment Guidelines. Each student must meet the standards of competence for Provider of Medical First Aid. This includes: Complete approved training and meet all the competencies in the table. Pass written examinations for the portion of the competencies on knowledge and understanding; successfully accomplish a practical demonstration of skill for selected competencies.

Brief List of Topics to be Covered:

- Anatomy I
- Anatomy II (Lab-Vital Signs)
- Skin Diseases (Lab-Dressings)
- History & Physical Exam (Lab-Practice H&P)
- Cardiac Arrest & Drowning (Lab-CPR)
- Trauma Care (Lab-Rapid Assessment Exam)

Course Number and Name:

EPO 220: Diesel Engineering I

Credits and Contact Hours:

2 Credits

Student may attend either the 1100-1150 and 1630-1720 class session. While the vessel is at sea classes will be held seven days a week unless otherwise indicated in the cruise calendar.

Instructor's Name:

Robert Jackson

Textbook, Title, Author and Year:

Diesel Engines, Marine Engineering Series, Third Edition, by A. J. Wharton, Butterworth/Heinemann, ISBN: 0-7506-0217-1

Modern Marine Engineer's Manual-Volume II, Third Edition, by E. Hunt, Cornell Maritime Press, ISBN 0 87033-537-5 (v.2)

Engineman 3, Naval Textbook provided to students in an electronic format

Specific Course Information:

This course is an introduction to the internal combustion engine utilized by industry and merchant vessels. Covered topics include basic theory, history of the diesel engine, gas exchange process, engine types, engine construction, engine parts, fuel injection, and merchant vessel propulsion. All diesel engine types are covered but emphasis is given to the crosshead type slow-speed diesel engine which is the dominant form of main propulsion for the world's merchant fleet.

Specific Goals for the Course:

At the end of this course the student should have a basic working knowledge of the diesel engine. The course prepares students for the motor section of the USCG Third Assistant Engineer's Examination

EPO 220 Diesel Engineering I fulfills requirements of the Standards of Training, Certification, and Watchkeeping (STCW) Convention. Students are required to demonstrate proficiency in their knowledge of the marine diesel engine. A grade of "C-" or higher is required for STCW certification.

Brief List of Topics to be Covered:

- Introduction to low speed diesels
- Gas exchange process
- Low speed engine parts 1
- Low speed engine parts 2
- Trunk engines
- Trouble shooting, diagnostics
- Fuel injection systems

Course Number and Name:

EPO 230: Steam Plant Operations

Credits and Contact Hours:

1 Credit

Mon/Thu: 11:00 - 12:00

Instructor's Name:

Scott Green

Textbook, Title, Author and Year:

Steam Plant Operations, 7th 8th or 9th Edition, Everett B. Woodruff, et al, ISBN 0-07-036150-9 *et seq*

Quick 'n' Dirty Guide to Running a Steam Plant, 3rd Edition, S. Green, Department Of Engineering Technology, California Maritime Academy (online)

a. Other Supplemental Materials:

All Online Course Content via Moodle provided by CMA

Other Recommended Reading Materials

Various course and reference materials will be posted to Moodle throughout the semester.

Modern Marine Engineering Manual (Volume 1), 3rd Edition, Everett C. Hunt
Steam and Gas Turbines Second Edition, Maida Saarlax, ISBN 1-59114-750-6

Specific Course Information:

This course provides an introduction to the operation of a typical marine steam turbine propulsion plant, with emphasis placed on operations of high-pressure boilers and associated equipment. The course consists of lecture and practical training in engineering systems, as well as interactive student-lead exercises in the Steam Plant Simulator facilities. The emphasis of this course is to provide the student with an understanding of the essentials of a high-pressure steam cycle and the ways in which various systems and components interact with other systems. This course prepares students (and is a pre-requisite) for Steam Plant Watch Team Management (EPO235).

a. Pre-requisites: All: EPO 125 & EPO 125L

b. Co-requisites: All: EPO 214

Specific Goals for the Course:

Students will gain the knowledge and application of essential engine plant operation principles as a vessel propulsion system is brought from a shipyard “cold” condition up to normal conditions with full steam pressure. The follow-on course – Watch Team Management - will continue with operation of main engines and turbo-generators. Each class section will be arranged as a particular ship’s crew, with assigned positions rotating appropriately during examination periods and for general practice. Although the focus will be upon marine propulsion steam plants, salient points as they relate to shore-side steam facilities will also be discussed. Primary attention will be given to the concepts of proper plant monitoring techniques (such as rounds, start-up/shutdown of equipment, data analysis, communications protocols, and critical thinking in a technical environment.)

Students will be introduced to the principles of Engine Room Resource Management (ERM) as set forth by the International Maritime Organization (IMO) of the United Nations, and learn to apply these skills during all vessel routines and classroom activities. Industry examples and historical events will be used in illustrating various key components to modern-day vessel operational watch techniques. Each student will have the opportunity to lead the other members of the Watch as the “Watch Engineer” for at least one examination exercise and for various practice sessions. As the specific watch assignment may or may not be announced prior to class, all students are required to be prepared to step into any role at any time. All class simulation will take place in real time, interspersed with instruction in procedures and progressing through to group exercises.

- a. LO1: Introductory exposure to the knowledge, techniques, skills and modern equipment used aboard typical ocean-going commercial vessels; LO2: The ability to apply current knowledge and critical thinking to operations problems associated with vessel propulsion and auxiliary plants; LO3: Introduction to casualty analysis techniques in managing various vessel status situations; LO4: The ability to function effectively within and to lead engineering watch teams; LO5: The ability to relate the principles of fluid mechanics, thermodynamics and physics to the operation of a large high-pressure steam plant; LO6: The ability to communicate effectively in a technical environment; LO7: Introduction to the application of situational awareness principles and crisis response techniques during potentially stressful situations; LO8: Introduction to the operation of propulsion boilers and auxiliary machinery, and to operation of a vessel under demanding circumstances.

Brief List of topics to be Covered:

- Light-off a main propulsion boiler
- Secure a main propulsion boiler
- Check boiler water level
- Maintain boiler water level
- Read boiler gauges
- Change out a burner

Course Number and Name:

EPO 235: Watch Team Management

Credits and Contact Hours:

1 Credit

Mon: 10:00 – 11:50 (Section 1)

Mon: 14:30 - 16:20 (Section 2)

Wed: 09:00 – 10:50 (Section 3)

Thu: 16:30 - 18:20 (Section 4)

Instructor's Name:

Scott Green

Textbook, Title, Author and Year:

Modern Marine Engineering Manual (Volume 1), 3rd Edition, Everett C. Hunt
"The Quick 'n' Dirty Guide to Running a Plant", 3rd Edition, S. Green (online)

a. Other Supplemental Materials:

Various course and reference materials will be posted to Moodle throughout the semester.

Steam and Gas Turbines Second Edition, Maida Saarlax, ISBN 1-59114-750-6
Steam Plant Operations, 7th, 8th, or 9th Edition, Everett B. Woodruff, et al,
ISBN 0-07-036150-9 *et al.*

Specific Course Information:

This course is a continuation of the principles of vessel operations introduced in EPO230 Steam Plant System Operations. Advanced turbine plant operating procedures and situational management strategies are covered in detail and will form the framework upon which each class session is built. Human factors such as fatigue, communications protocols, and personnel organization are also covered. Using the Academy's Steam Plant Simulator facilities, student teams will learn to operate all aspects of high-pressure steam propulsion and power generation plants and associated auxiliaries. This course will also expand the student's understanding of fundamental Crew Resource Management (CRM). It shall be assumed that all students enrolled in the course have a solid grasp of the procedures and concepts from all pre-requisite courses, and fundamentals courses (Physics, Introduction to Marine Engineering and Third Class Cruise). EPO 235 fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of "C-minus" is required in the course to certify STCW competency in the technical details of operating a ship at various status conditions.

Specific Goals for the Course:

Students will gain the knowledge and learn to apply essential engine plant operation principles as the vessel is brought from a shipyard "cold" condition to full at-sea status. Each class section will be arranged as a particular ship's crew, with assigned positions rotating appropriately. All events that take place – including those errors initiated by the student crew itself – will be taken as "vessel operations history" and will carry through from week to week. The student crew will report all salient events regarding vessel status

to Engineering and Deck Faculty as the appropriate regulatory, vessel and company representatives. Each “vessel” will be assigned a repair and operations budget from which costs incurred through student error will be deducted.

Students will increase their general knowledge of the principles of Engine Room Resource Management (ERRM) as set forth by the International Maritime Organization (IMO) of the United Nations, and learn to apply these skills during all vessel routines. Industry examples and historical events will be used in illustrating various key components of modern-day vessel operational watch techniques and implementation of the principles of CRM. Each student will have the opportunity to function at all levels of the Watch, from non-licensed rating through vessel Chief Engineer. All class simulation will take place in real time and will include routine log keeping and other administrative paperwork. Each student team will be tasked with developing and implementing appropriate ship’s safety protocols, certificates and tracking systems.

a. Student Learning Objectives:

Exposure to the knowledge, 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 the written and spoken word; Skills in the application of situational awareness principles and crisis response techniques during potentially stressful situations; Skills in the operation of propulsion and auxiliary turbines; Skill in operating a vessel under demanding casualty circumstances; Successful demonstration of associated competency skills required of the Standards of Training, Certification and Watch-keeping Convention 2010 *et seq.*

Brief List of Topics to be Covered:

- Prepare 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 a boiler high water alarm
- Respond to a boiler low water alarm
- Place a ship’s service turbo-generator on service

Course Number and Name:

EPO 310: Ships Operations III

Credits and Contract Hours:

1 Unit

Tue and Thu: 0900-1000

Instructor's Name:

Lyle Cook

Textbook, Title, Author and Year:

No Textbook

a. Other Supplemental Materials:

Required Safety equipment includes:

- CMA Hard Hat
- Hearing Protection
- OSHA approved safety glasses
- Work gloves
- Flashlight

Specific Course Information:

This course is a practical engineering laboratory in which students will learn specific skills through direct involvement in the inspection, maintenance and repair of shipboard systems and equipment. Supervision of equipment maintenance is emphasized. This course is also intended to enhance student comprehension of engineering concepts taught in the classroom by applying theory of operation to actual system operation.

Specific Goals for the Course:

To instruct students in the practical maintenance and repair routine required of engineering personnel while preparing the ship for the annual training cruise. Basic engineering skills are emphasized including safe use of tools and equipment, maintenance procedures, and necessary cleaning and repair of equipment. Students will be expected to carry out all instructions and assignments with diligence and personal responsibility. Students will demonstrate satisfactory STCW competencies. Sound safety work practices and shipboard safety orientation will be major objectives to be impressed upon each student.

Brief List of Topics to be Covered:

Bearings: Rolling Contact, Sliding Surface

Electric Motors: AC Motor Controllers I, Three Phase AC Motors

Pumps: Centrifugal Pump Overhaul, Centrifugal Pump Basics & Troubleshooting

Positive Displacement

Seals: Mechanical

Course Number and Name:

EPO 312: Turbines

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 0800-0850

Instructor's Name:

John Rodgers

Textbook, Title, Author and Year:

Hunt, Everett C. *Modern Marine Engineers Manual (Volume I)*. 3rd ed. Centreville, MD: Cornell Maritime Press, 1999. Print.

ISBN: 0-87033-496-4

Soares, Claire. *Gas Turbines- A Handbook of Air, Land and Sea Applications*, 2008.
Elsevier, Burlington, MA., USA

ISBN: 978-0-7506-7969-5

a. Other Supplemental Materials:

Supplemental reading materials will be posted to Moodle

Specific Course Information:

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.

a. Pre-requisite: EPO 214, Boilers

b. Co-requisite: EPO 235, Steam Plant Watch Team Management

Specific Goals for the Course:

EPO 312 is a study of the construction, operation and maintenance of steam turbines and condensers, gas turbines, reduction gears and propulsion shafting. Upon successful completion of this course, the student:

LO1: 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.

LO2: Will be able to 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.

LO3: Will 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.

LO4: Will be 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.

LO5: Will be able to 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.

LO6: Will have been exposed to the body of knowledge tested in the steam vessel section of the U.S. Coast Guard third assistant engineer examination.

Brief List of Topics to be Covered:

Steam and Gas Turbine Propulsion
Principles of Steam Plant Technology
Steam Turbine Nomenclature
Turbomachinery Fundamentals
Steam Turbine Construction
Steam Turbine Controls
Auxiliary Steam Turbines/Governors
Condensers and Air Removal Equipment

Course Number and Name:

EPO 315: Manufacturing Processes II

Credits and Contact Hours:

1 Credit

Mon/Wed/Fri: 13:30-14:20

Instructor's Name:

Stan Hitchcock

Textbook, Title, Author and Year:

None

Specific Course Information:

This is an intermediate course in machine shop practices utilizing engine lathes, milling machines, drill presses, precision measuring instruments and hand tools. Assigned projects include execution of drawings developed by students in prior graphics design courses.

Specific Goals for the Course:

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

SLO1 Demonstrate good work and safe habits when using hand tools for metalworking and when using machine tools

SLO2 Perform basic machining operations on engine lathes, milling machines, drill presses and bench grinders

SLO3 Perform proper and accurate use of precision measurement instruments

SLO4 Read engineering drawings and sketches to accomplish required operations on machine tools

During this course, students will demonstrate the ability to:

Interpret a drawing or sketch and devise a manufacturing process

Select from different tools and tooling for manufacturing a part

Use safe work practices with various machine tools in the shop

Brief List of Topics to be Covered:

Safe fabrication and repair methods

Plumb bob project

Machinist's clamp project

Drilling and threading a blind hole

Externally threading a hand die

Knowledge of metal work

The design characteristics in construction of equipment

Course Number and Name:

EPO 319: Facilities Engineering Diagnostics Lab

Credits and Contact Hours:

1 Credit

Wed: 19:00-21:00

Instructor's Name:

Douglas Rigg

Textbook, Title, Author and Year:

Practical Machinery Vibration Analysis & Predictive Maintenance.
by Cornelius Scheffer and Paresh Girdhar ISBN 978-0-7506-6275-8

a. Additional material will be provided on Moodle and passed out in class.

Specific Course Information:

This course provides an overview of modern facility maintenance programs.

It is a combination of lectures, laboratories and research paper preparation.

Preventive, predictive and reliability centered maintenance programs are examined and evaluated. The economics of maintenance programs are also analyzed. The laboratories examine the theory and application of vibration analysis, tribology and non-destructive testing. Also included is infrared analysis and rough shaft alignment techniques.

Specific Goals for the Course:

The student will gain an understanding of the major maintenance programs used in facilities today. The student will be qualified to step into facility maintenance program to perform maintenance work, evaluate the economics of maintenance and perform maintenance data acquisition and analysis. The student will gain an understanding of the diagnostic tools currently in use and how diagnostic tools are part of an overall maintenance program.

Brief List of Topics to be Covered:

Predictive Maintenance
Financial Implications
Vibration Monitoring and Analysis
Oil Analysis

Course Number and Name:

EPO 321: Introduction to Power Generating Plants

Credits and Contact Hours:

1 Credit

Mon/Wed: 13:00-15:00

Instructor's Name:

Pat Morris

Textbook, Title, Author and Year:

Modern Marine Engineer's Manual-Volume I, Third Edition, by E. Hunt, Cornell Maritime Press, ISBN 0 87033-496 (v.2)

Steam Plant Operations, Ninth Edition, by Woodruff, and Lammers, McGraw-Hill, ISBN 978-0-7-166796-8

Diesel Plant Simulator Lab Manual, compiled by Robert Jackson

Specific Course Information:

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.

Specific Goals for the Course:

Provide the student with an opportunity to learn the function and operation of all the various engineering systems found at modern power plants. All power plant engineering systems will be discussed in detail giving the student an insight into normal operation, common system problems, and the interaction between various systems. The simulator environment provides excellent training in the control & monitoring of a power plant using a centralized computerized control system similar to those used in industry. Students will be instructed in all procedures necessary to start various power plants from an off-line, through start up, base-loaded and maximum power conditions. Instruction will be given on normal maintenance, operation parameters, and fault analysis for each engineering system. Subjects covered within this course include modern heat recovery techniques, engine exhaust emissions, and combustion analysis. Students will be organized into small groups while in the Full Mission Simulator to provide training in Power plant Team Management techniques. This training will foster good communication and trouble-shooting skills in an environment similar to that which would be found at many power plants during normal operation and under the extremely stressful conditions encountered during emergency situations.

Brief List of Topics to be Covered:

For Full Mission Training and Assessment, the class will be broken up into two teams (Blue & Red) with four student members on each team. One of the team members is

assigned the lead position of (O&M) Operations and Maintenance Manager and the other three students are assigned to the support roles of (OMT's) Operator Maintenance Technicians. All the training positions are assessed for Watch Management/Situational Awareness, Power Plant Operations/Engineering Knowledge, and Team Preparedness. The Operations and Maintenance Manager position is rotated between the student team members after each assessment scenario. The final grade for the Full Mission Trainer is determined by the improvement demonstrated by the team over the entire course. Each assessment period is also a learning experience for the students and this distinction allows the students the flexibility to make a mistake in one scenario without it seriously affecting their average. But it must be stressed that for this portion of the training the instructor is assessing the competence of the entire team as a whole. Therefore it is very important that all team members train together to insure that all are ready and competent to complete the scenario.

Watch Management/Situational Awareness

The (O&M) Operations and Maintenance Manager will be evaluated on his/her effectiveness as a leader in developing a cohesive team which can efficiently monitor plant operations, diagnose system faults and find the best solutions to mechanical failures or system malfunctions. Student demonstrates a situational awareness of power plant requirements, and the ability to prioritize actions according to importance of events during normal and emergency situations. Also assessed under this category is the student's ability to maintain effective lines of communication with each team member, and the Plant Manager. The entire team is evaluated on its demonstrated ability to act quickly and professionally to resolve any emergency situations that may occur in the plant. All student team members must follow proper watch procedures and instructions from superior officers in a professional manner.

Plant Operations/Engineering Knowledge

Student team demonstrates their knowledge of the engineering plant and associated systems. This includes plant layout, engineering systems, operating parameters and equipment light off/securing procedures.

Team Preparedness

Student team has a cohesive well prepared plan which has been developed prior to the assessment scenario. The team as a whole is responsible for the individual preparation of each member of their team. The performance of team members in the PTT assessment will have a strong impact on this category of the team evaluation.

Course Number and Name:

EPO 322 & EPO 322L: Diesel Engineering II/Simulator

Credits and Contact Hours:

1 Credit (Lecture) and 1 Credit (Lab)
Appointment by e-mail

Instructor's Name:

Robert Jackson & Patrick Morris

Textbook, Title, Author and Year:

Pounder's Marine Diesel Engines and Gas Turbines, Ninth Edition, by Doug Woodyard, Butterworth-Heinemann, ISBN 978-0-7506-8984-7

Diesel Plant Simulator Lab Manual, compiled by Robert Jackson

a. Other Supplemental Materials:

Modern Marine Engineer's Manual-Volume II, Third Edition, by E. Hunt, Cornell Maritime Press, ISBN 0 87033-537-5 (v.2)

Compendium Marine Engineering, by Seehafen Verlag, DW Media Group GmbH, ISBN 978-387743-822-0

Specific Course Information:

The student will be given an introduction to the operation of slow-speed diesel propulsion systems. The course consists of lecture and practical training in engineering systems and proper operating procedures. The student will learn to operate a heavy-fuel diesel-propulsion plant under normal operating conditions. Students will learn to work effectively as a team to diagnose combustion & machinery faults under emergency conditions representative of those encountered on an operating vessel. The emphasis of this course is Engine Team Management techniques utilizing the simulator as an instructional tool to train the students in good communication and problem solving even during stressful conditions which can occur during casualty situations.

a. Pre-requisite: EPO 220 Diesel Engineering I

Specific Goals for the Course:

Provide the student with an opportunity to learn the function and operation of all the various engineering systems found on a modern marine slow-speed motor vessel. All major motor vessel engineering systems will be discussed in detail giving the student an insight into normal operation, common system problems, and the interaction between various systems. The simulator environment provides excellent training in the control & monitoring of a power plant using a centralized computerized control system similar to those used in industry. Students will be instructed in all procedures necessary to transition a motor vessel from a completely dead "cold ship" condition to the vessel operating at full power on an ocean voyage. Instruction will be given on normal maintenance, operation parameters, and fault analysis for each engineering system. Subjects covered within this course include diesel engine starting systems, diesel engine reversing systems, modern heat recovery techniques, diesel engine exhaust emissions, and combustion

analysis. Oily Water Separator operation and Inert Gas System/ Crude Oil Cargo procedures will be discussed as well as the student's professional and ethical social responsibilities to prevent oil pollution to the world's oceans. Students will be organized into small groups while in the Full Mission Simulator to provide training in Engine Team Management techniques. This training will foster good communication and troubleshooting skills in an environment similar to that which would be found on a motor vessel during normal operation and under the extremely stressful conditions encountered during emergency situations.

Brief List of Topics to be Covered:

- Electrical Distribution & Automatic Buss Transfer
- Motor Vessel Fresh Water Cooling Systems
- Mechanical Fuel Injection
- Mechanically Actuated High-Pressure Fuel Pumps
- Electronic Fuel Injection
- Motor Vessel Steam Systems
- HFO Service Systems
- Marine Fuel Oil Storage, Transfer & Treatment Systems

Course Number and Name:

ET 110: Introduction to Engineering Technology

Credits and Contact Hours:

1 Credit

Tue and Wed: 08:00-08:50

Instructor's Name:

Michael Kazek

Textbook, Title, author and Year:

Bibliography – Donaldson, Krista, *The Engineering Student Survival Guide*, 3rd Edition, New York: McGraw Hill, 2005, ISBN: 978-0-07-286890-6

a. Other Supplemental Materials:

Handouts made available on MOODLE at least a week in advance and will also be handed out during class.

Specific Course Information:

ET 110 is a survey course for incoming students in the Engineering Technology program. The Engineering Technology curriculum, individual strategies for academic success, professional career opportunities in engineering technology and basic safety training are included in the coursework.

Specific Goals for the Course:

Gain an understanding of the Engineering Technology profession; the educational requirements, the people and what they do; Develop personal goals for their tenure at CMA; Develop time management skills to ensure academic success; Develop an understanding of the requirements for employment in the Engineering Technology profession; Develop an understanding of the benefits associated with membership in a professional society; Develop an understanding of the skills required for success in the field of Engineering Technology; Develop a class schedule for Spring Semester 2013. Develop a basic understanding of Occupational Safety to include hearing protection, eye protection, electrical safety, electrical lockout/tagout (including TSG), and confined space entry.

Learning Outcomes (LO)

LO1 Recognize the need for and gain an ability to engage in lifelong learning, including the need for updating technical knowledge and skills.

LO2 Develop and understanding of the Engineering Technology profession.

LO3 Develop a respect for diversity and knowledge of contemporary professional, societal and global issues.

Brief List of Topics to be Covered:

Time management

Curriculum management

Goal setting

Hearing Protection

Eye Protection
Electrical Safety
Lockout / Tagout
Confined Space Entry

Course Number and Name:

ET 230: Properties of Materials

Credits and Contact Hours:

2 Credits

Mon and Wed: 13:30-14:20

Instructor's Name:

Michael Strange

Textbook, Title, Author and Year:

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

a. Other Supplemental Materials:

Handouts and assignments will be posted to Moodle when they become relevant.

Callister, William D., Jr., *Materials Science and Engineering: an Introduction*, 7th ed., Hoboken, NJ, John Wiley & Sons, Inc., 2007, Print, ISBN: 978-0-471-73696-7.

Van Vlack, Lawrence H., *Elements of Materials Science and Engineering*, 6th ed., Saddle River, NJ, Prentice-Hall, 1989, Print, ISBN: 978-0201093148.

Shackelford, James F., *Introduction to Materials Science for Engineers*, 7th ed., Saddle River, NJ, Prentice-Hall 2009, Print, ISBN: 978-0-13-601260-3.

Smith, William & Hashemi, Javad, *Foundations of Materials Science and Engineering*, 5th ed., New York, NY, McGraw-Hill, 2009, Print, ISBN: 978-0073529240.

Specific Course Information:

Examination of the properties of materials from the atomic to the macroscopic levels, looking at crystal structures and the application of materials to engineering systems. Emphasis is on metals, but nonmetals are discussed. Mechanical properties, creep, fatigue, corrosion and failure characteristics are covered. Current usage of advanced materials is also discussed.

Copies of the course materials such as the syllabus, course schedule, assignment handouts, etc. may be found by logging on to your Moodle account.

a. Pre-requisites: CHE 100, CHE 100L, MTH 210

Specific Goals for the Course:

Students will gain an understanding of materials from interactions on the atomic level to selection and specification of engineering materials in design.

Additionally students will become aware of several factors that engineers must be account for when specifying materials. Students will also become familiar with forensics, analysis and prediction of failure modes for components. Others include, but are not limited to environment, fracture, fatigue, performance and aesthetics.

Finally, students will be exposed to methods, techniques and practices commonly used in engineering. These include communication of technical material, problem solution strategy and information distillation.

LO1: Exposure to the knowledge, techniques, skills and modern tools used in the field of material science.

LO2: The ability to apply current knowledge and emerging applications of mathematics, science, engineering and technology to problems associated with material science.

LO3: The ability to evaluate and analyze the contribution of materials 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.

Brief List of Topics to be Covered:

Atomic Structure & Bonding

Crystalline Solids

Imperfections in Solids & Dislocations

Diffusion and Time Dependent Processes

Mechanical Properties

Strengthening Mechanisms

Failure, Fracture and Fatigue

Phase Diagrams

Phase Transformations and Microstructure Kinetics

Corrosion Mechanisms

Polymeric Materials

Application, Processing and Design of Materials

Course Number and Name:

ET 230L: Properties of Materials Lab

Credits and Contact Hours:

1 Credit

Tue: 08:00-09:50

Instructor's Name:

Stan Hitchcock

Textbook, Title, Author and Year:

Donald Askeland and Pradeep Fulay, *Essentials of Materials Science and Engineering*, Second Edition, Toronto: Cengage Learning, 2009. ISBN: 978-0-495-24446-2. This is the same text used in ET 230, Properties of Materials.

a. Other Supplemental Materials:

Copies of the course materials including, but not limited to the syllabus, major assignment handouts, and homework may be found on my faculty web page accessible through clicking the following link: <http://moodle.csum.edu/>

Specific Course Information:

This course compliments ET 230, Properties of Materials. Students will investigate the physical characteristics of different metals through testing, data acquisition, and calculations and submit reports based on established laboratory report guidelines. Students learn how the properties described in ET 230 are derived. The different experiments are outlined in the course schedule.

a. Co-requisite: ET 230

Specific Goals for the Course:

Students will gain the knowledge, proficiency and understanding of properties and parameters considered in the design, fabrication and repair of systems and components and the application of safe working practices in the workshop environment.

LO1: The ability in the laboratory setting to use proper practices and instrumentation for measuring physical phenomena; 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.

Brief List of Topics to be Covered:

Identification of Metals

Hardness Testing

Charpy Impact Test

Fatigue Test

Microscopy

Tensile Test
Creep Test
Jominy End Quench Test

Course Number and Name:

ET 232: Statics

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 10:00-10:50

Instructor's Name:

Jon Fischer

Textbook, Title, Author and Year:

Mechanics: Combined Statics Study Pack & Dynamics, 12/E by Hibbeler (c) 2010 ISBN-10: 0138149291

Specific Course Information:

Statics begins a comprehensive two semester study of the fundamental concepts of engineering mechanics. The first semester is concerned with statics, which is the study of force systems, equilibrium, and moments.

a. Prerequisites: MTH 210 Tech. Calculus 1, PHY 200 & 200L:Engineering Physics I

Specific Goals for the Course:

LO1: Demonstrated ability to apply mathematical tools to solving marine engineering problems

LO2: Demonstrated ability to use computer tools

LO3: Demonstrated ability to use instruments for measuring

LO4: Demonstrated ability to analyze and interpret results of experiments

LO5: Demonstrated ability to improve process and design

LO6: Demonstrated understanding of issues in working on a team.

LO7: Demonstrated ability to function as a member of a small team including providing individual contributions to the team.

LO8: Demonstrated ability to lead a team

LO9: Demonstrated ability to apply engineering principles of thermodynamics, fluid mechanics, statics, dynamics, mechanics of materials and electrical circuits to marine engineering problems.

LO10: Ability to apply electrical and electronics skills to marine engineering systems especially automatic controls

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
Conditions for Rigid Body Equilibrium
Free Body Diagrams and Equations of Equilibrium
Conditions for Rigid Body Equilibrium
2 and 3 Force Members
3D Problems
Structural Analysis: Simple Trusses
Method of Joints
Structural Analysis: Method of Sections

Course Number and Name:

ET 250: Electrical Circuits
ET 250L: Electrical Circuits Lab

Credits and Contact Hours:

Lecture (3 Credits); Lab (1 Credit)
Mon/Wed/ Fri: 8:00AM to 8:50AM

Instructor's Name:

T. E. Mancilla

Textbook, Title, Author and Year:

“Electrical Engineering, Principles & Applications”, 5th edition by A. R. Hambley

Specific Course Information:

The course covers ac and dc electric circuits; transient behavior of circuits is treated along with introductory electronic devices: diodes and amplifiers.

STCW: ET 250 L, Electrical Circuits Lab fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of “C-minus” is required in the course to certify STCW competency in the following areas:

Specific Goals for the Course:

Analyze simple ac and dc circuits using network reduction, mesh and node 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 circuit behavior; calculate circuit time constant and performance
Assemble a 555 timer circuit that meets desired frequency specifications
Use the Thevenin 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
Assemble simple Operational amplifier circuits for voltage gain and filtering purposes
Describe single diode rectification of ac to produce dc with minimum ripple voltage
Use oscilloscopes, wattmeters, 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

Brief List of Topics to be Covered:

Resistive Circuits
Inductance & Capacitance
Transients
Steady State Sinusoidal Analysis
Frequency Response, Bode Plots, and Resonance

Course Number and Name:

ET 330: Dynamics

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 10:00 – 11:00

Instructor's Name:

Mr. Jon Fischer

Textbook, Title, Author and Year:**For ET 232 and ET 330:**

Mechanics: Combined Statics Study Pack & Dynamics, 12/E by Hibbeler (c) 2010 ISBN-10: 0138149291

For just Dynamics

Mechanics: Dynamics 12/E by Hibbeler (c) 2010, ISBN: 0136077919

Specific Course Information:

Motion and force analyses for particles and rigid-bodies are studied in two and three dimensions. The principles of dependant and relative motion, work, and energy, conservation of energy, & impulse and momentum are applied to engineering system components.

- a. Pre-requisite: ET 232

Specific Goals for the Course:

1. Develop an ability to analyze particle motion along straight and curved paths and to solve problems involving position, velocity, and acceleration in time.
2. Develop an ability to analyze the accelerated motion of a particle using a free-body diagram and the equation of motion in various coordinate systems
3. Become familiar with the principle of work, energy, and develop an ability to solve problems using force, velocity, and displacement.
4. Become familiar with the concept of conservative force and develop an ability to solve kinetic problems by applying the principle of conservation of momentum.

- a. Student Learning Objectives

LO1: Ability to apply mathematical tools to solving marine engineering problems.

LO2: Ability to apply engineering principles of thermodynamics, fluid mechanics, dynamics, mechanics of materials, and electrical circuits to marine engineering problems

Brief List of Topics to be Covered:

Statics Review

Calc Review

Intro to Kinematics

Rectilinear Motion

Erratic Motion
Curvilinear Motion
Projectile Motion
Motion of a Projectile Normal and Tangential Components
Dependant Motion Analysis

Course Number and Name:

ET 332: Strength of Materials

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 2:00 – 3:00

Instructor's Name:

Dr. Dinesh Pinisetty

Textbook, Title, Author and Year:

Mechanics of Materials, 3rd Edition, Timothy A. Philpot, John Wiley & Sons, Inc., ISBN: 978-0-470-56514-8, 2011.

Handouts and assignments will be posted to iLearn when they become relevant.

Specific Course Information:

Strength of Materials (sometimes called Solid Mechanics or Mechanics of Materials) is fundamental to the understanding of how components and members behave under service loads. It provides us with methodology to predict the performance and even the failure of devices we depend on. The basic science taught allows for predicting the strength of a component (such as the arm of a jib crane) 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 with the profession. Basic techniques taught will be applicable to many situations and are routinely used in at component (e.g., stress in turbine shaft during spin-up) and system levels (e.g., stresses in ship plates due to wave loading)

b. Pre-requisite: ET 232, MTH 210 (Technical Calculus I)

Specific Goals for the Course:

Upon successful completion of this course, students will gain:

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.

Brief List of Topics to be Covered:

Introduction and review of basic concepts

Stress-Strain Mechanical Properties of Materials

Normal stresses; Stress concentrations; Residual Stresses

Torsion

Bending
Shearing stresses
Combined loadings
Stress Transformations
Design of Beams
Factors of Safety
Deflection of Beams
Buckling of Columns

Course Number and Name:

ET 340: Fluid Mechanics

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 11:00 – 12:00

Instructor's Name:

Dr. Dinesh Pinisetty

Textbook, Title, Author and Year:

Applied Fluid Mechanics, 6th Edition, Robert L. Mott, Pearson-Prentice Hall,
ISBN: 0-13-114680-7, 2006.

a. Other Supplemental Materials:

Handouts and assignments will be posted to iLearn when they become relevant.

Specific Course Information:

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.

Specific Goals for the Course:

LO1: The students learn about the properties of fluids including density, specific weight and viscosity and how they are used.

LO2: 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.

LO3: The student learns how to select equipment for fluid power systems including pumps, piping, fittings, fans, ducts and instrumentation.

Brief List of Topics to be Covered:

Nature of Fluids
Viscosity of Fluids;
Pressure Measurements
Forces Due to Static Fluids
Buoyancy and Stability
Flow of Fluids and Bernoulli's Equation
General Energy Equation
Reynolds Number, Laminar Flow, Turbulent Flow
Velocity Profiles
Pipe Losses
Pump Selection and Application
Open Channel Flow
Forces Due to Fluids in Motion
Drag and Lift

Fans, Blowers, Compressors and the Flow of Gases
Flow in Air Ducts

Course Number and Name:

ET 340L: Fluid Mechanics Lab, Sections 1-4

Credits and Contact Hours:

1 Credit

Tue: 0900-10:50; 12:30-14:20; 14:30-16:20; Thu: 14:30-16:20

Instructor's Name:

Michael Kazek and Dr. Dinesh Pinisetty

Textbook, Title, Author and Year:

Mott, Robert. *Applied Fluid Mechanics*. 6th ed. Upper Saddle River, NJ: Pearson Education Inc, 2006. Print.
ISBN: 0-13-114680-7

a. Other Supplemental Materials:

Safety is paramount in the lab. You are required to bring your own safety glasses. If there are any special requirements for a particular lab, you will be told the week prior. Lab assignments are posted to Moodle in the Fluid Mechanics Laboratory Manual.

Specific Course Information:

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.

a. Co-requisite: ET 340

Pre-requisites: MTH 211 Calculus II,
PHY 205 Engineering Physics II

Specific Goals for the Course:

Students will gain the knowledge, proficiency and understanding of fluid mechanics as the field of study relates to parameters considered in the fabrication and repair of systems and components typically found in industry.

LO1 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.

LO2 The ability to function effectively 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.

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
Hydraulics

Course Number and Name:

ET 342: Refrigeration and Air Conditioning

Credits and Contact Hours:

2 Credits

Tue and Thu: 0700-0750

Instructor's Name:

Michael Kazek

Textbook, Title, Author and Year:

Althouse, Andrew; Turnquist, Carl; Bracciano, Alfred. *Modern Refrigeration and Air Conditioning*. 18th ed. Tinley Park, IL: The Goodheart-Willcox Company, Inc., 2004. Print

ISBN (13): 978-1-59070-280-2

ISBN (10): 1-59070-280-8

Althouse, Andrew; Turnquist, Carl; Bracciano, Alfred. *Study Guide: Modern Refrigeration and Air Conditioning*. Supplement to the 18th ed. Tinley Park, IL: The Goodheart-Willcox Company, Inc., 2004. Print

ISBN (13): 978-1-59070-281-9

ISBN (10): 1-59070-281-6

a. Other Supplemental Materials:

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on my faculty web page accessible through clicking the following link:

<http://oldmoodle.csum.edu/moodle24/>

Specific Course Information:

The course compliments the learning objectives and course outcomes in ET 342 L, Refrigeration and Air Conditioning Lab. The course covers the major aspects of marine, residential and commercial refrigeration and air conditioning systems (AC&R). Topics included are specifically designed for refrigeration and air conditioning operations and maintenance. The text includes an introduction to commercial AC&R fundamentals, types of commercial units, load calculations, system controls, maintenance, troubleshooting, and servicing procedures.

Co-requisite: ET 342L

Pre-requisite: ET 344, Thermodynamics

Specific Goals for the Course:

Students will gain the knowledge, proficiency and understanding of AC&R as the field of study relates to parameters considered in the troubleshooting and repair of commercial systems found in industry. Specifically,

A general understanding of AC&R systems, operations, and maintenance.

The ability to perform load calculations.

The ability to use Psychrometric and Pressure-Enthalpy diagrams.

A general understanding of heating system design.

A general understanding of refrigeration systems and their management.
A general understanding of compression and absorption AC&R systems.
A general understanding of AC&R control systems.
A general understanding of AC&R systems design.
A general understanding of troubleshooting techniques for AC&R systems.

LO1 Demonstrated ability to apply mathematical tools to solving marine engineering problems (Program outcome 2.1)

LO2 Demonstrated ability to design mechanical systems (Program outcome 4.2)

LO3 Demonstrated ability to apply engineering principles of thermodynamics, fluid mechanics, statics, dynamics, mechanics of materials and electrical circuits to marine engineering problems (Program outcome 6.1)

Brief List of Topics to be Covered:

Fundamentals of Refrigeration
Compression Systems
Refrigerant Controls
Electrical-Magnetic Fundamentals
Electric Motors
Electric Circuits and Controls
Domestic Refrigerating and Servicing
Commercial Systems and Applications and Servicing
Absorption Systems
Refrigeration and Air Conditioning Loads
Heating and Humidification
Air Distribution Calculation, Measurement and Cleaning
Central Air Conditioning and Heat Pumps
Air Conditioning Control Systems, Servicing and Troubleshooting

Course Number and Name:

ET 342L: Refrigeration and A/C Laboratory

Credits and Contact Hours:

1 Credit

Mon: 9:00-10:50 and Tue: 12:30-2:20

Instructor's Name:

Patrick Morris

Textbook, Title, Author and Year:

Modern Refrigeration and Air Conditioning, By Althouse/Turnquist/Bracciano, The Goodheart-Wilcox Publishing Company ISBN: 978-0-7506-7969-5

- a. Supplemental reading materials will be posted to Moodle.

Specific Course Information:

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 conditioning systems, chill water systems, absorption systems, refrigerated vans, and ice machines. Basic AC circuits, single-phase electrical motor theory and motor starter operation and troubleshooting will be covered in detail.

Specific Goals for the Course:

ET 342L: The objective of this course is to provide the student with an opportunity to learn to troubleshoot and maintain common marine refrigeration and air conditioning systems. The student will experience the normal operations of actual equipment, develop the ability to analyze operational data, and implement repair procedures to understand the construction, operation and maintenance of marine refrigeration and air conditioning systems.

LO1: Gain the needed technical skills to operate and maintain refrigeration that would be installed in an industrial plant and merchant ships.

LO2: The industrial trainers located in the refrigeration laboratory and the refrigeration equipment located on the T/S Golden Bear will be utilized for this training.

LO3: The student will gain a basic understanding of refrigeration controls, compressors, condensers, evaporators, auxiliary equipment and flow control devices.

LO4: Basic troubleshooting, maintenance, tools and repair procedures will also be covered.

LO5: Will be able to explain the principles of thermodynamics and mechanical engineering related to the design of refrigeration and air conditioning systems. 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 refrigeration and air conditioning systems.

LO6: Will have been exposed to the body of knowledge tested in the EPA examination.

Brief List of Topics to be Covered:

Start / Stop Refrigeration System

Energize and Secure A/C System
Energize and Secure Ventilation System

Course Number and Name:

ET 344: Thermodynamics

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 14:30-15:20

Instructor's Name:

Michael Kazek

Textbook, 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., 2011. Print. ISBN: 978-0470-49590-2

Specific Course Information:

A study of the basic laws of thermodynamics and their application to propulsion and heat-power generating systems: steam and gas turbines, internal combustion engines, and vapor-compression refrigeration systems. The learning outcomes meet USCG Domestic Licensure requirements as set forth in CFR Table 11.950-2(a), Subjects for Engineer Officer Endorsements.

- a. Pre-requisite: PHY 200 & PHY 200L – Engineering Physics

Specific Goals for the Course:

LO1: The use of closed system energy balances for analysis of systems undergoing thermodynamic cycles.

LO2: 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.

LO3: Steady-state control volume analysis, using appropriate assumptions and property data.

LO4: The use of the Second Law of Thermodynamics to assess heat engine and refrigeration cycles.

LO5: 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.

LO6: Thermodynamic analysis of vapor power systems, internal combustion engines, gas turbine power plants and vapor-compression refrigeration systems.

Brief List of Topics to be Covered:

Thermodynamic Systems
Thermodynamic Properties
Equilibrium
Laws of Thermodynamics
1st Law Applied to Control Volumes
Enthalpy
Application to Closed / Open Systems
Refrigerator and/or Heat Pumps

Properties of Pure Substances
Steam Power Cycle
Gas Power Systems
Diesel Cycle Analysis

Course Number and Name:

ET 350: Electrical Machinery
ET 350L: Electrical Machinery Lab

Credits and Contact Hours:

3 Credits (Lecture) & 1 Credit (Lab)
Mon/Wed/Fri: 1:30-2:30

Instructor's Name:

Terrance E. Mancilla

Textbook, Title, Author and Year:

Electrical Engineering Principles and applications, 5th ed, Allan Hambley

a. Other Supplemental Materials:

References: Industrial Electricity and Motor Controls-Miller & Miller
Electric Motors and Controls- UGLY'S Pocket Guide

Specific Course Information:

This course covers the fundamentals of magnetism, magnetic circuits and transformers. Included are principles and operation of series , shunt , compound DC generators and motors; single phase and three phase AC generators, synchronous and induction motors, DC and AC motor controllers, and stepper motors ; and system protective devices and safety.

- a. Co-requisite: ET 350L
- b. Pre-requisite: ET 250 Electrical Circuits

Specific Goals for the Course:

To reinforce theory of electrical machines presented in class.

To understand the differences in the construction, performance and operation of electrical machines.

To provide awareness of the importance of staying current with new technology.

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.

Brief List of Topics to be Covered:

Fundamentals for power applications and magnetic circuits
Transformers
Three phase circuits
DC machines
AC machines

Course Number and Name:

ET 370: Electronics

Credits and Contact Hours:

3 Credits

Schedule on Office Door

Instructor's Name:

Terrance E. Mancilla

Textbook, Title, Author and Year:

Electrical Engineering Principles and Applications, 5th Ed, Allan Hambley
Robotics with the Boe-Bot, Andy Lindsay, Parallax

Specific Course Information:

Each student will purchase a mandatory Parallax USB Boe-Bot kit which contains a microcontroller. These kits serve as the platform for a series of learning experiences and they are the central part of the projects. The projects will be examples of embedded systems (hardware with embedded software) that sense outside variables, process the sensed information and produce appropriate responses. Sharing or joint ownership of kits is not allowed. The success of the exercises depends upon students individually developing strength in prototyping, programming and documenting embedded systems. A significant number of laboratories will require individual students to bring their personal microcontroller system to the laboratory and use it as a platform for the laboratory activity. This will ensure maximum use of the embedded system capability and individual student growth.

Specific Goals for the Course:

Identify major electronic circuit components and make measurements accessing performance
Understand theory and operation of Field Effect and Bipolar Junction Transistors
Prototype electronic circuits of moderate complexity and evaluate them
Use Infrared diodes and determine the modulation bandwidth of IC Infrared receivers
Describe and utilize the Sony IR communication protocol
Represent numbers in binary, decimal, hexadecimal and octal; add and subtract binary
Measure and interpret duty cycle modulated waveforms
Discuss AD conversion and apply AD converters in circuits
Apply Op Amps as comparators and simple filters
Develop calibration factors for accelerometer DCM and analog output voltages
Describe the concepts and applications of embedded systems
Describe the Parallax BS2 microcontroller components, RAM, CPU, and EEPROM
Program a microcontroller for multiple applications including:
Sensing tilt using a two-axis accelerometer
Sensing light using photo resistors
Sensing IR using IC Infrared receivers
Sending and receiving IR communications codes

Driving servos to control a small robot
Lighting one or more LEDs to signal system status
Producing audible sounds to signal system status
Implementing a desired system response to a variety of conditions
Use a microcontroller, circuits, sensors and actuators to produce an embedded system.

Brief List of Topics to be Covered:

Electronic Diagrams
Configuration and Operating Principles of Electronic Circuits
Flowchart Automation and Control Systems

Course Number and Name:

ET 400 /400L: Instrumentation and Measurement/Lab

Credits and Contact Hours:

Lecture (3 Credits): Mon/Wed/Fri: 9:00-10:00

Lab (1 Credit): Section 1 – Tue 9:00-10:50

Section 2 – Wed 2:30-4:20

Section 3 – Thu 9:00-10:50

Instructor's Name:

Jon Fischer

Textbook, Title, Author and Year:

Process Control Instrumentation Technology, 8th Ed. Curtis D. Johnson, Prentice Hall Publishers

ISBN-10: 0131194577

a. Other Supplemental Materials:

Instrumentation, 5th Ed. Kirk, Weedon, Kirk, American Technical Publishers

ISBN-10: 0826934307

Parallax Boe-Bot Robot Kit (USB Version) Item 28832

Specific Course Information:

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.

a. Pre-requisites: ET 370 – Electronics

b. COM 220 – Programming/Computer Applications

c. ET 250 - Circuits

Specific Goals for the Course:

LO1: Ability to use computer tools

LO2: Ability to understand emerging technologies

LO3: Ability to apply emerging technologies to marine projects

LO4: Ability to develop lab procedures

LO5: Ability to use instruments for measuring

LO6: Ability to write a technical report

LO7: Ability to analyze and interpret results of experiments

LO8: Ability to improve process and design

LO9: Ability to function as a member of a small team

LO10: Ability to lead a team

LO11: Ability to apply electrical and electronics skills to marine engineering systems especially automatic controls

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 the application of 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.

Brief List of Topics to be Covered:

Process Control

Analog Signal Conditioning – Time Response

Analog Signal Conditioning – Dividers and Bridges

Analog Signal Conditioning – Filters

Analog Signal Conditioning – Op-Amps

Digital Signal Conditioning – ADCs

Digital Signal Conditioning - DACs

Thermal Sensors

Course Number and Name:

ET 442: Heating, Ventilation and Air Conditioning (HVAC)

Credits and Contact Hours:

2 Units

Mon/Wed: 10:00 –11:00

Instructor's Name:

Dr. John Massey, Ph.D.

Textbook, Title, Author and Year:

HVAC - Heating, Ventilating, and Air Conditioning 3rd Edition, American Technical Publishers, Homewood IL, ISBN 978-0-8269-0678-6 By: S. Don Swenson

Workbook:

HVAC - Heating, Ventilating, and Air Conditioning 3rd Edition, American Technical Publishers, Homewood IL, ISBN 978-0-8269-0679-3 By: S. Don Swenson

Specific Course Information:

This course covers the major aspects of residential and commercial HVAC systems. Topics included are specifically designed for HVAC and building maintenance technicians. The text includes an introduction to HVAC fundamentals, types of HVAC units, load calculations, residential and commercial controls, maintenance, troubleshooting, and servicing procedures. The main focus of the course is on HVAC unit operation, HVAC unit mechanical, electrical, and pneumatic systems, and the safety practices required to work on HVAC units and systems. The textbook also covers the latest technology in combustion of fuels, heat pumps, control systems, and system design.

- a. Pre-requisite: ET 342 and ET 342L
- b. Co-requisite: ET 442L

Specific Goals for the Course:

A general understanding of HVAC Systems Operation and Maintenance.

Know how to perform load calculations.

Know how to use Psychrometric and Pressure - Enthalpy Diagrams.

A general understanding of heating system design.

A general understanding of refrigeration systems and their management.

A general understanding of compression and adsorption air conditioning systems.

A general understanding of air conditioning control systems.

To be knowledgeable in HVAC system design

Know basic troubleshooting techniques for the HVAC systems

Ability to apply creativity in the design of systems, components or processes in the facilities environment

Ability to receive the certification as Certified Plant Engineer in Training.

Successfully passing the Certified Plant Engineer in Training exam.

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

Ability to analyze the performance of power plants

Ability to operate power plant

Brief List of Topics to be Covered:

Psychrometrics and Pressure – Enthalpy Diagrams
Load Calculations
Combustion of Fuels and Forced Air Heating Systems
Forced Air and Steam Heating Systems
Steam and Hydronic Heating Systems
Refrigeration Principles and Management
Compression System
Air Conditioning and Heat Pumps
Control Systems

Course Number and Name:

ET 442L: Refrigeration and Air Conditioning Lab

Credits and Contact Hours:

1 Credit

Wed: 14:30-16:30

Instructor's Name:

Douglas Rigg

Textbook, Title, Author and Year:

ET 442 L Lab Manual will be provided.

Modern Refrigeration and Air Conditioning, By Althouse/ Turnquest /Bracciano.
The Goodheart-Wilcox Publishing Company.

Specific Course Information:

Introduction to basic principles of refrigeration and air conditioning

a. Co-requisites: ET 342 Refrigeration and Air Conditioning

Specific Goals for the Course:

The goal of this course is to train the student in the needed technical skills to operate and maintain the HVAC and refrigeration equipment that would be install in an industrial plant. The industrial trainers located in the refrigeration lab and the refrigeration equipment installed on the T/S Golden Bear will be utilized for this training. The student will gain a basic understanding of refrigeration controls, compressors, condensers, auxiliary equipment, and flow control devices.

Basic troubleshooting, maintenance, tools, and repair procedures will also be covered.

Brief List of Topics to be Covered:

Safety and systems drawing; Air flow measurement; Wet bulb temperature measurement; Air density and velocity; Flow rate calculations; Humidity and dew point; Common service procedures; The refrigeration cycle; The effect of humidity on refrigeration; Refrigeration controls; Air conditioning process; Removing sensible and latent heat

Course Number and Name:

ET 460: Automation
ET 460L: Automation Lab

Credits and Contact Hours:

Lecture (3 Credits); Lab (1 Credit)
Mon/Wed/Fri:14:30-15:30

3. Instructor's Name:

Jon Fischer

Textbook, Title, Author and Year:

Process Control Instrumentation Technology 8th* Ed.Curtis D. Johnson, Prentice Hall
PublishersISBN-10: 0131194577

a. Other Supplemental Materials:

Instrumentation 5th Ed.Kirk, Weedon, Kirk, American Technical PublishersISBN-10:
0826934307

Parallax Boe-Bot Robot Kit (USB Version) Item 28832

Specific Course Information:

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.

- a. Prerequisites: ET 400/400L, Instrumentation and Measurement/Lab and MTH 201, Technical Calculus II

Specific Goals for 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
PC 6-2: Demonstrated ability to apply electrical and electronics to marine engineering systems especially automatic controls.

ET460/460L fulfills requirements of the Standards of Training, Certification and Watchkeeping (STCW) Convention. A minimum grade of “C-minus” is required in the course to certify STCW competency in the following areas:

Brief List of Topics to be Covered:

Mechanical Sensors: Displacement, Position
Mechanical Sensors: Strain Gauges
Final Control
Final Control: Power Electronics
Final Control: Actuators
Final Control: Valves
Discrete State Process Control: Ladder Logic
Controller Principles: Composite Control
Controller Principles: P,I,D control
Motion Sensors and Accelerometers

Course Number and Name:

ET 490: Power Engineering Technology

Credits and Contact Hours:

3 Credits

Tue and Thu: 11:00-12:00

Instructor's Name:

Terrance E. Mancilla and John Rodgers

Textbook, Title, Author and Year:

Wildi, Theodore, *Electrical Machines, Drives and Power Systems*, 6th Edition, Prentice Hall, 2006. ISBN: 0130930830

a. Other Supplemental Materials:

Apollo's Fire, Jay Inslee and Bracken Hendricks

Fundamentals of Engineering Thermodynamics, 6th Edition, Michael J. Moran and Howard N. Shapiro

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on my faculty web page accessible through the clicking the following link:
<http://www.csum.edu/TTinfo/Departments/AcademicComputing/moodle.asp>

Specific Course Information:

A capstone course in engineering technology in which students apply the engineering fundamentals of previous thermodynamics and electrical machinery course work to studies of combustion processes, combustion by-products and emission abatement and electrical distribution and transmission systems commonly found in modern marine engineering propulsion plants and the power industry. Additionally, through guest lecturer presentations, industry training and/or field trips, students will become familiar with renewable energy resources. As a research project, students will select an alternative energy topic, which may include 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.

a. Co-requisite: ET 490L

Pre-requisites: ET 340/340L, Fluid Mechanics
ET 344, Thermodynamics
ET 350, Electrical Machinery

Specific Goals for the Course:

ET 490 is a study of combustion processes, combustion by-products and emission abatement and electrical distribution and transmission systems commonly found in modern marine engineering propulsion plants and the power industry. Upon successful completion of this course, the student:

LO1: Will be able to apply the principles of fluid mechanics and thermodynamics in power plant performance analyses.

LO2: Will be able to apply the principles of electrical machinery to in the analysis of electrical power generation, transmission and distribution.

LO3: Will learn how to develop strategies for analyzing power generating system performance.

LO4: Will develop an appreciation for the harmful emissions associated with fossil fuel power plants and have a basic understanding of the technologies for controlling them.

LO5: Will have a basic understanding of alternative energy solutions.

Brief List of Topics to be Covered:

Electrical energy generation, photovoltaic and fuel cells, wind and wave energy, transmission of electrical energy, distribution of electrical energy, marine electrical power systems, combustion and fuel selection, alternative fuels, gas turbines, power technology development, and nuclear power technology and plants.

Course Number and Name:

HUM 310: Engineering Ethics, Sections 1-2

Credits and Contact Hours:

3 Credits

Mon/Wed/Fri: 0800-0850 (1) and 1230-1320 (2)

Instructor's Name:

Michael Kazek

Textbook, Title, Author and Year:

Ibo van de Poel and Lamber Royackers, *Ethics, Technology and Engineering, An Introduction*. (West Sussex, United Kingdom: John Wiley & Sons, 2011).

ISBN: 978-1-4443-3094-6

The text is also available in electronic formats:

eBook 978-1-4443-9570-9

ePub 978-1-4443-9571-6

a. Other Supplemental Materials:

A Writer's Reference, sixth edition (2007), by Hacker, for a review of the fundamental principles of writing; and *Elements of Style ([1935], 1959, 1972, 1979, 2000)*, by Strunk and White, for a simple, classic statement of the basic principles of English Composition.

Copies of the course materials such as the syllabus, major assignment handouts, etc. may be found on my faculty web page accessible through the clicking the following link: <http://oldmoodle.csum.edu/moodle24/>

Other readings will be posted to Moodle at least a week in advance and will also be available in the library on reserve.

Specific Course Information:

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 practice. 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 actions and/or justify your actions so that more serious problems can be avoided.

1. Pre-requisite: EGL 220, Critical Thinking

Specific Goals of the Course:

LO1 To read and think critically.

LO2: To develop moral reasoning skills.

LO3: To improve writing skills in an engineering context.

LO4: To understand multiple perspectives and to respect others of diverse persuasions.

LO5: 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.

Brief List of Topics to be Covered:

Social responsibility of engineers, disclosure, whistle-blowing, professionalism, global ethics, and risk-assessment

Course Number and Name:

MTH 100: College Algebra and Trigonometry

Credits and Contact Hours:

4 Credits

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Instructor's Name:

Dr. Brent Pohlmann

Textbook, Title, Author and Year:

College Algebra and Trigonometry (9th edition) by Barnett and Ziegler;

Specific Course Information:

During this course, students will demonstrate their ability to:

- Understand the application of mathematical techniques and reasoning to solve problems
- Create mathematical expressions from word or application problems and analyze those expressions by applying mathematical principles
- Understand practical aspects of mathematics problems

Specific Goals of the Course:

Upon successful completion of this course, the student will be able to:

LO1: Perform algebraic operations on polynomial and rational expressions.

LO2: Solve problems involving integer exponents, radicals and rational exponents.

LO3: Solve systems of linear equations by algebraic methods.

LO4: Solve equalities and inequalities involving absolute values.

LO5: Perform algebraic operations on complex numbers

LO6: Find the slope-intercept form of a line

Brief List of Topics to be Covered:

Algebraic functions and operations; Domain and range of a function; Exponential and logarithmic functions; Quadratic, exponential and logarithmic functions; Angle measurement conversions; Trigonometric values of angles; Unit circle; Sine and cosine functions; Properties of right-triangles

Course Number and Name:

MTH 211: Calculus II

Credits and Contact Hours:

4 Credits

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Instructor's Name:

Kevin Klapstein

Textbook, Title, Author and Year:

Thomas' Calculus, Early Transcendentals (12th edition) by Thomas, Weir and Hass;
Addison-Wesley Publishing (ISBN 978-0-321-58876-0).

Specific Course Information:

During this course, students will demonstrate their ability to:

- apply mathematical techniques and reasoning to solve problems in mathematics.
- create mathematical expressions from word or application problems and analyze those expressions applying mathematical principles.
- understand practical aspects of mathematics problems.
- understand the benefits and limitations of applying mathematical techniques to problems in mathematics.
- use deductive reasoning and critical thinking to solve problems.

Specific Goals of the Course:

Upon successful completion of this course, the student will be able to:

- apply definite integrals in the solution of practical problems in geometry, science and engineering.
- evaluate integrals by using different integration methods, tables of integrals and computer algebra systems.
- understand differential equations and use them in mathematical modeling.
- comprehend and evaluate infinite sequences and series and be able to determine whether they converge or diverge.
- use analytic geometry in practical problems in science and mathematics.

Brief List of Topics to be Covered:

Introduction and Review; Volumes; Arc lengths; Surface areas; Moments; Logarithms; Exponential change; Separable equations; Hyperbolic functions; Relative rates; Integration by parts; Trigonometric integrals; Trigonometric substitutions; Partial fractions; Improper integrals; First order Ordinary Differential Equations; Graphical solutions; Phase planes; Sequences; Infinite series; Integral test; Comparison test; Ratio test; Alternating series; Power series; Taylor and McLaurin series; Binomial series; Polar coordinates; Graphs in polar coordinates

Course Number and Name:

PHY 200 : Engineering Physics I

Credits and Contact Hours:

3 Credits (Lecture)

Mon/Wed/Fri: 1:00-1:50 and Tue: 11:00-11:50

Instructor's Name:

Matthew Fairbanks

Textbook, Title, Author and Year:

University Physics (12th edition) by Young and Freedman; Addison-Wesley Publishing

Specific Course Information:

During this course, students will demonstrate their ability to:

- learn fundamental principles of particle motion
- learn principles of work, energy, elasticity.
- understand properties of solids, fluids and gases.
- understand the heat problem solving.

Specific Goals of the Course:

Upon successful completion of this course, the student will be able to:

- understand physical science principles and their relationship to the physical universe.
- apply theories, principles and models, in conjunction with the scientific method to analyze problems in the physical sciences
- and computer algebra systems.
- understand acquire and utilize mathematical and computational techniques to both analyze and comprehend problems in the physical sciences.

Brief List of Topics to be Covered:

Vectors addition; Kinematics; Forces; Newtons laws of motion; Work and energy; Impulse and momentum; Applications

Course Number and Name:

PHY 200L : Engineering Physics I Laboratory

Credits and Contact Hours:

1 Credits (Lecture)
Schedule of Office Door

Instructor's Name:

Matthew Fairbanks

Textbook, Title, Author and Year:

University Physics (12th edition) by Young and Freedman; Addison-Wesley Publishing

Specific Course Information:

Demonstrate familiarity with laboratory equipment and its use.

Perform data collection using experimental devices to gain a physical sense of basic theories, models and principles of physics.

Understand the need for precise and accurate measurements.

Apply the scientific method when analyzing results from measurements, computation of physical quantities and interpretation of data.

Understand the limitations of experimental procedures and apply scientific reasoning in the interpretation of measurements and computed values.

Work in small groups and discuss findings with others.

Write laboratory reports to describe the laboratory equipment, experiment and findings.

Communicate findings and the scientific reasoning used to solve problems to the class.

Specific Goals of the Course:

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

- Apply the scientific method and employ scientific reasoning to problems in physics.
- Understand the fundamental concepts of mechanics.
- Use theories, principles and models to describe and predict the outcome of an experiment.
- Apply mathematical and computational techniques associated with laws of physics.
- Use computational and problem solving skills as tools for specific engineering applications.
- Successfully apply new concepts and techniques to practical problems in science and engineering.

Brief List of Topics to be Covered:

PHY200L is a laboratory physics course designed to enhance the conceptual learning of physics by adding visual and tactile components through hands-on experience. It is a co-requisite of PHY200. Students will work in groups of 2 or 3 to perform experimental measurements directly related to Physics 200 topics. These measurements will be guided by each week's worksheet. Each student will write an individual lab report for every experiment performed.

Course Number and Name:

PHY 205 : Engineering Physics II

Credits and Contact Hours:

4 Credits (Lecture)
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Instructor's Name:

Matthew Fairbanks

Textbook, Title, Author and Year:

University Physics (12th edition) by Young and Freedman; Addison-Wesley Publishing

Specific Course Information:

Apply scientific reasoning to problems in this course:

Use theories, principles and models in conjunction with the scientific method to analyze problems in science.

Understand the benefits and limitations of applying the scientific method to problems in this course.

Understand the practical application of theories, principles, and models in science.

Understand the benefits and limitations of applying theories, principles and models in science.

Specific Goals of the Course:

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

- 1) Apply scientific reasoning to the physics problems.
- 2) Solve physics problems and synthesize proper outcomes under different boundary conditions.
- 3) Think critically and analyze and understand the basic concepts of physics.
- 4) Understand the practical applications of theories and principles in modern technology.
- 5) Understand and appraise the various natural phenomena around them.
- 6) Understand how the modern technology, based on physics, impact the society

Brief List of Topics to be Covered:

Review: Gravitational forces and the potential and gravitational field strength & simple harmonic motion; Electrostatics, field strength and electrical forces; Gauss's law; Electrostatic potential; Capacitance and dielectrics; Current resistance and electro motive forces; Direct current circuits; Magnetic field and magnetic forces on the moving charges and conductors; Sources of the magnetic fields Ampere's law; Faraday's laws of Electron magnetic Induction; Mutual and self inductance; Alternating current circuit

APPENDIX B – CURRICULA VITAE

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

12 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:** Lyle Cook

2) **Education:**

B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA -
Complete 104 units

3) **Academic Experience:**

First Assistant Engineer
Engineering Watch Officer/Instructor, 1991-Present

4) **Non-Academic Experience:**

United States Navy, 1968-1990

5) **Certifications or Professional Registrations:**

USCG – Chief Engineer of Steam, Motor and Gas Turbine Vessels of any Horsepower

6) **Current Membership in Professional Organizations:** None

7) **Honors and Awards:** None

8) **Service Activities:**

Chair - Retention, Tenure and Promotion Committee

9) **Publications and Presentations:** None

10) **Recent Professional Development Activities:** None

1) **Name:** Jonathan Fischer

2) **Education:**

B.S., Bioengineering, University of Pittsburgh, Pittsburgh, PA – 2001

B.A., History and Philosophy of Science, University of Pittsburgh, Pittsburgh, PA – 2001

M.S. Mechanical Engineering, University of California Berkeley, Berkeley, CA – 2005

1) **Academic Experience:**

Associate Professor, The California Maritime Academy, 2013-Present

Assistant Professor, The California Maritime Academy, 2007-2013

Full Time Lecturer, The California Maritime Academy, 2006-2007

Part Time Lecturer, Sonoma College, 2005-2006

2) **Non-Academic Experience:**

Full Time Research Engineer, Dept. of Anatomy and Neurobiology, Drexel University, 2002

- Invented a robotic technique to study the biomechanics of the human elbow joint

- Wrote a complete set of software tools for motion capture

Part Time Lead Trainer, Ivy West Educational Services, 2005-2006

- Trained tutor's for one of Northern California's elite academic services companies

3) **Certifications or Professional Registrations:** None

4) **Current membership in professional organizations:**

American Society for Engineering Education, 2012-present

Instrumentation and Automation Society 2007-2012

5) **Honors and Awards:** None

6) **Service Activities:**

Executive Committee--Academic Senate

Faculty Advisor - Tau Alpha Pi Honor Society

Faculty Advisor – CMA Chapter of Instrumentation and Automation Society

Member – Policy Committee, 2007-2012

7) **Publications and presentations:**

"A Hands-On Project to Improve Mechanical Analysis Skills: A Comparative Study," Proceedings of the American Society for Engineering Education 2012 Conference for Industry and Education Collaboration, 2012

"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

"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

"*Have Furloughs Affected Students' Performance?*," 13th Annual CSU Symposium on University Teaching, CSU San Bernardino, April 2010

"*Novel, Non-destructive Techniques for Determining Human Elbow Kinematics and Kinetics: Application to the Lateral Pivot Shift Test,*" Thesis Presentation. University of California, Berkeley, December 2004

"*Nano-DMA for Characterization of Viscoelastic Polymers and Biomaterials,*" 7th World Biomaterials Congress. Sydney, May 2004. Juried

"*Function of the Anterior and Posterior Cruciate Ligaments: Effects of Age and Gender,*" 46th Orthopaedic Research Society Meeting, Orlando, March 2000. Juried

"*Development of Software for a Robotic/Universal Force-Moment Sensor Testing System: Application to the Knee,*" Research Presentation. Department of Orthopaedic Surgery, University of Pittsburgh, August 1999

8) Recent professional development activities:

Grants:

- Federal Highway Administration's *National Summer Transportation Institute* Statement of Work Application and Request for Funds, (\$57,179) 2011

Reviewer:

- Paper Reviewer: 2013 *ASEE Annual Conference* (Engineering Technology Division) Atlanta, GA.
- Reviewer: "Is There an Engineer Inside You?: A Comprehensive Guide to Career Decisions in Engineering" (Third Edition) by Celeste Baine, 2013

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

Technical Coordinator for Engineering Simulators, 1997-Present

Course Coordinator for EPO214/EPO230/EPO235 – 2007-2010

Maritime Vocational Lecturer II – 1998-2010

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:**

“Welding the Weakest Link: A Cooperative Approach to Joint Simulation for Deck and Engineering Training,” International Maritime Lecturers’ Association Conference, St. Johns, Newfoundland, Canada, 2013

“Filling the Void – True Assessment of Students’ Actual Operations Knowledge,” 14th Annual General Assembly of the International Association of Maritime Universities, Constanta, Romania, 2013

“RE-Integration of Global Perspectives in Inter-departmental Simulation Training,” with Bill Schmid, Maritime Education Summit, Massachusetts Maritime Academy, 2009

“Team Organization and Independent Learning in Engine Simulator Laboratories,” 6th General Assembly of the International Association of Maritime Universities, Malmo, Sweden – 2005; 6th International Conference on Engine Room simulators, Portoroz, Slovenia – 2005

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: Stan Hitchcock

2) Education:

B.S., Organizational Behavior, University of San Francisco, San Francisco, CA – 1989

A.A., General Education, Napa Valley College, Napa, CA – 1982

3) Academic Experience:

Maritime Vocational Lecturer and Course Coordinator for Machine Shop Classes, The California Maritime Academy, 2011-Present

4) Non-Academic Experience:

Logistics Officer – TS Golden Bear, 2006-2011

Preparator, Copia, The American Center for Wine, Food & the Arts, 2001-2006

Maintenance General Supervisor, Napa Pipe Corporation, 1992-2001

Senior Organizational Development Specialist, BEI Systron Donner Corporation, Inertial Division, 1989-1991

Supervisory Facilitator, Mare Island Naval Shipyard, Productivity Management Office, 1984-1989

Machinist, Mare Island Naval Shipyard, Mechanical Group, Machine Shop 31, 1982-1984

Journeyman Machinist, Kaiser Steel Corporation, 1978-1982

Machinery Repairman Second Class, US Navy, 1974-1978

5) Certifications or Professional Registrations:

Merchant Mariner's Document – 2007

CPR Certified – 2009

6) Current Membership in Professional Organizations: None

7) Honors and Awards: None

8) Service Activities:

Tutor, Napa Library Literacy Project, Napa County Jail Literacy Program

Faculty/Staff Advisor, California Maritime Academy Auto Shop Club

Community Advisory Board, Valley Oak High School

Board President, Network Consulting Services

9) Publications and Presentations:

A Study of the Relationship Between Quality Circle Participation and Job Satisfaction, AQP Press – 1989

Presented at the Association for Quality and Participation Annual Conference – 1989

10) Recent Professional Development Activities: HaasTec 2013

1) **Name:** Robert Jackson

2) **Education:**

B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1976

3) **Academic Experience:**

Chair of Dept. of Engineering Technology, The California Maritime Academy, 2013-Present
Tenured Maritime Vocational Instructor, The California Maritime Academy, 2012-Present
Maritime Vocational Instructor, The California Maritime Academy, 2000-2012

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):
Participated as a lecturer in the 2008 and 2011 TUMSAT MET Summer Camp held in Japan at the Tokyo University Maritime Campus. I was invited to take part on two different occasions by the program administrator Professor Naoyuki Takagi Ph.D.

Electronic Class (Moodle) Website Development:

Extensive development of the Electronic Moodle website for all of the courses taught, including those on the summer training cruise. All course material is placed onto the site including the class syllabus, electronic textbooks (when used), PowerPoint presentations, student reading assignments, electronic multiple-choice examinations, manufacturer's technical reports, and internet websites which contain information pertinent to the class.

9) **Publications and Presentations:**

“*Team Organization and Independent Learning in Engine Simulator Laboratories,*” IAMU Annual General Assembly 6 (AGA 6), Malmo, Sweden, 2005
“*Utilization of Electronic Coaching and Assessment Software in Engine Simulator Laboratories,*” 9th International Conference on Engine Room Simulators (ICERS 9), New York, 2009; Kongsberg Maritime User Conference of the Americas, on November 29th, 2009

in Orlando, Florida

“Simulation across the Engineering Curriculum Getting the Most from Your Simulation Systems,” IAMU AGA Conference, Busan, Korea, 2010

California Air Resources Board Investigation:

Principal Investigator for a contract between the California Air Resources Board (ARB) and the California Maritime Academy, project 09-410, was signed on December 1, 2009.

Investigations and findings of the contract were presented at the Maritime Working Group meeting, Oakland, 2010.

“Operating Ships within Emission Control Areas (ECA’S),” The Society of Naval Architects & Marine Engineers (SNAME) symposium, San Francisco, 2010.

10) Recent Professional Development Activities:

The CMA Engineering Technology Department has been actively seeking research opportunities that fit our operational and maritime experience. In 2011 the ET Department participated as a lower-tier subcontractor to Zimitar, in successfully proposing a five year, \$4 million, Department of Energy offshore wind energy research grant. In 2012, working along with the Mechanical Engineering Department, we began funded research on the Zimitar 160 meter offshore rotor development project. This past year we also participated in the submission of a separate \$50 million DOE wind energy proposal. We were unsuccessful in obtaining funding under that proposal, but developed relationships with commercial and industrial firms including Moog, Ingalls Shipbuilding, and others.

The ET Department wishes to expand upon our recent efforts in offshore wind energy. We plan to initiate discussions with Kongsberg Maritime with the goal to create a simulator model of wind turbine generators incorporated with internal combustion engines. These efforts will be coordinated with hybrid power systems development in cooperation with Wartsilla and will likely seek funding through the California Energy Commission.

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 Operations, City of Fairfield Public Works – 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:**

“A Computer Simulation of the Fluctuating Pressure Fields in a Marine Propeller” presented at the 40th Heat Transfer and Fluid Mechanics Institute – 2008

10) **Recent professional development activities:**

A Method for Improving Geothermal Heat Pump and Heat Pipes, Application No. 6126577, Provisional Patent Filed – 12/02/2009

Self-Modulating Air Register, Application No. 61769569, Provisional Patent Filed – 2/26/2013

1) Name: Michael S. Kazek

2) Education:

- B.S. Degree in Marine Engineering, *US Coast Guard 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:

- The California Maritime Academy, CSU; Full Time Lecturer; Fall 2008 to Present
- The California Maritime Academy, CSU, Course Coordinator for ET 110, HUM 310, ET 340 L, ET 342, ET 344, ENG 430

4) Non-academic Experience:

- The California Maritime Academy, CSU, Deputy Director, Department of Leadership Development, Aug 2005 to Aug 2008, Full Time
- US Coast Guard, Naval Engineering Support Unit Boston, Commanding Officer, 2003-2005, Full Time
- US Coast Guard, Coast Guard Cutter Boutwell, Executive Officer, 2001-2003, Full Time
- US Coast Guard, Naval Engineering Support Unit Alameda, Executive Officer, 1998-2001, Full Time
- US Coast Guard, Vessel Support Branch, Maintenance & Logistics Command Pacific, Naval Engineering Division, Assistant Branch Chief, 1996-1998, Full Time
- US Coast Guard, Specifications Branch, Maintenance & Logistics Command Pacific, Naval Engineering Division, Hull Section Chief, 1994-1996, Full Time
- US Coast Guard, Coast Guard Cutter Seneca, Chief Engineer, 1991-1994, Full Time
- US Coast Guard, Coast Guard Group Key West, Engineer Officer, 1988-1991, Full Time
- US Coast Guard, 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, C, 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, CMA, Sept 2007
- Covey’s 7 Habits for Highly Effective People, CMA, Sept 2007
- Covey’s Leadership Foundations, A Workshop for Emerging Leaders, CMA, Feb 2008

6) Current Membership in Professional Organizations:

- Level 2 Certification, American Swimming Coaches Association (ASCA)
- Member, Society of Naval Architects and Marine Engineers, 2010 to Present

7) Honors and Awards:

- United States Coast Guard Meritorious Service Medal
- United States Coast Guard Commendation Medal (five awards)
- United States Coast Guard Letter of Commendation

8) Service Activities:

- Student Services Personnel Advisor, Student Leadership Council (Oct 05 to April 08)
- 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 & Investigating Committee (May 06 to Present)
- Head Coach, CMA Master’s Swimming Team (Jan 2006 to Present)
- President, Parent Association, North Bay Athletic Association (Jun 10 to Present)
- Vice President of Operations, North Bay Athletic Association (Jun 10 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 engine program licensing submittal to the US Coast Guard outlining the ET and ME Departments plan for compliance with 1978 Standards, Certification, Training and Watchkeeping for Seafarers (STCW) as amended in 2010.

1) **Name:** Terry Mancilla

2) **Education:**

U.S. Air Force Electronics and Ground Radio Maintenance Course – 1966

A Sc., Electronics Technology, College of Marin – 1970

B. Sc., Electronics Technology, San Francisco State University – 1972

Electronic Instrumentation School, Hewlett Packard Company – 1974

M.S., Engineering Science, University of California at Berkeley – 1976

Sustainable Energy Graduate Certificate, Stanford University – 2010

Electrical Machinery Graduate Certificate, Auburn University – 2011

3) **Academic Experience:**

Assistant Professor, Engineering Technology, 2009-Present

Lecturer of Engineering, School of Science & Engineering, San Francisco State University, 2006-2009

4) **Non-Academic Experience:**

Consulting Applications Engineer, Pendulum Instruments, Stockholm, Sweden, 2008-2010

Various Engineering Positions, Hewlett-Packard Company & Agilent Technologies, 1973-2006

5) **Certifications or Professional Registrations:**

Teaching Credential – Engineering, California Community College – 1977

FCC GROL Elements 1 & 3 License – 2010

6) **Current Membership in Professional Organizations:**

American Legion – Jack London Sonoma Post

American Society for Engineering Education (ASEE)

7) **Honors and Awards:** None

8) **Service Activities:**

Unity Council Member-Cal Maritime

SFSU Engineering Advisory Board

SF Maritime National Historic Park Docent

Texas A&M Sea Grant Review Board Member

National Liberty Ship Memorial Volunteer

9) **Publications and Presentations:**

Proceedings of International Association of Maritime Universities AGA 14

“ELECTRO-TECHNICAL OFFICER TRAINING FOR THE MODERN ERA”

Pendulum Instruments Seminar

“ FREQUENCY & TIME METROLOGY MEASUREMENT BASICS”

10) **Recent Professional Development Activities:**

Auburn University Certificate- “Electro-Mechanical Machinery”- 2012

Stanford University Certificate “Sustainable Energy Conversion & Storage”- 2010

Federal Communications Commission GROL Maintainers License- 2010

1) **Name:** James McCarthy

2) Education:

General Business and Supervision, Napa Valley College – 1976-1978

3) Academic Experience:

Vocational Instructor, Welding and Machine Shop, California Maritime Academy – 1997-Present

Simulator Operator, Ship's Bridge Simulator for Deck Department – 1996-1997

4) Non-Academic Experience:

Millwright and Welder, Millwright Union – 1995-1996

Lead Ordnance Equipment Mechanic, Mare Island Naval Shipyard – 1978-1995

Outside Marine Machinist, Mare Island Naval Shipyard – 1976-1978

5) Certifications or Professional Registrations:

TWIC Card

Z-Card

BAT Training for Safety Orientation

Fork List License

Precision Measurement License

VHF Radio License

Chemical Spot Test License

Current CPR and First Aid Certification

6) Current Membership in Professional Organizations: None

7) Honors and Awards: None

8) Service Activities:

Instrumental in negotiating with Miller Electric and Smith Torches to obtain donations of welding equipment and cutting torches to the CMA Welding Lab – saving the academy approximately \$500,000 in equipment costs.

9) Publications and Presentations: None

10) Recent Professional Development Activities: None

1) **Name:** Patrick J. Morris

2) **Education:**

B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1974

3) **Academic Experience:**

Full Time Marine Vocational Lecturer, The California Maritime Academy, 2011-Present

4) **Non-Academic Experience:**

Crockett Cogeneration – 1x1 Combined Cycle 7FA Power Facility, Crockett, CA

Professional Experience, Crockett Cogeneration – 1x1 Combined Cycle 7FA Power Facility

- a. Plant Manager, Oversee the maintenance and management of a 240 MW, Combined cycle power plant, February 2008 To July 2011
- b. Assistant Plant Manager, assist in the management, operation, maintenance and responsible for all training, January 2006 To February 2008
- c. Plant Engineer, responsible for all engineering, engineering development, planned and unplanned outages, assist in training and safety, September 2001 To December 2006
- d. Shift Supervisor, operation, responsible of the daily operation of a shift, April 2000 To September 2001
- e. Operating Maintenance Technician, responsible for operation and maintenance duties, February 1998 To April 2000

Professional Experience, West Coast Shipping – UNOCAL, S/S Cornucopia – Anhydrous Ammonia/LPG Gas Carrier

- a. Chief Engineer, Manage of the operation, maintenance, and repair of all boilers, power plant, cargo handling, communication systems, computer systems and safety equipment. Supervise 4 engineers, 6 journeymen with planned daily work schedules for required 24-hour coverage for weeks at sea. Delegation to subordinates of work tasks, with Quality Control oversight. Develop goals and objectives for the assistant engineers and journeymen. Supervise shipyard overhauls over multiple years and various countries.
- b. First Engineer, assist chief engineer in all duties, February 1988 to August 1990
- c. Second Engineer, responsible operation and maintenance of all boilers, auxiliary steam systems and fuel systems, May 1982 to February 1988
- d. Third Engineer, responsible for all distillers, lubrication, electrical repairs and assist in cargo handling, April 1982 to May 1982

United States Navy Reserve, Lieutenant, Honorable Discharge, July 1974 to October 1983

5) **Certifications or Professional Registrations:** None

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: Dinesh Pinisetty

2) Education:

Ph.D., Department of Mechanical Engineering, Louisiana State University (LSU), Baton Rouge, LA – 2011

M.S., Department of Mechanical Engineering, Louisiana State University (LSU), Baton Rouge, LA – 2005

3) Academic Experience:

Assistant Professor, Department of Engineering Technology, The California Maritime Academy, 2013-Present

Full Time Lecturer, Department of Engineering Technology, The California Maritime Academy, 2012-2013

Adjunct Professor, Department of Mechanical and Aerospace Engineering, Polytechnic Institute of New York University (NYU-POLY), 2011-2012

Research Associate, Department of Mechanical and Aerospace Engineering, Polytechnic Institute of New York University (NYU-POLY), 2011-2012

Research Assistant, Department of Mechanical Engineering, LSU, 2003-2010

Teaching Assistant, Department of Mechanical Engineering, LSU, 2004-2005

4) Non-Academic Experience:

Design Engineer, Satyam Venture Engineering Services, India, 2002-2003

5) Certifications or Professional Registrations: None

6) Current Membership in Professional Organizations: None

7) Honors and Awards:

Best Research Presentaiton Award, Annual Graduate Student Conference, LSU – 2004

Economic Development Assistantship Award, LSU – 2005

Best Research Presentation Award, Annual Graduate Student Conference, LSU – 2009

Dissertation Fellowship Award, LSU – 2010

8) Service Activities:

Organized Seminar Series, NYU-POLY – 2012

Graduate Student Advisory Committee Member – 2007

Co-Chair for annual Graduate Student Conference, LSU – 2006

Vice President of International Students Association, LSU – 2005

9) Publications and Presentations:

“*Viscoelastic Properties of Hollow Glass Particle Filled Vinyl Ester Matrix Syntactic Foams: Effect of Temperature and Loading Frequency*”, J. Materials Science, Vol. 48, pp. 1685-1701, 2013

“Compressive Properties of Closed Cell Polyvinyl Chloride Foams at Low and High Strain Rates”, Composites Part B, Vol. 44, pp. 403-416, 2013

“Development of light weight composites with low coefficient of thermal expansion”, American Society for Composites, Arlington, TX, 2012

“Fabrication and Characterization of Electrodeposited Antimony Telluride Nanowires and Nanotubes”, J. of Materials Chemistry, Vol. 21, pp. 4098-4107, 2011

“Characterization of Electrodeposited Bismuth-Tellurium Nanowires and Nanotubes”, Acta Materialia, Vol. 59, pp. 2455-2461, 2011

“Thermal Conductivity of Semiconductor Semimetal Superlattice Nanostructure”, Acta Materialia, Vol. 58, pp. 570-576, 2010

“Electrodeposition of Bismuth-Telluride (N-type) and Antimony-Telluride (P-type) Nanostructured Bulk Thermoelectric Device”, Proceedings of MRS Spring Meeting, San Francisco, CA, 2010

“Molecular Dynamics Simulation of Pore Growth in Lipid Bilayer Membranes in the Presence of Edge-Active Agents”, Applied Physics Letters, Vol. 91, 204104, 2007

10) Recent Professional Development Activities:

Reviewer:

- Journal of Alloys and Compounds
- Journal of Composite Materials
- Composites Part B
- TMS Journal of Minerals, Metals and Materials Society
- ASME Bioengineering Conference

1) Name: Douglas Rigg

2) Education:

B.S., Marine Engineering Technology, The California Maritime Academy, Vallejo, CA – 1979

USN Fuel Testing School, 2 weeks Point Loma, CA – 1981

Diesel Training ,2 weeks, Sulzer Brothers Limited, Winterthur, Switzerland – 1982

USN Fire Fighting and Damage Control School, 2 weeks , Treasure Island, CA – 1982

Calhoon MEBA Engineering School, Easton, MD:

Computer Training, 4 weeks – 1985

LNG School and Advanced Firefighting, 6 weeks – 1986

Digital Electronics, 4 weeks – 1990

Refrigeration Class, 2 weeks, EPA Universal Refrigerant Recovery Certification – 1994

Diesel Engineering, 6 weeks – 1995

Steam Plant Engineering, 6 weeks – 1996

Container Crane Maintenance, 3 week – 2001

PIC- Person in Charge Medical, 4 weeks, License Endorsement for PIC Medical – 2002

Government Vessel Certification, 2 weeks – 2004

Diesel Engineering, 4 weeks – 2009

3) Academic Experience:

Full Time Faculty, The California Maritime Academy, 2011-Present

LVO and MVI , and Adjunct on Training Ship Golden Bear, 2005-Present

4) Non-Academic Experience:

Marine Engineer's Beneficial Association; Assistant Engineer, MEBA Contracted Vessels; Sailing full time as either 1st, 2nd or 3rd Assistant Engineer, 1982-2010

Military Sealift Command –Pacific; Third Assistant Engineer on various Oilers, Missile Trackers, and Bulk Cargo vessels, 1979-1982

5) Certifications or Professional Registrations:

ISA – Instrumentation Society of Automation

Chief Engineer License, Steam, Motor, GT any Horsepower, C/E Issue #4

PIC- Shipboard Medical License Endorsment

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: ABET Training Conference

1) Name: John Rodgers

2) Education:

B.S. Naval Architecture and Marine Engineering, University of Michigan – 1976

B.S. Marine Engineering, Texas Maritime Academy - 1973

3) Academic Experience:

Maritime Vocational Instructor, II, California Maritime Academy – 2010-Present

4) Non-Academic Experience:

Ship's Chief Engineer, Grand River Navigation Company, Great Lakes – 2008-2010

Ship's First Engineer, MARAD ROS Gas Turbine Vessel, GTS – 2000-2006

MARAD ROS Surveyor – 1995-2000

ABS Surveyor, American Bureau of Shipping – 1981-1990

Naval Architect and Marine Engineer, Sea-Land and APL – 1976-1981

5) Certifications or Professional Registrations:

US Coast Guard License, Chief Engineer, Unlimited Horsepower, Steam, Motor and Gas Turbine Vessels

6) Current Membership in Professional Organizations:

Society of Naval Architects and Marine Engineers

San Francisco Society of Port Engineers

7) Honors and Awards:

2003 Operation Iraqi Freedom Sea-Lift Medal

8) Service Activities:

Member of CMA Fee Advisory Committee – 2012

Board of Directors, San Francisco Society of Port Engineers – 2012-Present

Worked with Project Lead the Way Organization to host teachers from local High Schools to tour CMA campus – 2012

Working with IEEE Society to host member tour of CMA campus – 2013

9) Publications and Presentations: None

10) Recent Professional Development Activities:

Attended 2012 Society of Naval Architect and Marine Engineers Annual Convention

Attended DNV Certified Course on Natural Gas Marine Propulsion, October, 2012

Attended CMA Faculty Study Groups Discussing Teaching Techniques Using the “Flipped Classroom” and “Authentic Learning”

Working to Develop CMA/KUBOTA Engine Mechanic's Classroom in Dwyer Hall Power Lab.

1) **Name:** Michael Edward Strange

2) **Education:**

M.S., Mechanical Engineering, Stanford University, Stanford, CA – 1986
B.S., Mechanical Engineering, San Diego State University – 1984

3) **Academic Experience:**

Asst. Professor, Engineering Technology, California Maritime Academy, 2008-Present
Lecturer, Mechanical Engineering, San Francisco State University, 2001-2009
Instructor, Engineering Graduate Assistant, Mechanical Engineering, Stanford University, 1986-2001

4) **Non-Academic Experience:**

Engineering Technician, San Francisco State University, 2001-2008
Engineering Consultant, Department of Pediatric Surgery, University of California, San Francisco, 2006-Present
Engineering Consultant, Orthopaedic Research, The Taylor Collaboration, 2010-2013
Engineering Consultant, Beyond Productions (MythBusters), 2005-2011
Engineering Services, Beyond Productions (MythBusters), 2011-Present

5) **Certifications or Professional Organizations:** None

6) **Current Membership in Professional Organizations:**

American Society of Engineering Education

7) **Honors and Awards:**

Richard W. Fish Teaching Excellence Award – 2010
Don Eden Service Award, San Francisco State University – 2004
H. O. Fuchs Memorial Award – SAE – 1990
Tau Beta Pi – 1983, Pi Tau Sigma - 1983

8) **Service Activities:**

CMA Library Committee, Academic Technology Committee, Homecoming Committee, Executive Committee of the Academic Senate

9) **Publications and Presentations:**

Refereed Journals

Sheppard, S.D., Strange, M.E., “Fatigue Life Estimation in Resistance Spot Welds: Initiation and Early Growth Phase,” *Fatigue and Fracture of Engineering. Materials & Structures*, Vol. 15, No.6, 1992, 531-549

Conference Proceedings

Sheppard, S.D., Strange, M.E., “Structural Stress Estimation in Resistance Spot Welds,” Proceedings from the Sixth Annual North American Welding Research Conference: Design and Fitness for Service of Welded Structures, Oct. 8-10, 1990, Columbus, OH

Sheppard, S.D., Schoepfel, A., Strange, M.E., “Enhanced Fatigue Performance of Resistance Spot Welds,” Sheet Metal Welding Conference IV Proceedings, Oct. 10-12, 1990, Detroit, MI

Sheppard, S.D., Schoepfel, A., Strange, M.E., “Controlled Quenching for Improved Fatigue Performance of Resistance Spot Welds,” ASME Winter Annual, Nov. 25-30, 1990, Dallas, TX

Sheppard, S.D., Strange, M.E., “Total Fatigue Life Estimation in Resistance Spot Welds,” Proceedings for the Seventh Annual North American Welding Research Conference: Total Quality Welding, Oct. 2-4, 1991, Columbus, OH

Invited Presentations

Strange, M.E., “Improved Fatigue Performance of Resistance Spot Welds”, Henry Fuchs Memorial Lecture, SAE Fatigue Design and Evaluation Committee Meeting, April 2-3, 1990, Pittsburgh, PA

Strange, M.E., “Innovation and the Engineering Design Process”, Series of Lectures, November 24-28, 2008, Hakodate National College of Technology, Hakodate City, Hokkaido, Japan.

Associated Presentations

Curran PF, Hirose S, Jamshidi R, Christensen D, Fechter R, Bratton BJ, Strange M, Harrison MR. Magnetic mini-mover procedure for pectus excavatum: Background studies, technical design, and evolution of the 3MP (Podium Presentation). October 16-20, 2009. American Academy of Pediatrics, Washington, DC.

Pichakron KO, Jelin EB, Hirose S, Curran PF, Stephenson JT, Strange M, Harrison MR. Magnamosis II: Magnetic compression anastomosis for gastrojejunostomy and jejunojejunostomy (Podium Presentation). October 16-20, 2009. American Academy of Pediatrics, Washington, DC.

Curran PF, Jamshidi R, Fechter R, Christensen D, Strange M, Harrison MR. Magnetic alteration of asymmetric pectus excavatum deformities (Poster). June 29–July 3, 2008. Pacific Association of Pediatric Surgeons, Jackson Hole, WY.

Media Credits & Appearances

Strange, M.E., Televised Interview with KTSF about announcement of closure of San Francisco State School of Engineering, San Francisco, California, February 2004.

Strange, M.E., Engineering Consultant and Content Provider, *MythBusters*, many episodes, Beyond Productions, San Francisco, California, 2006-Present.

Strange, M.E., Engineering Consultant and Presenter, *Good Question with Ken Bastida*, several episodes, KPIX, San Francisco, California, 2007-2009

10) Recent Professional Development Activities: CIEC 2013, HassTec 2013, ABET

APPENDIX C – EQUIPMENT

Engineering Technology Instructional Equipment:

Material/Mechanical Lab

- Universal tensile test machine (with electro-hydraulic control and data acquisition 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 °C 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.

Fluid/Thermal Lab

- Two wind tunnels
- Heat exchanger test stand with double pipe, shell and tube configurations
- Small gas turbine
- Conduction test stand
- Pipe flow test stand
- Internal combustion gas engine
- Data acquisition system using LabView
- Instrumentation that includes
 - Pressure transducers
 - 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 computer workstations with LABVIEW data acquisition hardware and software
- Instructor computer workstation

- Six programmable logic controller (PLC) Trainers
- TecQuipment servo trainer
- Ball and beam control trainer
- Several printed circuit trainers
- Process control liquid level trainer

Electric Circuits and Electronics Lab

- Ten student workstations plus one instructor work station each with:
 - New desktop PC with flat panel monitor
 - Tektronix TDS3102 digital LCD oscilloscope
 - HP bench top digital multi-meter
 - HP dual, 0-30V, regulated power supply
 - Function generator
- Five Hampden electric machine workstations each with:
 - DC/AC three-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
 - Three-phase synchronous machine
 - Three-phase induction motor
 - Single-phase induction motor
 - Hitachi three-phase, variable frequency drive

Power Lab

Operational Equipment:

- A combined cycle gas/steam plant
- Diesel engine generator set with SCR treatment and a gas analyzer
- Alturdyne 80 kW gas turbine
- 200 kW three-phase resistive load bank
- Southwest WindPower 200 wind turbine with three-phase resistive load and anemometer (located on the roof)
- Solar photovoltaic panel (100W) on a rotating frame with load bank
- Parabolic Solar Steam Generator

Nonoperational equipment:

- Twelve-cylinder locomotive diesel engine
- Steam turbine with reduction gear set
- Several small engines and transmissions
- One hundred kW wind turbine

Diesel Simulator

- Eight computer workstations
- Instructor's workstation
- Engine room console simulator
- Seven-generator console simulator
- Engine room "local control" simulator
- Emergency diesel generator electrical console simulator
- Shipboard electrical distribution panel simulator
- Bilge and sludge system panel simulator
- Fuel and lube oil system panel simulator

Steam Simulator

- Two steam boiler burner assembly simulators
- Marine boiler cutaway
- Marine steam plant engine operating system simulator
- Instructor's workstation
- Marine turbogenerator electrical console simulator
- Marine diesel generator electrical console simulator

Training Ship Golden Bear

Engineering Instrumentation Lab:

- Industrial instrumentation trainer for both level and flow processes
- Three analog pressure transmitter trainers
- Three analog temperature transmitter trainers
- Four pneumatic control valve trainers

Electrical Lab:

- One Hampden DC/AC three-phase variable voltage power supply
- One Hampden three-phase transformer wiring trainer
- Two Hampden motor control Trainers
- Seven motor control wiring Trainers
- Three dissectible three-phase squirrel cage motor trainers

Power Lab:

- Flash type evaporator trainer
- Sliding-bowl type centrifugal oil separator trainer
- Eight cylinder two-stroke cycle marine diesel engine cutaway for visual training
- Centrifugal pump trainer
- Six internal combustion diesel engine trainers
- Six single cylinder internal combustion Otto cycle trainers
- Pump & motor alignment trainer

- Air-end air compressor trainer
- Turbocharger trainer
- Woodward UG8 Hydraulic Governor test stand
- Vickers hydraulics system trainer

Diesel Simulator Lab:

- Three two-screen computer workstations
- Three flat-screen wall-mounted monitors

Engine Room:

- Two (2) R-5 V-16 Enterprise direct-reversing medium speed diesel engines
- Three (3) MaK six-cylinder diesel generator sets
- Three (3) York A/C chiller units
- Three (3) Hamworthy engine starting/reversing air compressors
- Drive train clutch, reduction gear set, thrust bearing, shaft bearings and seals
- Two (2) steam generators
- Emergency diesel generator and electrical controls
- Three (3) rotary ship's service air compressors

Machine Shop:

- Engine lathe
- Knee-type milling machine
- Welding station

Classrooms:

- Seven classrooms
- Computer lab
- Library

APPENDIX D – INSTITUTIONAL SUMMARY

1. The Institution

- a. California Maritime Academy (CMA)
200 Maritime Academy Drive
Vallejo, CA 94590
Name and address of the institution
- b. Rear Admiral Thomas A Cropper – President
- c. Dr. Gerald Jakubowski – Provost
- d. Dr. Nael Aly – Academic Dean
- e. Accreditation Board for Engineering and Technology, Inc., (ABET)
 - Marine Engineering Technology– Initial 1977, most recent 2006
 - Facilities Engineering Technology – Initial 1999, most recent 2006

2. Type of Control

CMA is a public university being a campus of the California State University (CSU) system. CMA is controlled by the 25 member CSU Board of Trustees and the Chancellor of the CSU.

3. Educational Unit

Both programs, Facilities Engineering Technology (FET) and Marine Engineering Technology MET are implemented by the Department of Engineering Technology (ET). Each program has a coordinator that oversees the program and reports directly to the department chairperson.

The ET department elects a chairperson through an election by members of the ET faculty. This election is executed, independently by the university-wide Academic Senate. This department chairperson is directly overseen by the Academic Dean.

The Academic Dean is directly overseen by the Provost

The Provost is directly overseen by the President

4. Academic Support Units

The academic support units consist of one school and five departments.

Dr. Graham Benton – Chairperson of Culture and Communications Department

Dr. James Burns – Dean of Sponsored Projects and Extended Learning

Mr. Peter Hayes – Chairperson of Marine Transportation Department

Dr. Timothy Lynch – Chairperson of Maritime Policy and Management Department

Dr. Donna Nincic – Director of ABS School of Maritime Policy and Management

Dr. Richard Robinson – Dean of Library

Dr. Cynthia Trevisan – Chairperson of Science and Mathematics Department

5. Non-academic Support Units

Mrs. Evelyn Andrews – Registrar

Captain Harry Bolton – Master of Training Ship Golden Bear

Dr. James Burns – Dean of Extended Learning

Mr. James Dalske – Director of Career Center

Mr. Marv Christopher – Director of Athletics

Dr. Deborrah Herbert – Dean of Students

Ms. Nicole Hill – Director of Financial Aid

Mr. Michael Kazek – Director of US Coast Guard Licensing Programs

Mr. Stephen Kreta – Vice President of Student Affairs

Dr. Vivienne McClendon – Director for Engagement, Teaching and Learning

Dr. Richard Robinson – Dean of Library

Mr. Jason Wenrick – Chief Information Officer

6. Credit Unit

The academic calendar year consists of a Fall and a Spring semester. Each semester is 15 weeks in length followed by a final examination week.

Lecture classes – One semester credit unit represents one class hour per week.

Laboratory classes – One semester credit unit represents three laboratory hours per week.

7. Tables

Table D-1a. 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 2012-2013	FT	8	4	6	0	0	19	X	X	1	X	X
	PT	0	0	0	0	0	0	X				
1 2011-2012	FT	7	4	0	1	0	13	X	X	2	X	X
	PT	0	1	0	0	1	2	X				
2 2010-2011	FT	4	0	3	0	1	8	X	X	2	X	X
	PT	0	0	0	1	0	1	X				
3 2009-2010	FT	3	3	1	1	0	8	X	X	6	X	X
	PT	0	0	0	0	1	1	X				
4 2008-2009	FT	6	1	2	2	1	12	X	X	5	X	X
	PT	1	0	0	1	0	2	X				
5 2007-2008	FT	4	2	1	0	1	8	X	X	3	X	X
	PT	0	0	2	1	1	4	X				

FT--full time
PT--part time

Table D-1b. Program Enrollment and Degree Data

Marine Engineering Technology

	Academic Year	Enrollment Year					Total Undergrad	Total Grad	Degrees Awarded			
		1st	2nd	3rd	4th	5th			Associates	Bachelors	Masters	Doctorates
Current 2012-2013	FT	46	29	20	12	7	115	X	X	25	X	X
	PT	2	3	3	1	1	10	X				
1 2011-2012	FT	27	22	12	15	6	83	X	X	32	X	X
	PT	4	6	1	2	1	14	X				
2 2010-2011	FT	29	14	19	14	5	81	X	X	22	X	X
	PT	5	6	0	2	1	12	X				
3 2009-2010	FT	23	21	13	18	1	77	X	X	35	X	X
	PT	2	1	3	2	1	9	X				
4 2008-2009	FT	25	17	17	10	7	76	X	X	22	X	X
	PT	3	0	4	1	2	10	X				
5 2007-2008	FT	18	17	11	16	7	69	X	X	31	X	X
	PT	2	3	1	1	5	0	X			X	X

FT--full time
PT--part time

Table D-2. Personnel
Engineering Technology

Year: 2012-2013

	HEAD COUNT		FTE
	FT	PT	
Administrative	0	0	0
Faculty (tenure-track)	6	0	6.0
Other Faculty (excluding student Assistants)	5	3	7.8
Student Teaching Assistants	0	0	0
Technicians/Specialists	0	0	0
Office/Clerical Employees	0	0	0
Others	0	0	0

Signature Attesting to Compliance

By signing below, I attest to the following:

That Marine Engineering Technology and Facilities Engineering Technology have 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 Technology Programs* to include the General Criteria and any applicable Program Criteria, and the *ABET Accreditation Policy and Procedure Manual*.

Dean Nael Aly

Signature

Date